2020 Hartland Local Hazard Mitigation Plan

Adopted: November 18, 2020 FEMA

Approved: December 1, 2020

CERTIFICATE OF ADOPTION
November 16, 2020
Selectboard, TOWN OF Hartland, Vermont
A RESOLUTION
ADOPTING THE Hartland, Vermont 2020 Local Hazard Mitigation Plan

WHEREAS, the Town of Hartland has historically experienced severe damage from natural hazards and it continues to be vulnerable to the effects of the hazards profiled in the **Hartland, Vermont 2020 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 Hartland has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its **Hartland, Vermont 2020 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 Hartland; and

WHEREAS, the **Plan** recommends several hazard mitigations actions (projects) that will provide mitigation for specific natural hazards that impact the Town of Hartland 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 Hartland eligible for funding to alleviate the impacts of future hazards; now therefore be it

RESOLVED by Town of Hartland Selectboard:

1. The **Hartland, Vermont 2020 Local Hazard Mitigation Plan** is hereby adopted as an official plan of the Town of Hartland;

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 WITHNESS WHEREOF, the undersigned have affixed their signature and the corporate seal of the Town of Hartland this 18 day of November 2020.

Gordon Richardson
Selectboard Chair

ATTEST
Clyde A Jenne
Town Clerk

Hartland VT Town Clerk's Office
Received for Record
November 24, 2020 at 10:00 AM
and recorded in Town Records Book 9
at Page 281
ATTEST: Clyde A Jenne
Town Clerk

U.S. Department of Homeland Security
FEMA Region I
99 High Street, Sixth Floor
Boston, MA 02110-2132

FEMA

December 7, 2020

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

Dear Ms. Smith:

As outlined in the FEMA-State Agreement for FEMA-DR-4474, 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 2020 Hartland Local Hazard Mitigation Plan and approved it effective **December 1, 2020** through **November 30, 2025** 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, and Title 44 Code of Federal Regulations (CFR) Part 201.

With this plan approval, the jurisdiction is eligible to apply to 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 I Mitigation Division for approval every five years to remain eligible for FEMA mitigation grant funding.

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 Melissa Surette at (617) 956-7559 or Melissa.Surette@fema.dhs.gov.

Sincerely,

Captain W. Russ Webster, USCG (Ret.), CEM
Regional Administrator
FEMA Region I

WRW:ms

cc: Ben Rose, Recovery and Mitigation Section Chief, VEM

CONTENTS

INTRODUCTION

Natural and human-caused hazards may affect a community at any time. They are not usually avoidable; 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 Hartland more disaster resistant.

Mitigation planning is only one of four phases of emergency management. Preparedness, response, and recovery are the other pieces of the cycle. At any one time, a community may be in more than one phase of emergency management. It is important to distinguish between these four phases, especially between mitigation and preparedness. Mitigation is often confused with preparedness, and vice versa. Below are descriptions of each of the four phases of emergency management:

- **Mitigation**: preventing future emergencies or minimizing their effects
    - Includes any activities that prevent an emergency, reduce the chance of an emergency happening, or reduce the damaging effects of unavoidable emergencies.
    - Buying flood and fire insurance for your home is a mitigation activity.
    - Mitigation activities take place before and after emergencies.
- **Preparedness**: preparing to handle an emergency
    - Includes plans or preparations made to save lives and to help response and rescue operations. Training and proper equipment are preparation
    - Evacuation plans and stocking food and water are both examples of preparedness.
    - Preparedness activities take place before an emergency occurs.
- **Response**: responding safely to an emergency
    - Includes actions taken to save lives and prevent further property damage in an emergency situation. Response is putting your preparedness plans into action.
    - Rescuing people from flooding or putting out a fire are both response activities.
    - Response activities take place during an emergency.
- **Recovery**: recovering from an emergency
    - Includes actions taken to return to a normal, preferably incorporating mitigation actions to create an even safer situation following an emergency.
    - Recovery includes getting financial assistance to help pay for the repairs.
    - Rebuilding damaged roads or providing loans to businesses are both recovery activities.
    - Recovery activities take place after an emergency.

Figure 1: The Four Phases of Emergency Management

PURPOSE OF MITIGATION PLANNING

The purpose of this Plan is to assist Hartland in identifying all hazards facing the town, ranking them, and identifying strategies reduce risks from known priority hazards.

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

The 2015 Hartland Local Hazard Mitigation Plan was the first stand-alone mitigation plan drafted for the Town. Previously, the Town had a town-specific 2011 Annex in the Regional Pre-Disaster Mitigation Plan. This Plan has been reorganized and new sections were added:

- Program eligibility subsequent to plan approval
- Authority for plan development
- Participating jurisdictions
- Funding for plan development
- Brief information about the community

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

This 2020 Plan expands upon the 2015 plan by analyzing new hazards, adding new and relevant data, and creates new mitigation actions for the Town to follow over the next five years.

In addition, for identifying hazards and ways to mitigate then in Hartland, the Plan also serves as an important financial incentive during federally declared disasters. In October 2014, the state enacted new Emergency Relief and Assistance Fund (ERAF) rules that provide additional state matching funds for federal disaster relief under FEMA's Public Assistance Program (FEMA typically requires a 25% match). To qualify, municipalities must have taken four actions: adopt updated road standards, participate in the National Flood Insurance Program (NFIP) by adopting flood hazard area regulations, annually adopt a local emergency management plan, and have a local Hazard Mitigation Plan approved by FEMA. Under ERAF, there is a financial incentive that allows the town to lessen their financial burden during federally declared disasters. By having taken these four basic actions, the state will contribute

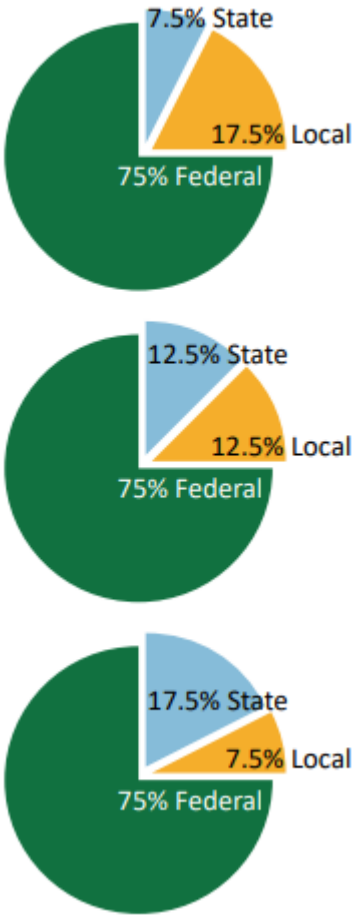


Figure 2: Different Levels of ERAF

half (12.5%) of the 25% match on federal disasters.

A fifth incentive that not many communities in Vermont take advantage of is to adopt either a River Corridor bylaw or participate in the Community Rating System (CRS). River Corridor bylaws regulate lands mapped by the State of Vermont that are usually beyond the FEMA-mapped flood zone, with the concern being erosion that can undermine structures. CRS is a complicated administrative process with a simple premise – that taking additional flood prevention steps will lessen flood damages. Communities in the CRS enjoy lower flood insurance rates.

Having either of the fifth actions will lower the financial burden under the ERAF rule to only a 7.5% match for the town. At the time of this writing, the town is financially responsible for 17.5% on the dollar in federally declared disasters due to the expiration of the local hazard mitigation plan. Every percent saved in a million-dollar disaster is $10,000.

Separately, in 2014, state planning law (24 V.S.A. Chapter 117) required that all updated municipal comprehensive plans must include a "flood resilience" element, addressing both flooding and fluvial erosion hazards. This requirement was met with the adoption of Hartland's Town Plan on May 15, 2017. The flood resilience section references and incorporates material from the 2015 adopted and FEMA-approved hazard mitigation plan.

COMMUNITY PROFILE

The Town of Hartland, located in Windsor County, in the Eastern-Central section of the State on the Connecticut River bordering the State of New Hampshire, has an area of 28,544 acres, or 44 square miles and a population of 3,483 (2013 - 2018 American Community Survey 5-Year Estimates). Hartland has two villages that are State Designated Villages, Hartland 3-Corners and 4-Corners. Both are on VT Route 12.

Highways U.S. Route 4, U.S. Route 5, VT Route 12 and Interstate 91, provide the major highway access to the Town. Railroads passing through the town are Amtrak and New England Railroads.

The town has a volunteer fire department. Fire station 1 is located on Route 12, Hartland. Station 2 is located on Clay Hill Road, North Hartland. The Fire Department has mutual aid agreements with Upper Valley Mutual Aid and the Upper Valley Regional Emergency Services Association (U.V.R.E.S.A.), which include 12 towns in New Hampshire, 10 towns in Vermont, and the VA Hospital in Hartford. Mutual Aid assistance is intended to supplement rather than replace local efforts.

Law enforcement is handled by a Town Constable and the State Police with headquarters in Royalton. Hartford Dispatch and Rockingham State Police Barracks provide dispatching services.

The town Highway Maintenance garage is located on VT Route 12 and is responsible for 75 miles of highways within the Town. The State Highway district garage is located in White River Junction on Beswick Drive.

There is one elementary school, one nursery school, and one day care facility in Hartland. School buses transport the public elementary school students. The town has experienced population growth over the last 10 years due to the influence of Hanover, Lebanon and White River Junction.

Primary industries in town are North Hartland Tool Corporation, D&D Gravel/Excavating, and Britton Lumber.

The nearest hospitals are the Mt. Ascutney Hospital, located in Windsor; VA Medical Center, in White River Junction; Dartmouth-Hitchcock Medical Center, Lebanon, N.H.; Alice Peck Day, Lebanon, N.H.; and, Valley Regional Hospital, Claremont, N.H.

The US Army Corps of Engineers North Hartland Lake flood control property extends from the North Hartland Dam in a rural residential area of Hartland to the heavily-visited Quechee Gorge, the new Visitor Center and the State Park area in Hartford. Many homes in Hartland are located close to brooks. Lull's Brook flows through two of the town's densely developed village areas, Three Corners and Four Corners. As noted previously, much development in town has followed the logical path provided by the brooks and so many homes are located close to these streambanks. It is recognized that the interests of property owners in expanding or redeveloping these residences must be balanced with the need to prevent further water quality degradation.

The FEMA Flood Insurance Rate Maps for Hartland identified floodplain areas along McArthur Brook, the Connecticut River, the Ottauquechee River and its tributaries, Lull's Brook and its tributaries including Alder Meadow Brook, and portions of Babcock Brook along Route 12. These mapped floodplains cover only a small portion of the land area of Hartland. The lands surrounding the Army Corps of Engineers North Hartland Lake are controlled by the ACOE as part of the flood control dam project.

THE PLANNING PROCESS

Plan Developers

The Town of Hartland procured the Two Rivers-Ottauquechee Regional Commission (TRORC) to assist with updating the 2015 Hazard Mitigation Plan. Tory Littlefield, Regional Planner, was the main staff person from TRORC that assisted the town. In conjunction with Dave Ormiston, Town Manager of Hartland, the following community members were enlisted to be the steering committee for this Plan update:

- John Sanders, Hartland Fire Chief
- Chet Pasho, Hartland Fire Department
- Alan Beebe, Hartland Rescue Squad
- Mike Howe, Hartland Elementary School
- Tom Ripley, Aging in Hartland
- Nancy Tusinski, Hartland Public Library Director
- James Dow, Hartland Constable
- Rob Anderegg, Hartland Conservation Commission Chair
- Bill Barrow, Highway Road Foreman
- Sarah Wood, Conservation Commission
- Mary O'Brien, Selectboard

Plan Development Process

The 2011 Hartland Annex was originally part of the 2008 multi-jurisdictional Regional Hazard Mitigation Plan, drafted by TRORC, and approved by FEMA on September 30, 2008 with its first local annex. The Hartland Annex received subsequent FEMA approval, but since it was part of a larger plan, FEMA treats its start date as September 30, 2008 and so the Hartland Annex expired on September 30, 2013.

This Plan was reconstructed in 2015 (FEMA Approved August 4, 2015) as a single jurisdiction, standalone Hartland Local Hazard Mitigation Plan. As such, several sections were added or updated to include all necessary information.

The 2015 Plan provided a good base for the 2020 Plan update. Below, you can find the summary of changes and of the planning process for the 2015

Plan, and a thorough description of the changes and planning process for the 2020 Plan.

SUMMARY OF 2015 CHANGES AND ADDITIONS

New sections were added to discuss the plan development process, mitigation strategies, existing hazard mitigation programs, projects and activities, and plan maintenance. Data updates were made to relevant sections, and hazards were reevaluated with a hazard ranking system used by Vermont Emergency Management (then the Vermont Division of Emergency Management and Homeland Security).

The top hazards that was identified by the Town, and was analyzed in great detail in the Plan, were; hazardous materials spills, severe weather, landslides/mudslides/rockslides, structural fire, and wildfire. A previous top hazard from the 2008 Annex and were removed for the 2015 Plan included extreme cold/snow/ice storms. For each new hazard, a location/vulnerability/extent/impact/likelihood table was been added to summarize the hazard description. Additionally, maps were added to the 2015 Plan depicting critical facilities, town infrastructure, and the NFIP designated floodway and 100-year floodplain.

SUMMARY OF 2015 PLANNING PROCESS

Three meetings were held with committee members on June 2, 2014, September 8, 2014, and November 5, 2014. An informational meeting was held on February 3, 2015 with the Hartland Selectboard to inform residents on the final draft of the Plan. Notices for these meetings were posted in The Valley News, Herald of Randolph, Journal Opinion, Vermont Standard, on the Hartland town website, the TRORC newsletter, and in other relevant local distribution areas in hopes to achieve the maximum amount of public participation possible.

Feedback was sought from outside organizations separate from the committee to include the Hartland Selectboard, Planning Commission, Army Corps of Engineers, Northwest Regional Planning Commission, and the Division of Emergency Management and Homeland Security (now Vermont Emergency Management).

2020 PLAN CHANGES

While the 2015 Hartland Plan provided a good basis for the 2020 Plan, there were several sections that needed updates based on public meetings. Below is a list of significant changes made to this Plan:

- **General**
  - Data updates: new hazard incidents, new federal emergency declarations, and census data,
  - Reevaluation of hazards using a hazard ranking system.
  - Maps were updated to reflect new state data layers.
- **Hazard Analysis**
  - Based on a hazard ranking exercise conducted on a public meeting held on May 6, 2020, the following hazards were identified as being the top hazards in Hartland; flash flood/floods/fluvial erosion, extreme cold/snow/ice, hazardous materials spill, severe wind, and fire hazards (to include structure and wildfire/brushfires). Each hazard is thoroughly analyzed for the Town of Hartland to include

location, vulnerability, extent, impact, and likelihood.
    - Top hazards from the 2015 Plan that were removed for the 2020 Plan include; severe weather and landslides/mudslides/rockslides.
    - The 2015 Plan separately analyzed structural fires and wildfires, but the committee wished to do an all-encompassing section on fire hazards.
- **Mitigation Strategies**
    - A public meeting was held on June 16, 2020 with the committee and members of the public to develop mitigation strategies for this 2020 plan.
    - Mitigation strategies related to severe weather and landslides/mudslides/rockslides were removed, and new strategies for flash flood/floods/fluvial erosion and extreme cold/snow/ice were created.
    - Mitigation strategies that were completed since the 2015 plan were removed and added into a new table that shows what was accomplished since the last plan was adopted.

2020 PLANNING PROCESS

The 2015 Plan process was an immersive process taken on by the committee and TRORC since it acted as an entirely new Plan (as it was an annex before). For the 2020 Plan, a similarly immersive process was conducted with the committee to gather as much public feedback as possible. Below is a thorough description of each public meeting that was held for this iteration of the Plan.

- **May 6, 2020**
    - Summary: A public meeting was notified and held on ZOOM due to the COVID-19 situation. There was a total of 18 participants. This meeting acted as a kick-off meeting to explain what a hazard mitigation is as

Figure 3: A picture of the ZOOM meeting attendees for the May 6, 2020 meeting.

Figure 4: The flyer that was distributed for the first public meeting.

well as to conduct the hazard ranking exercise.
    - Major outcomes: Other than the committee, several members of the public and other town officials learned what a hazard mitigation plan is and how important it is for a town to have a mitigation plan. Five major hazards were then selected based on the ranking exercise. These hazards will be the main focus of the Plan.
    - Notifications: A flyer was created and posted on the TRORC website, Town of Hartland website, in physical locations around town, and sent to the Hartland listserv.
- **June 16, 2020**
    - Summary: A public meeting was notified and held virtually. There was a total of 11 participants that included members of the committee and the public. A summary of mitigation planning was discussed for any new people to the process, and then the group went through past mitigation actions and created new mitigation actions.
    - Major outcomes: The group went through the 2015 mitigation actions and determined which ones were completed and which were not. New mitigation actions were created for new hazards (Severe Wind and Extreme Cold). Much of the discussion surrounded vulnerable populations and how to contact them.
    - Notifications: A flyer was created and posted on the TRORC website, Town of Hartland website, in physical locations around town, and sent to the Hartland listserv.
- August 31, 2020
    - Summary: A public meeting was notified and held virtually to go over the draft of the Plan. In total there were five participants, all were members of the committee with no members of the public present.
    - Major outcomes: The final draft of the Plan was reviewed with some minor edits made by committee members.
    - Notifications: Notices were placed in the Valley News, on the Hartland town website, Hartland listserv, and the TRORC website.

A final draft of the Hartland Mitigation Plan was sent to surrounding communities via email on September 8, 2020 to ask for feedback. Feedback was due via email to TRORC on September 17, 2020. No comments on the draft plan were received.

Status Update on Mitigation Actions Identified in 2015

The following table outlines the mitigation actions that were proposed in Hartland's 2015 Hazard Mitigation Plan for the Town of Hartland.

Participants in the new Plan update process reviewed these actions and reported on the status of each (in order of 2011 priority). Actions related to long-term mitigation of natural hazards are so noted.

Hazard(s) Mitigated	Mitigation and Preparedness Actions	Local Leadership	Prioritization	Possible Resources*	Time Frame	Completed?
All Hazards	*Ensure that Hartland's Local Emergency Operations Plan (LEOP) is kept up-to-date and identifies vulnerable areas and references this Plan.*	Town Manager	High	Local resources; TRORC; Vermont DEMHS	1 year after date of Plan Approval	Yes
	Develop a methodology the Town can use for consistently documenting infrastructure damage after weather events. (Mitigation and Preparedness)	Road Foreman	High	Local resources; TRORC	1 year after date of Plan Approval	No
	Meet with Vermont DEMHS regarding setting up VT Alert in Hartland.	Selectboard/ Town Manager	Medium	Local resources; Vermont DEMHS	2 years after date of Plan Approval	No
Structural Fire	*Ensure that fire department personnel maintain their Firefighter certifications.*	Hartland Volunteer Fire Department	High	Local resources (FD); VT Fire Academy; mutual aid departments	1 year after date of Plan Approval	Yes
	Conduct a public education program on fire prevention at the three schools in Hartland.	Hartland Volunteer Fire Department	High	Local resources (FD); small prevention budget; mutual aid departments	1 year after date of Plan Approval	Annually at Elementary School, Four Corners Daycare, Hartland Cooperative Nursery School

Hazard(s) Mitigated	Mitigation and Preparedness Actions	Local Leadership	Prioritization	Possible Resources*	Time Frame	Completed?
	Develop a pre-plan program for significant structures in the Town of Hartland. For each significant structure, develop a pre-fire plan and tour the structure to familiarize FD members with the layout of the structure.	Hartland Volunteer Fire Department	Medium	Local resources (FD)	2-4 years after date of Plan Approval	Ongoing
Hazardous Material Spill	*Ensure that all emergency response and management personnel continue to receive HAZMAT Awareness training at a minimum.*	Hartland Volunteer Fire Department	High	Local resources (FD)	1 year after date of Plan Approval	Yes, every winter
	Continuously stock gear to help contain small spills when they occur (booms, absorbent materials, etc.).	Hartland Volunteer Fire Department	High	Local resources (FD)	1 year after date of Plan Approval	Yes, work with Ascutney Fire Department
Wildfire/ Brushfire	*Seek funding to draft a Community Wildfire Protection Plan (assesses and maps the community wildfire risk, discusses the ability to respond and recommends actions to reduce wildfire risk). (Mitigation)*	Hartland Planning Commission/ Town Manager	Low (new)	Local resources; Vermont Rural Protection Task Fore	4-5 years after date of Plan Approval	No
	Develop a public education program to educate residents about wildfire/brushfire risks and how to minimize the occurrence of wildfire/brushfire. (Mitigation)	Hartland Volunteer Fire Department	Medium (new)	Local resources (FD)	2 years after date of Plan Approval	Not done, plead with them at Town Meeting to get burn permit, listserv posting when high hazard conditions

Hazard(s) Mitigated	Mitigation and Preparedness Actions	Local Leadership	Prioritization	Possible Resources*	Time Frame	Completed?
	Develop a program to receive training and practice using brushfire/forestry equipment.	Hartland Volunteer Fire Department	High	Local resources (FD)	1 year after date of Plan Approval	Part of Fire Fighter 1 curriculum
	Complete a comprehensive survey of potential dry hydrant sites to determine the need for additional sites and potential location, and install dry hydrants. (Mitigation)	Hartland Volunteer Fire Department	Low (new)	Local resources (FD)	4-5 years after date of Plan Approval	14 hydrants in Hartland, state of maintenance at this point, have a good strategy in place
Landslides/ Mudslides/ Rockslides	*Complete an inventory of locations where critical facilities, buildings, and infrastructure are vulnerable to landslides/ mudslides/ rockslide, and map them. (Mitigation)*	Town Manager/Road Foreman	Medium (new)	Local resources; TRORC	2-4 years after date of Plan Approval	No
	Seek funding to fix the landslide issues on Densmore Hill Road. (Mitigation)	Town Manager	Medium (new)	Local resources; state resources; HMGP	2-4 years after date of Plan Approval	No
	Encourage and support floodplain restoration and bank stabilization projects, including willow and tree plantings on the C. Jones property, on a site that is town-owned and around a replaced snowmobile bridge next to the Hartland fire station. (Mitigation)	Town Manager	Medium (new)	Local resources; Ecosystem Restoration Program grants; Trout Unlimited	2-4 years after date of Plan Approval	Yes
Severe Weather	*Complete an up-to-date geo-referenced culvert inventory.*	Road Foreman	High	Local resources; TRORC; HUD CDBG-DR grant	1 year after date of Plan Approval	Yes

Hazard(s) Mitigated	Mitigation and Preparedness Actions	Local Leadership	Prioritization	Possible Resources*	Time Frame	Completed?
	Develop a program to regularly inspect and maintain town bridges and culverts; and develop a schedule to replace undersized culverts. (Mitigation)	Road Foreman	High (1st priority of 4 natural hazard mitigation projects in 2011 Plan)	Local resources; TRORC; HUD CDBG-DR grant	1 year after date of Plan Approval	Yes, on Culverts, No on Bridges.
Severe Weather	*Review Vermont ANR's river corridor maps and regulation requirements during the update process of the Town Plan and incorporate supportive language in the Town Plan.*	Planning Commission/ Town Manager/ Selectboard	Low (2nd priority of 4 natural hazard mitigation projects in 2011 Plan)	Local resources; TRORC; Vermont ANR	3-5 years after date of Plan Approval	It appears that this is a yes.
	Clear and maintain town road rights-of-way, and work with local utilities to request that utility corridors are cleared and maintained, as needed. (Mitigation)	Road Foreman	High priority for dangerous trees (5th priority of 4 natural hazard mitigation projects in 2011 Plan)	Local resources	1 year after date of Plan Approval	GMP appears to be doing this on their own.
	Replace a 3'x4' stone culvert on Densmore Hill Road with a 6'x12' culvert. This culvert was damaged in the 07/03/2013 rain event. (Mitigation)	Town Manager/Road Foreman	Medium (new)	Local resources; Vermont Structures grant; FEMA HMGP	2-4 years after date of Plan Approval	Yes
	Replace severely undersized stone culvert at 2 Mace Hill Road to an appropriately sized structure (a hydraulic study has not yet been completed). (Mitigation)	Town Manager/Road Foreman	Medium (new)	Local resources; Vermont Structures grant; FEMA HMGP	2-4 years after date of Plan Approval	In progress
	Identify frequently flooded roads and bridges. (Mitigation)	Road Foreman and Town Manager	Medium (3rd priority of 4 natural hazard mitigation projects in 2011 Plan)	Local resources	2-3 year after date of Plan Approval	No

CHANGES IN TOWN PRIORITIES AND VULNERABILITIES SINCE THE 2015 PLAN

This 2020 Local Hazard Mitigation Plan reflects the evolution of the Town's priorities since 2015. A major change to this 2020 plan includes the removal of two 'top hazards' from the 2015 plan and the addition of two new 'top hazards' for the 2020 plan. Severe weather was removed because the committee felt that it was too broad of a hazard to try to discuss and that being more specific was better to develop mitigation strategies. The other top hazard that was removed for this iteration was landslides/mudslides/rockslides. The committee was not sure why this hazard was first identified as being so important that it was included in the first place, so it was removed to include hazards that are more pressing for the town to address at this time.

The two new 'top hazards' that are included in this 2020 plan include flash flooding/floods/fluvial erosion and severe wind. These two hazards were not originally included in the 2015 Plan, so the committee thought that they were more relevant for the town to address in this iteration. With these two additions, new mitigation strategies were developed.

STATUS OF DEVELOPMENT IN HARTLAND

There has been a consistent number of new single-family homes being built throughout Hartland. In the Spring of 2019, the town saw upwards of 50 housing sites that were either new or being renovated. Since Hartland does not have a zoning bylaw, there is no accurate way to track new development unless it is through new wastewater or well water permits issued by the State of Vermont or if a homeowner is reappraising their property. Currently, the Town of Hartland is working to adopt a building permit ordinance that would require new construction in Hartland to obtain a permit.

One development that was a threat to Hartland was a new gas station at Exit 9 of I-89. Court proceedings stopped this development from occurring and the town put the land in conservation with the Upper Valley Land Trust. However, large scale housing projects, although not an immediate threat, is possible in Hartland. Since Hartland does not have an adopted zoning bylaw, the town relies on Act 250 to mitigate sighting concerns in and around hazard areas. Although the gas station project has now gone away, Hartland is anticipating that the U.S. Route 5 area around the Interstate could continue to see larger development pressures. But right now, the majority of development in Hartland is the construction of single-family homes along the back roads of Hartland where there are many hillside streams.

Depending on the location, new development in the Town of Hartland may be vulnerable to flood or fluvial erosion hazards or to landslides, mudslides, or rockslides. The Town's Flood Hazard Area Regulations regulate new development within the Special Flood Hazard Area, which would 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 Area Regulations may not protect new development from fluvial erosion hazards. Some of the areas vulnerable to flood hazards within the Town of Hartland are also vulnerable to landslides, mudslides and rockslides. Areas with steep slopes and/or unanchored or exposed soils may also be vulnerable.

Even though there is a Flood Hazard Area Bylaw, there is no concrete way to enforce it. The enforcement of the bylaw falls to the Town Manager. The Town Manager position is occupied with other things so there is no town staff person that is able to watch for any development in the flood hazard areas.

Existing Hazard Mitigation Programs, Projects & Activities

The Town of Hartland 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 and adoption of Hartland's Local Emergency Management Plan (LEMP). Last updated and approved on 4/20/2020.	Staff time from the Town Manager; assistance from TRORC. Funding from VEM.	Current program works well, no need to expand or improve on.
	Program— Participation in the Local Emergency Planning Committee Districts 3 and 12 (LEPC 3 and 12).	Volunteer time from Fire Department members; TRORC convenes LEPC12 meetings. SWCRPC convenes LEPC3 meetings. Funding from State Emergency Response Committee.	No need to expand or improve on attendance, as it is satisfactory.
	Program— Inclusion in the Orange and Windsor Counties Public Works Emergency/Non-Emergency Mutual Aid group, which serves as a compact to provide a framework through which nine municipalities give and receive mutual aid	Staff time from the Town Manager. Volunteer time from Hartland Volunteer Fire Department members. Funding from local sources (town and/or fire department budgets).	This program is ongoing, and there is no need to expand or improve upon it as it is currently satisfactory.
Insurance Programs	Authority/ Program—participation in National Flood Insurance Program (NFIP)	The Hartland Town Manager serves as the NFIP Administrator. Assistance from TRORC and Vermont ANR. Funding from local resources—annual budget.	Hartland's initial Flood Hazard Boundary Map was identified on 12/24/76. The Town's initial Flood Insurance Rate Map (FIRM) was dated 6/15/88. The Town's FIRM has been updated, and the current effective map date is 9/28/07. This bylaw regulates new construction in the Special Flood Hazard Area. The Town continues its participation in the NFIP by administering and enforcing its flood hazard bylaw, which was last updated and adopted on 09/04/2007.

Land Use Planning	Policy/Program—Hartland Town Plan Adopted on 05/15/2017. The Plan update was informed by the 2016 Local Hazard Mitigation Plan.	Volunteer time from Planning Commission, and assistance from TRORC and other state agencies on specific subject matter. Funding from Municipal Planning Grants and local resources.	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 statue.
	Completed Authority— Hartland Flood Hazard Area Regulations Adopted on 09/04/2007	Volunteer time from the Planning Commission, and assistance from TRORC and possibly Vermont ANR. Funding from Municipal Planning Grants.	During the Town Plan review/update period, these Regulations are also reviewed and updated if needed. At this time, local officials believe the flood regulations are satisfactory.
Hazard Control & Protection of Critical Infrastructure & Facilities	Policy/Program— Hartland Hazard Mitigation Plan Adopted on 8/4/2015.	Volunteer time from Town officials; assistance from TRORC and VEM. Funding from FEMA and local resources.	The 2020 Hartland Local Hazard Mitigation Plan will replace the 2015Plan. The 2020 LHMP has evolved from the 2015 Plan and has greatly expanded and improved upon it. Future iterations of the Town's LHMP will be updated by the Town at least every five years.
	2015 Culvert Inventory This culvert inventory included georeferenced locations for all Hartland culverts and recommendations for culvert upgrades to reduce vulnerabilities to flooding.	Personnel time from Town Road Commissioner/Foreman; assistance from TRORC. Funding from Better Roads grant/CDBG-DR monies; local personnel time and funding.	The Town will use the culvert inventory to further its culvert improvement program by helping to prioritize culvert upgrade projects. The Town will keep the culvert inventory up-to-date on a routine basis. Previously, the Town completed a culvert inventory in 2012 with assistance from TRORC.
	2020 Road Erosion Inventory This Road Erosion Inventory (REI) will provide the town a list of road segments that are the most vulnerable to fluvial erosion as well as an improvement plan for this road segments to lessen erosion.	Personnel time from Town Road Commissioner/Foreman; assistance from TRORC. Funding from Better Roads grants and local resources.	The Town will use this REI to further its culvert and road improvement program by helping to prioritize culvert and ditching upgrade projects. The Town will keep the REI inventory up-to-date on a five-year basis. This will be the first time Hartland has a completed REI to comply with the Municipal Roads General Permit (MRGP).
	Hartland Roads Commission – Roads Asset Management Plan This Plan identifies what is important, sets expectations for timelines, establishes the importance of a maintenance plan, and includes capital costs for planned road work.	Personnel time from the Hartland Roads Commission, Town Manager, Selectboard, and Road Foreman.	The Town will use this asset management plan to prioritize road repairs and maintenance to mitigate against damage by natural occurrences. The Hartland Selectboard and Town Manager will monitor the implementation of this plan.
Education/ Public Outreach	Ongoing Action— Emergency Shelter information is posted on the Town's website	Staff time from the Town Manager/other town staff. Funding from local sources—town budget.	This is an ongoing action, and town officials believe there is no need to expand or improve on this action at this time.

	Ongoing Program— Distribution of structure fire/emergency preparedness pamphlets	Volunteer time from the Hartland Volunteer Fire Department, and staff time for the Town Manager/other town staff members. Funding from the Hartland Volunteer Fire Department's prevention budget.	This is an ongoing action, and town officials believe the education program is adequately meeting expectations.

Plan Maintenance

This Plan will be updated and evaluated annually, by discussing its effectiveness and making note to incorporate any necessary revisions in the update process, at a March or April Selectboard meeting, along with the review of their Local Emergency Management Plan (LEMP). At this meeting, the Selectboard, along with the Town Manager, will monitor the implementation of the hazard mitigation strategies outlined in this Plan, by noting those that have been completed, are in the process of completion, or any issues with initiating the activity. Any 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, and the comments will be incorporated when relevant.

Updates and evaluation of this Plan by the Selectboard and the local Emergency Coordinator/Director will also occur within three months after every federal disaster declaration directly impacting the Town of Hartland. The Town will monitor, evaluate and update this Local Hazard Mitigation Plan at a March or April Selectboard meeting and after every federally declared disaster directly impacting the Town. 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). For this next Plan update, the Two Rivers-Ottauquechee Regional Commission (TRORC) will help with Plan updates if assistance is requested by the Town of Hartland and if funding is available. If TRORC is unable to assist the Town, then Hartland's Town Manager, Administrative Assistant, or Selectboard will update the Plan, or the Selectboard may appoint a committee of interested citizens (including the current local Emergency Coordinator/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, notice within the municipal building, and notice in The Valley News and the TRORC newsletter/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 should be invited to the meeting; these include: UV Mutual Aid, the Army Corps. of Engineers, and the Vermont Agency of Natural Resources (VT ANR). VT ANR will be invited

because they can provide assistance with NFIP outreach activities in the community, models for stricter floodplain zoning regulations, delineation of fluvial erosion hazard areas, and other applicable initiatives. These efforts will be coordinated by the Town Manager.

Updates may include changes in community mitigation strategies; new town bylaws, zoning and planning strategies; 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.

Hartland shall also incorporate mitigation planning into their long-term land use and development planning documents. The 2013 Vermont Legislature passed a law requiring all towns to incorporate flood resiliency elements into their town plans as of July 2014. To do so, flood hazard and fluvial erosion hazards will be identified, and strategies and recommendations will be provided to mitigate risks to public safety, critical infrastructure, historic structures and public investments. This Local Hazard Mitigation Plan assisted the Town when the Town Plan was updated and adopted in 2017 when a new flood resilience element was added.

It is also recommended that the process work both ways and the Town review and incorporate elements of the Local Hazard Mitigation Plan into updates for the municipal plan, zoning regulations, and flood hazard/ fluvial erosion hazards (FEH) bylaws. The incorporation of the goals and strategies listed in the Local Hazard Mitigation Plan into the municipal plan, zoning regulations and flood hazard/FEH 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.

COMMUNITY VULNERABILITY BY HAZARD

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?
- 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 Hartland 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 Hartland, 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 Hartland 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 hold. 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.

The following table reflects the hazards that we believe can be expected, or are at least possible, in the central Vermont area. In the 2020 Plan, it was decided to model the hazard ranking off of the 2018 Vermont State Hazard Mitigation Plan to simplify the process. The table below shows the ranking criteria that was used.

Hazard Assessment Ranking Criteria		
	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: ,1% probability of occurrence per year	Negligible: isolated occurrences of minor property and environmental damage, potential for minor injuries, minor economic disruption.
2	Occasionally: 1-10% 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: >10% by <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% probability in a year	Major: severe property and environmental damage on a community or regional scale, multiple injuries or fatalities, significant economic impact

Using this ranking criteria, the table on the next page shows a list of hazards that may affect Hartland in the future, along with their ranking on which hazards are most likely to be severe. Out of this table, a list of five hazards that are believed to be the worst threats (bolded in the table, below) are then followed-up with discussion and

mitigation strategies throughout the rest of this Plan.[1] In this iteration of the Plan, several new hazards were added to the table, these included: pandemic, invasive species, the Emerald Ash Borer, and Extreme Heat. It was decided to remove the term 'Severe Weather' from the table in this 2020 Plan. The committee felt that Severe Weather was too broad of a term, and thought that each description of Severe Weather would be better off parsed out in the table instead of grouping them all together. It should be noted that hazards assigned with the same "Hazard Score" are not in order and their placement in the table should not be assumed to reflect their potential to create hazards for the town.

Hazard Assessment							
Hazards	Probability	Potential Impact					Score
		Infrastructure	Life	Economy	Environment	Average	
Flash Flood/Floods/Fluvial Erosion	**4**	**4**	**3**	**3**	**3**	**3.25**	**13**
Emerald Ash Borer (EAB)	3	4	1	3	4	3	9
Invasive Species (Other than EAB)	4	2	1	2	4	2.25	9
Extreme Heat	4	2	4	2	3	2.75	11
Epidemic	2	2	4	4	1	2.75	5.5
Extreme Cold/ Snow/ Ice	**4**	**3**	**2**	**2**	**3**	**2.5**	**10**
Hazardous Materials Spill	**4**	**4**	**1**	**1**	**4**	**2.5**	**10**
Severe Wind	**4**	**4**	**1**	**3**	**2**	**2.5**	**10**
Fire Hazards (Structure and Wildlife/Brushfire)	**4**	**3**	**2**	**2**	**3**	**2.5**	**10**
Landslides/ Mudslides/ Rockslides	2	4	3	3	4	3.5	7
Lightning	4	2	2	4	2	2.5	10
Hail Storms	3	4	1	1	2	2	6
Ice Jams	3	4	2	3	3	3	9
Earthquake	2	1	1	1	1	1	2
Dam Failure	2	4	4	4	4	4	8
Hurricane/ Tropical Storms	3	4	2	4	4	3.5	10.5
Water Supply Contamination (Private and Public Sources)	2	4	3	3	4	3.5	7
Tornado	1	4	3	2	3	3	3

[1] It's important to note that those hazards which were not found to pose the greatest threats may still occur in Hartland's future; however, they are not the focus of this Plan.

Federal Disaster Declarations: Windsor County (1969-2020)

Disaster Number	Date	Incident Type	Description
277	8/30/1969	Flood	SEVERE STORMS, FLOODING
397	7/6/1973	Flood	SEVERE STORMS, FLOODING, LANDSLIDES
518	8/5/1976	Flood	SEVERE STORMS, HIGH WINDS, FLOODING
938	3/18/1992	Flood	HEAVY RAINS, ICE JAMS, FLOODING
1101	2/13/1996	Flood	ICE JAMS, FLOODING
1201	1/15/1998	Severe Storm(s)	SEVERE ICE STORMS, RAIN, HIGH WINDS, FLOODING
1228	6/30/1998	Severe Storm(s)	SEVERE STORMS, FLOODING
1307	11/10/1999	Severe Storm(s)	TROPICAL STORM FLOYD
1336	7/27/2000	Severe Storm(s)	SEVERE STORMS, FLOODING
1488	9/12/2003	Severe Storm(s)	SEVERE STORMS, FLOODING
1698	5/4/2007	Severe Storm(s)	SEVERE STORMS, FLOODING
1715	8/3/2007	Severe Storm(s)	SEVERE STORMS, FLOODING
1790	9/12/2008	Severe Storm(s)	SEVERE STORMS, FLOODING
4022	9/1/2011	Hurricane	TROPICAL STORM IRENE
4140	8/2/2013	Flood	SEVERE STORMS AND FLOODING
4207	2/3/2015	Severe Storm(s)	SEVERE WINTER STORM
4330	8/16/2017	Flood	SEVERE STORMS, FLOODING
4445	6/14/2019	Flood	SEVERE STORMS, FLOODING
4532	4/8/2020	Pandemic	PANDEMIC

Source: FEMA.

Tsunami (Vermont is landlocked)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Volcano (Vermont has no active volcanoes)	N/A	N/A	N/A	N/A	N/A	N/A	N/A

The Hartland LHMP committee discussed the results of the hazard ranking activity and decided to focus on hazards that had the potential to impact the Town on a town-wide scale and had the potential to occur frequently

After engaging in discussions using their best available knowledge, the Town of Hartland identified the following "top hazards" (based on frequency of occurrence and potential impact and the need for further analysis) which they believe their community is most vulnerable to:

- Flash Flood / Floods / Fluvial Erosion
- Extreme Cold / Snow / Ice
- Hazardous Materials Spill
- Severe Wind
- Fire Hazards (Structure and Wildlife / Brushfire)

Each of these "top hazards" will be discussed in the proceeding sections. Data for these hazards were gathered from several federal resources, and are often only available at the county level. As such, information specific to Windsor County was used to identify and evaluate the type, frequency and relative impact of past events within the larger Hartland region, which could therefore be expected to affect the community in the future.

According to FEMA, there were nineteen federally-declared major disasters for Windsor County between 1969 and 2020 – averaging about one every three years – though not all impacted Hartland directly. As indicated in Federal Disasters Declaration table, the majority of declared disasters was due to flooding or other types of severe storms. Most recently, and one that has never before been declared for, was the pandemic COVID-19 (or coronavirus).

The National Oceanic and Atmospheric Administration (NOAA) compiles storm events data, dating from 1950 to present. For the purposes of this HMP, storm events from 2000 and onward were analyzed. These cover "regional" weather events for the larger Windsor County area (National Weather Service Forecast Zone) for periods of cold/wind chill, extreme cold/ wind chill, flash flood, flood, frost/freeze, hail, heat, heavy snow, high wind, strong wind, thunderstorm wind, winter storm, and winter weather. Over this 20-year reporting period, 246 reported regional storm events (averaging around 12 per year) were catalogued – including eleven events specific to Hartland. In some cases, several events are reported for the same storm system. Database entries also include more general estimates of related property and crop damage – totaling $5 million over this twenty-year period.

As expected, the majority of recorded regional

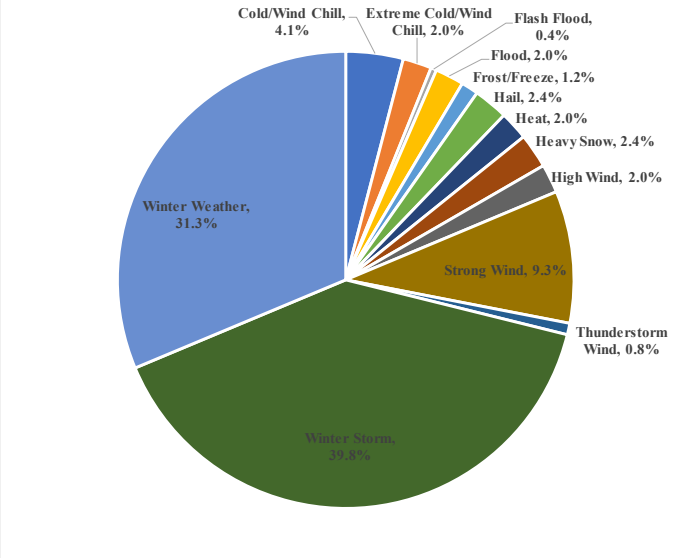
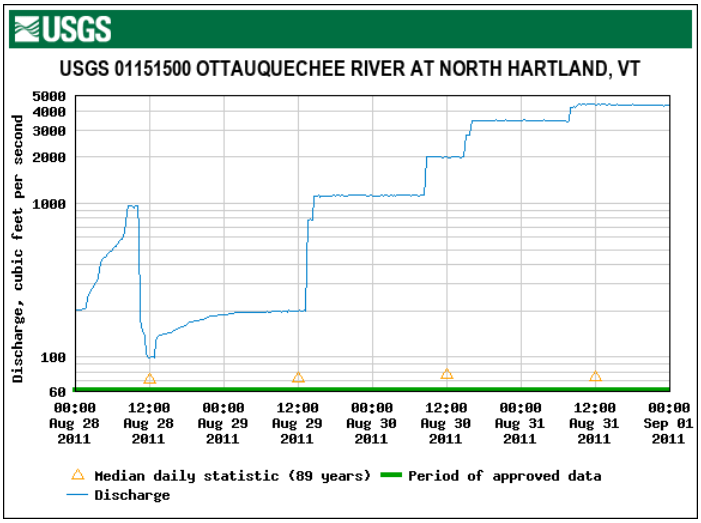


Figure 5: Windsor County Storm Events | Source: NOAA Storms Database

events relate to winter storms and winter weather, while the majority of more localized events are associated with severe thunderstorms (to include wind, heavy rain, and hail). In addition to flooding and flash flooding, storm-related hazards include high winds, with estimated gusts ranging from 35 to 50 knots (40 to 60 miles per hour) and hail up to

1.75 inches. Hazards related to cold temperatures – including unseasonal frosts, and periods of extreme



cold during winter months – are more common than heat spells; however, five heat-related events have been reported since 2006, including dry spells in 2011 and 2012 that resulted in some crop damage. The heat wave on 2011 resulted in one death in Windsor County.

Hazard Profiles

FLASH FLOOD, FLOODS & FLUVIAL EROSION

In the 2018 State Hazard Mitigation Plan, fluvial erosion is the number one hazard that threatens Vermont. Flash Floods and Floods from tropical storms and heavy rain events result in fluvial erosion of our roads and properties. Flooding can happen at any time of the year, but historically has resulted from ice jams and snowmelt runoff in the spring, and severe storms in late summer and fall. The most widespread and damaging floods – including the November 1927 flood and Tropical Storm Irene in August 2011 – have all been associated with hurricanes or tropical storms tracking up the northeast coast. In each case heavy rainfall, on top of already saturated soil conditions, resulted in very large volumes of runoff over a short period of time.

The Ottauquechee River runs through northern Hartland, eventually flowing into the Connecticut River in North Hartland. Before the Ottauquechee River flows into the Connecticut, it is dammed at the North Hartland Dam, owned by the Army Corp of Engineers. Data taken from the USGS website shows that during and after Tropical Storm Irene in August 2011, the Dam reached well over 4,000 cubic feet per second, well above the median daily flow of about 70 cubic feet per second. The gage height, as you can see in Figure 6 reached to almost 8 feet, above the normal.

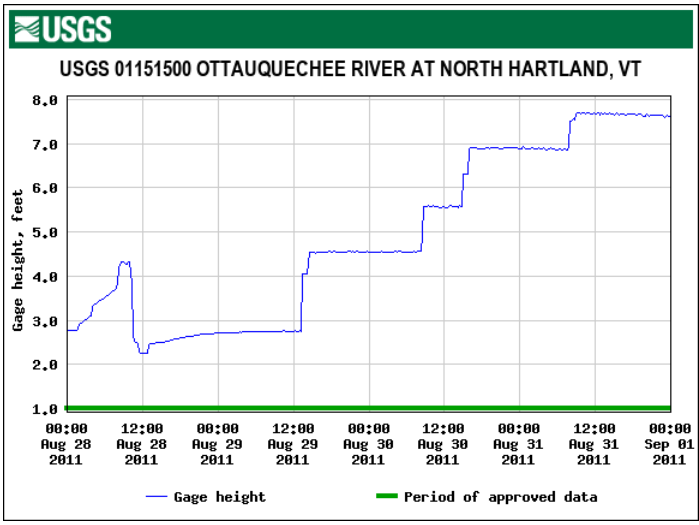


Figure 7: CuFigure 6: Gage Height at the North Hartland Dam during T.S. during T.S. IIrene, 2011

Local damage from Tropical Storm Irene was not as extensive in Hartland as the rest of Windsor County. FEMA aid accounted for $209,050. Other federal funds, such as those from the U.S Federal Highway Administration, contributed $111,909 to Hartland.

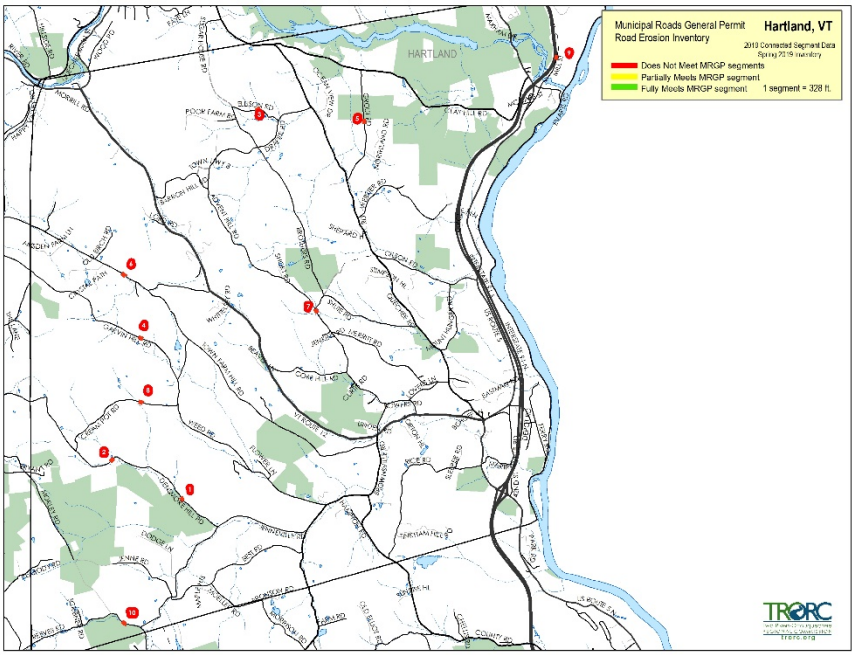
According to the NOAA storm data since 2000 for Windsor County, there were 23 major flood and rain events. Tropical Storm Irene on August 28, 2011 was the most damaging flood event for the entire State of Vermont. In addition to TS Irene,

there are several more notable flood events to have affected Windsor County. Table 5.4 indicates the top five flood events (other than TS Irene) to have affected the greater region. Extent data for fluvial erosion is unavailable for Hartland.

Top Five Flood Events in Windsor County			
Date	Classification	Estimated Damage	Description
7/1/2017	Flash Flood	$3,200,000	3-4 inches of heavy rainfall over saturated soils.
7/11/2007	Flash Flood	$750,000	3 inches fell in two hours, some areas saw over 6 inches
7/28/2014	Flash Flood	$600,000	2-3 inches in an hour.
7/16/2000	Flash Flood	$500,000	Heavy rainfall and thunderstorms
4/15/2019	Flash Flood	$500,000	0.5-1.5 of rain over rapidly melting snow.

The Hartland Flood Hazard Area Regulations were adopted on September 4, 2007. The bylaw is intended to limit development in the Special Flood Hazard Area (SFHA) and the 100-year floodplain of FEMA mapped waterways and others in the town. Currently, the regulations encompass a 50-foot buffer for the Connecticut River, Ottauquehcee River, Babcock Brook, Fulling Brook, Harlow Brook, Alder Meadow Brook, McArthur Brook, Lulls Brook, Weed Brook, and Densmore Brook.

There are 67 buildings in the Special Flood Hazard Area (SFHA) in Hartland. Out of those, only 18% have flood insurance (or 12 buildings). According to the Flood Ready Vermont website, one of these buildings is a critical public structure. The flooding that occurred as a result of Tropical Storm Irene is considered to be greater than a 100-year flood event, and possibly closer to a 500-year flood. As a result, it is important to restore floodplain, improve areas and/or increase the number of areas for retention of floodwaters to reduce the risk to structures and critical and road infrastructure wherever possible, in addition to employing other mitigation measures.



Recent studies have shown that the majority of flooding in Vermont is occurring 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 (DHCA, 1998). 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. Furthermore, precipitation trend analysis suggests that intense, local storms are occurring more frequently.

Culvert maintenance is an on-going effort in the Town Hartland. Hartland has historically engaged in completing comprehensive culvert inventories, and completed a comprehensive, geo-referenced culvert inventory in 2015 funded by a Vermont VTrans Better Backroads grant. As part of the culvert inventory, priority culvert projects for the Town will be identified, a project overview (including a description, needed materials, and budget) will be complete for each project. The projects will then be reviewed/vetted by the Vermont river engineer covering the Town of Hartland. Similarly, a Road Erosion Inventory (REI) was completed for the town in June 2020 that identified roads that are susceptible to erosion during heaving rain events and floods. According to the report, the following roads were identified as high priority; Densmore Hill Road, Ellison Road, Garvin Hill Road, Grout Road, Hartland Hill Road, Mace Hill Road, Cream Pot Road, Mill Street, and Reeves Road. Historically, Jenneville Road has been a frequent erosion and flooding issue for the town.

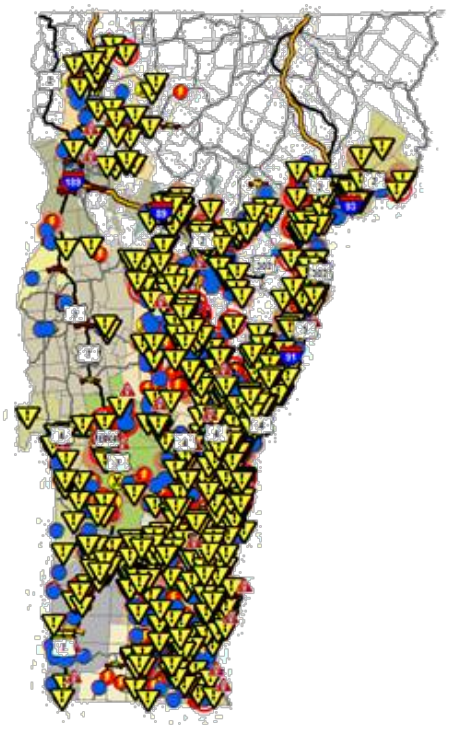


Figure 9: Map of Electric Line Hazards After a Storm

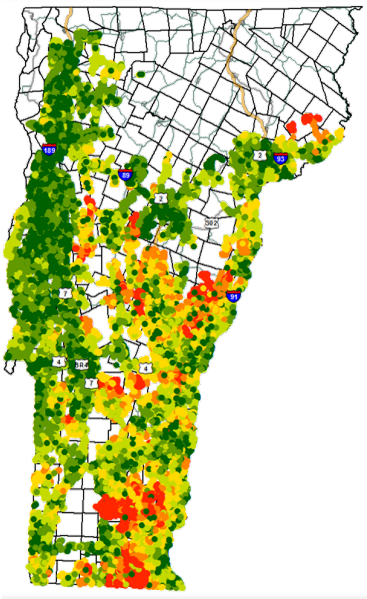
Currently, there are no development projects planned in Hartland in areas that would be vulnerable to flooding. There are no repetitive loss properties in Hartland on FEMA's NFIP list.

EXTREME COLD, SNOW & ICE

Winter storms are a regular occurrence in Vermont. Severe winter storms can cause serious damage, including collapse of buildings due to overloading with snow or ice, brutal wind chills, downed trees, downed 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 due to 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.

Severe winter storms included a blizzard on February 15-17 in 1958 that 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 Waitsfield. A string of storms in March 2001 hit the state, beginning with 15-30 inches on March 5-6 (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 leveled 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 of forest land were damaged in Vermont. Amazingly, there were no fatalities in Vermont, unlike Quebec where 3 million people lost power and 28 were killed.

Over the past few winters, Hartland has received numerous snow storms that have dropped significant amounts of snow over a day or two. 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 occur at some point in the future.

Depending on the event, particularly with heavy, wet snow or ice, electricity may be knocked out for a few hours or days. Green Mountain Power (GMP) is the utility in Hartland, and in conjunction with the Hartland road crew, has a regular tree trimming schedule to mitigate damage on power lines during these events. GMP is aware of communities that need more attention than others. By climate hardening their lines from future ice storms and high wind events, it will mitigate future damages and costs by the utility. Figure 9 is a map of GMPs service area, the red, orange, and yellow areas are the most vulnerable to these types of events that typically take place in the winter. The TRORC region is one of the worst in their region, which includes Hartland.

One such instance where electric lines were heavily impacted was during the Halloween 2019 Storm that dropped several inches of heavy wet snow and caused high winds. Some communities were without power for five days. The lack of electricity was an issue for many residents who were unable to heat their homes, have access to the internet, and had a lack of cell service. Figure 8 is a map provided by GMP on the number of outages they had in their service area from this storm. A total of 55,000 customers were without power at its peak, but total over 114,000 customers were without power at one point or another.

Figure 10: GMPs High Hazard Electric Infrastructure

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 the 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 the roof must bear. In general, winter weather is most hazardous to travelers. Icy and snow-covered roads present multiple examples of dangerous driving conditions and situations. The Town relies on Travel Advisories issued by VEM and the National Weather Service to alert residents of dangerous travel weather. However, it is difficult, if impossible, 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. To increase awareness in the event of hazardous weather, the Town also encourages residents to utilize 211, social media outlets, and the Town listserv.

NOAA storm data breaks out damaging storm events by type. Since 2000, the majority of storms to his Windsor County were related to heavy snow and extreme cold. This data is broken out in the following for Windsor County over 245 incidents:

- Cold/Wind Chill – 4.1%
- Extreme Cold/Wind Chill – 2%
- Frost/Freeze – 1.2%
- Heavy Snow – 2.4%
- Winter Storm – 39.8%
- Winter Weather – 31.3%

A winter storm that took place on February 23, 2010 caused over a million dollar in damages in Windsor County alone. This winter storm was classified as a blizzard and dropped 12 to 24 inches of snow across New England, New York, and Pennsylvania. The heaviness of the snow resulted in several roof collapses. The following table shows the top ten damaging winter storms in Windsor County. Of particular note is the winter of 2000-2001 where there were four major snow events to hit Windsor County.

Table 5.5: Top Ten Winter Storms in Windsor County

Date	Classification	Estimated Damage	Accumulation
2/23/2010	Winter Storm	$1,000,000	12-24 inches
2/14/2007	Heavy Snow	$250,000	20 inches
12/11/2008	Winter Storm	$250,000	1-3 inches and freezing rain
12/9/2015	Winter Storm	$250,000	unknown
11/26/2018	Winter Storm	$250,000	3 inches and freezing rain
3/5/2001	Winter Storm	$100,000	15 inches
2/5/2001	Winter Storm	$75,000	12 inches
3/22/2001	Winter Storm	$50,000	6-10 inches
3/30/2001	Winter Storm	$50,000	6-10 inches
11/26/2014	Winter Storm	$50,000	12 inches

SEVERE WIND

Generally speaking, wind is the result of differences in atmospheric pressure, and moves from an area of high pressure to an area of lower pressure. Slight or moderate winds are unlikely to be dangerous, and often have beneficial effects. However, severe wind may pose a threat to lives, property, and critical utility infrastructure. Light construction, such as manufactured homes, are often the most damaged by high wind events. High winds typically occur as a result of various weather events, such as severe storms, tropical storms or hurricanes.

Severe wind is just one category of a broader hazard, severe weather (thunderstorms, tropical storms, hurricanes, etc.). Storm events severe enough to generate wind shears, small cyclones and microbursts appear to be occurring with greater frequency in recent years, but associated

damage tends to be highly localized. One of the strongest and most damaging types of high winds are straight-line winds. Unlike tornadoes, which demonstrate a rotational damage pattern, damage caused by straight-line winds tends to be very linear. This type of wind can be very strong, producing wind speeds as high as 80 to 90 mph, and can last twenty minutes or more. They often occur at the gust front of a thunderstorm or originate with a downburst from a thunderstorm. Straight-line winds are notorious for downing forest stands in linear swaths.

To date, there have been no reported and documented tornados in the Town of Hartland; however, tornadic events have occurred in surrounding areas. Thus, all that is needed for a tornado to occur in the Town of Hartland are the "right" conditions. These events are capable of damaging or destroying structures, downing trees and power lines and creating injuries and death from collapsing buildings and flying objects. Tornadoes are less common than hail storms and high winds, but have occurred throughout Vermont. In fact, 45 tornadoes were recorded between 1953 and 2012, injuring 78 people and causing over $5 million dollars in estimated property damage. Nearly all of these occurred from May through August, and most of these occurred in the afternoon when thunderstorm activity is highest due to heating of the atmosphere. Tornadoes are classed by wind speeds from 40 – 318 miles per hour (mph) and placed into five categories (F0-F5). All recorded tornadoes in Vermont have either been FO (40-72 mph winds), F1 (73-112 mph winds) or F2 (113-157 mph winds). Interestingly, F2 tornadoes are the most common of the three classes recorded in the state.

Another extremely dangerous weather event that produces high winds is a derecho. Derechos are widespread, long-lived windstorms that are associated with a fast-moving band of severe thunderstorms. They are also capable of producing very high, straight-line winds and even tornadic winds. They are considered a warm-weather phenomenon, as they occur most often in the summer months—spring through early fall in the Northern Hemisphere. According to a National Weather Service map, the state of Vermont, the northern half of New York State and the rest of New England, derechos have a frequency of occurring about once every four years. There have been a few derechos that have occurred in Vermont in the last 15 years: on July 14-15 of 1995 ("the Adirondacks/Ontario Derecho"), on September 7, 1998 ("the Syracuse Derecho of Labor Day 1998"), on July 4-5 1999 ("the Boundary Waters-Canadian Derecho") and most recently on July 15, 2005. It is thought that the worst derecho to hit Vermont was the

"Boundary Waters-Canadian Derecho," killing one camper in the Northeast Kingdom.

It is important to note that, nine of the federally declared disasters that have affected Windsor County were categorized as severe storms. With that being said, the locations hit by severe wind are random and hard to predict. Of the NOAA Storms Data that was collected for Windsor County since 2000, only eight storms were classified as 'High Wind' (see table). The most damaging of these was on September 29, 2005 that caused over $100,000 in damage in Windsor County alone. This event is not listed on the federally declared disaster list, so it is likely this event was localized to Windsor County and not statewide. More specific high wind data is not available at the town or county level. Yet these

events are highly damaging to infrastructure as stated in the section before when speaking to Green Mountain Powers infrastructure in Hartland. Since a lot of the power infrastructure is labeled as 'high hazard' (or old) infrastructure, strong wind storms often take the power out just as much as winter storms do in Hartland.

Despite the threat of straight-line winds and derechos, the most common type of high winds, are strong, sustained winds or wind gusts or gales. These high wind events can still damage critical infrastructure or down trees, which can knock out electricity, block roads and cause bodily harm.

HAZARDOUS MATERIALS SPILL

Based on available VT Tier II data, there is one site in the Town of Hartland that has sufficient types and/or quantities of hazardous materials. This one site is the North Hartland Dam owned by the U.S. Army Corp of Engineers. Vermont Route 12 intersects with US Route 4 in the northwest corner of the town, while US Route 5 and Interstate 91 run parallel to the Connecticut River within Hartland. All of these roads see a large amount of truck traffic. As a result, there is always the threat of a hazardous material spill along these routes through the Town of Hartland. Fuel oil and gasoline are some of the most commonly transported hazardous materials that pass-through Hartland based on a state-wide Hazardous Materials Commodity Flow Study. The New England Central Railroad also runs through North Hartland, parallel to both I-91 and

Top 5 Most Damaging Wind Storms in Windsor County		
Date	**Classification**	**Estimate Damage**
9/25/2005	High Wind	$100,000
8/28/2011	Strong Wind	$100,000
10/16/2018	Strong Wind	$100,000
11/3/2018	Strong Wind	$100,000
2/26/2010	High Wind	$50,000

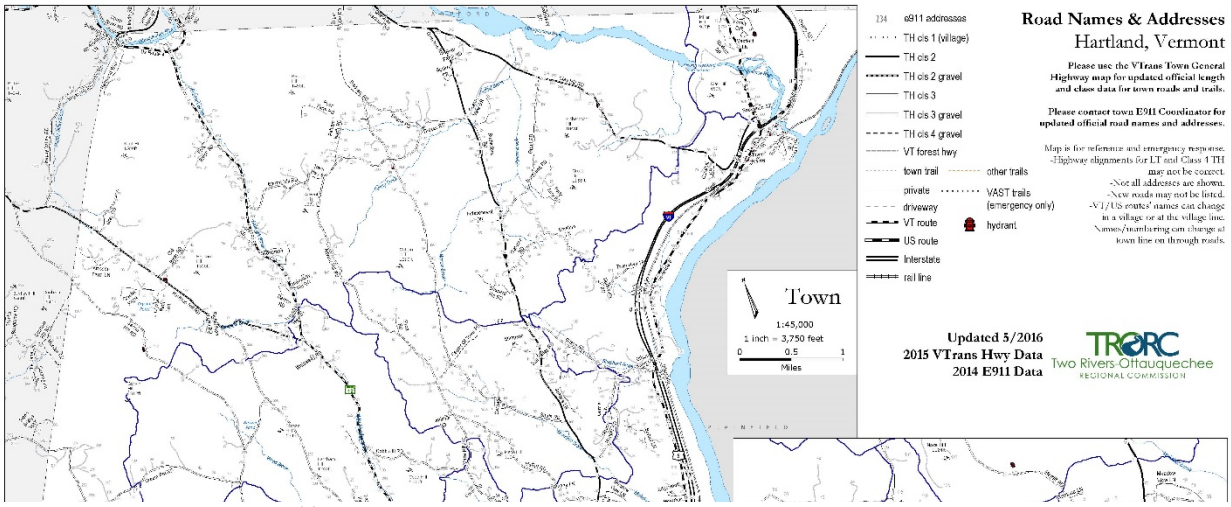
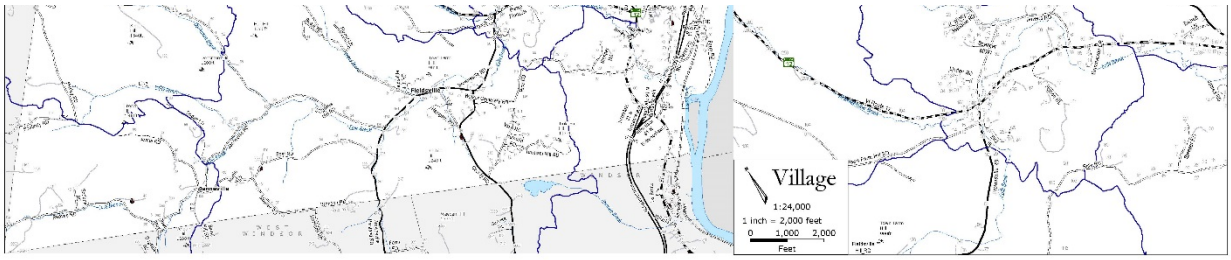


Figure 11: Map of Hartland, VT



US 5. At any given time, there can be hazardous materials aboard the train. Data for hazardous materials is not publicly disclosed by the rail companies, but based on an Irving propane and oil loading point in White River Junction, it is widely assumed that the rail companies frequently transport hazardous materials. Since Hartland has so many major transportation corridors, hazardous materials spills pose an area of high concern to the Hartland Volunteer Fire Department.

Within 1,000 feet of the railroad tracks and Vermont Route 12, US Routes 4 and 5 and I-91, there are 1,742 residences (including 390 mobile homes, 38 multi-family homes and 1,282 single family dwellings) and 245 commercial, industrial, or public buildings (including the Town Office, the Hartland Fire Station and 6 government buildings). In the event that 5% of these structures were involved in a HAZMAT incident, the estimated damage would be $22,757,424. It should be noted that the State of Vermont currently has one fully trained HAZMAT response team, with fully equipped vehicles located in Essex Junction, Putney, and Pittsford. Additionally, there are eighteen HAZMAT trailers scattered throughout the state that can allow a faster response for minor spills. The HAZMAT crew chief is available within minutes of a call for the team but on-scene response typically takes a minimum of four hours. In the event of a serious accident in town, there would be little time for evacuation and response would be difficult.

Perhaps the most impactful and serious spill to occur in the Hartland during this timeframe was in July 1997 when a tanker truck rolled over and spilled approximately 100 gallons of gasoline containing the fuel additive MTBE. According to a Vermont Public Radio article, the MTBE spill in Hartland was one of the three largest in the Vermont (the other two spills being located in Hinesburg and Killington) at the time. The Hartland spill impacted 38 water supplies in Hartland. Despite the fact that the State of Vermont banned MTBE in 2005, the remains of an MTBE spill can be detected for years to come.

The Vermont Department of Environmental Conservation (DEC), a subset of the Agency of Natural Resources, manages the statewide database for all HAZMAT spills. According to Vermont law, any spill over 2 gallons must be reported to the HAZMAT spill hotline. The following occurrences were retrieved from the spills database, and includes all spills since 1973 when DEC started recording spills. In total there were 129 spills since 1973 in Hartland.

History of Occurrences

Date Reported	Address	Nature of Incident	Product Released	Quantity
6/14/1973	Flood Control Dam	Tar To Reservoir	Tar	200 Gallons
11/21/1973		Transfer Spill	#2	500 Gallons
1/22/1977		Truck Accident	#2	1600 Gallons
6/16/1977	Shell Station	Crankcase Oil		
7/14/1980	Mobil Station	Lust	Gasoline	
1/30/1981	C V R R Yard	Oil Spill	# 2	8000 Gallons
6/3/1981	Four Corners Area	Road Oiling	Crankcase Oil	10 Gallons
3/24/1982	Cvps Transformer	Transformer Leak	Transformer Ol	2 Gallons
7/2/1982	Cvps	Transformer Leak	Transformer Oil	4 Gallons
11/23/1983	King Mtn. Rd	Truck Overturn	Diesel	100 Gallons
1/19/1984	Rt 4	Truck Accident	L.p.gas	
2/2/1988	Semcor Equipment	Solvent Spill	Safety Kleen Sol	
6/17/1988	Rt 12	Leaking Drums	Unknown- Possibly Oil	
10/4/1988	Merritt Road	Neighbors Septic System Failed	Septic	
5/8/1989	Queechee Road	Fuel Oil Killing Grass	#2 Fuel Oil	
8/23/1989	Route 5	Prchsd Used Drums W/residual	Paint Thinner	
10/1/1989	I 91 Mm 67	2-55 Gallon Drums On Interst.	Empty Drums	
2/21/1991	10 Bridge St	Tank Overfill	Diesel	30 Gallons
7/17/1991		Crankcase Oil On Ground		
11/21/1991	Quechee-Hartland Road	Oil Spill	Kerosene	
10/16/1992		Steam Heavy With Oil	#6	
4/15/1993	Rt. 5	Drum Gave Way	Waste Oil	20 Gallons
7/7/1993	Rt. 12	Car Accident	Gasoline	15 Gallons
10/22/1993	Brownsville	Petro Odor In New Drilled Well		
3/4/1994	Depot Rd	Tank Overfill	#6	20 Gallons
5/1/1994		Oil, Anti-freeze On Ground	Oil,anti-freeze	2 Gallons
8/23/1994	Depot Rd	Leaking Oil Tank	#6	
11/13/1995		Petro Odor In Tub, Black Residue	Unknown	
5/29/1996	Shute Rd	Road Oiling	Used Oil	
6/14/1996	Shute Rd	Road Oiling	Waste Oil	
2/5/1997	Skunk Hollow Tavern	Broken Fuel Line On Truck	Diesel	20 Gallons
7/24/1997	Hartland-Quechee Road	Tanker Truck Roll Over	Gasoline	50 Gallons
9/14/1997	I91 South	Tractor Trailer Accident	Organic Peroxide	4 Gallons
11/26/1997	Rt. 5	Car Accident	Gasoline	5 Gallons
11/28/1997	Trailer Park	Long-term Tank Leak	Kerosene	100 Gallons
7/16/1998	Rt. 5	Leaking above ground line	#2	

11/13/1998	Rt 5	Oil contaminated water	oil and water	12,000 Gallons
12/10/1998	Hartland Hill	Tank overfill	#2	
2/10/1999	Shute Rd	Truck accident	diesel	100 Gallons
2/11/1999	Shute Rd	Truck accident	diesel	100 Gallons
6/11/1999	116 Webster Rd	Heating oil spill	#2	60 Gallons
8/17/1999	Rt 5	Drum found in river	unknown	
10/27/1999		Spill in boiler room	mercury	
12/20/1999	I 91	Tractor trailer rollover	diesel	
12/29/1999	I-91 South	Engine malfunction	waste oil	1 Gallon
1/5/2000	11 Hartland Hill Rd	Above ground tank leak	kerosene	275 Gallons
8/2/2000	Rt 5	Release of Freon/ dumping	freon/ tires	
11/1/2000	U S Rt 5	Dumping oil,tires, white goods, const debris	motor oil, freon, solid waste	
5/11/2001		Dropped a bottle	methanol	1 Gallon
8/1/2001		Truck accident	diesel, milk	15 Gallons
8/13/2001	MM 68	Overfill of truck mounted AST	diesel	10 Gallons
9/12/2001	34 Jenneville Rd	Above ground tank failure	kerosene	300 Gallons
10/7/2001	161 Brownsville Rd	Leaking AST in basement	#2	200 Gallons
11/13/2001		Cylinders received	ethyl chloride	200 Gallons
1/23/2002	Rt 5	Contaminated water supply	M T B E	
1/27/2002	35 Beaver Lane	AST filter broke	#2	100 Gallons
12/16/2002		Fuel delivery overfill or loose valves	#2	
1/30/2003	18 Center of Town Rd	Delivery to wrong pipe	#2	5 Gallons
7/3/2003	18 Sykes Ave	UST system failure	gasoline	
7/3/2003	18 Sykes Mountain Rd	Failed test/line leak	gasoline	2 Gallons
10/24/2003	91 Mt Hunger Rd	Sheen on intermittent stream	petroleum	
11/6/2003	215 N Main St	Broken thermometer	mercury	
12/30/2003	87 Advent	Anti-freeze leak	anti-freeze	
4/1/2004	V A Drive	Elevator leak	hydraulic oil	20 Gallons
7/5/2004	Rt 12 and Fort Brook Rd	Hydraulic leak	hydraulic oil	2 Gallons
10/1/2004	153 Creampot Rd	Truck accident	diesel fuel	1 Gallon
1/31/2005	Rt 12	Tractor trailer hit telephone pole	diesel	30 Gallons
1/31/2005	33 Rt 12	Vehicle accident	diesel	15 Gallons
4/19/2005	Rt 12 & Barron-Advent Rd	Vehicle leak	diesel	75 Gallons
5/2/2005	Rt 5	Truck rollover	diesel	
1/31/2006	Rt 5 and Rt 12	Hydraulic leak	hydraulic oil	

3/17/2006	148 US Rt 5	Customer drove off w/hose attached	gasoline	4 Gallons
6/29/2006	55 Ellison Rd	Hydraulic failure	hydraulic oil	10 Gallons
7/10/2006	27 Grant Rd		unknown	
12/28/2006	1743 Maple St	Leak from delivery hose	#2	5 Gallons
3/12/2007	33 Martinsdale Rd	Overfill	#2	8 Gallons
12/8/2007	I - 91 MM 66	Tractor trailer accident	diesel	30 Gallons
6/5/2008	85 Brothers Rd	Farm tractor rolled over	gasoline	2 Gallons
9/7/2008	I-91 North MM 66	Drive train struck gas tank	gasoline and transmission	13 Gallons
1/21/2009	Clara Nichols Lane	Belt to gear generator lost	gear grease	.5 Gallon
4/17/2009	442 N Hartland Rd	Transformer overheated	non-PCB transformer oil	120 Gallons
4/29/2009	171 Rice Rd	Transformer failure	transformer oil	.5 Gallon
5/19/2009	94 Mt Hunger Rd	Leaking tank gauge and vent pipe	#2	2 Gallons
6/2/2009	Quechee Rd	Hydraulic failure	Hydraulic oil	15 Gallons
10/20/2009	Quechee Rd.	Leaking Septage	Septage	200 Gallons
11/23/2009	13 Merriott ST.	AST overfill	# 2 fuel oil	2 Gallons
12/7/2009	225 Clay Hill Rd.	Delivery Spill	# 2 Heating oil	1 Gallon
1/4/2010	171 Route 5	AST leaking	off road diesel	10-20 Gallons
1/18/2010	164 Woodstock Rd.	Busted hose	Hydraulic oil	10 Gallons
3/7/2010	2 Quechee Rd	AST release	#2	30 Gallons
4/22/2010	8 Durphey Drive	Leaking AST	#2	3 Gallons
1/18/2011	38 Farnum Farm Rd	Overfill during delivery	#2	1 Gallon
1/25/2011	96 RT 12	AST dripping		2 Gallons
1/27/2011	Hartland Hill Rd and Town Farm Rd	Hydraulic Equipment Failure	hydraulic oil	1.5 Gallons
6/6/2011	405 VT RT 12	Truck on its side	motor oil	10-20 Gallons
6/20/2011	15 North Main Street	Bucket loader tipped over	Diesel	5 Gallons
6/24/2011	97 Town Farm Hill Road	Spill during delivery	#2 fuel oil	3 Gallons
7/7/2011	Densmore Hill and Cream Pot Rds.	Car lost product on graded gravel road		4 Gallons
7/11/2011	RT 5 near Exit 9	Fuel tank fell off vehicle	gasoline	15-20 Gallons
8/6/2011	85 Best Road	Hydraulic Equipment Failure	hydraulic	1 Gallons
10/12/2011	Confluence of CT River and Ottauquechee River	Sheens on CT River at confluence Ottauquechee River	Sheens	--
10/21/2011	Tropical Storm Irene	Propane tanks and antifreeze drums caught up behind North Hartland Dam		unk --

5/7/2012	RT 5	Alleged dumping of oil and release from tank tops		unk --
10/22/2012	I-91 SB MM 63.7	TT saddle tank fell off and broke		125 Gallons
5/22/2013	10 Ogden Mill Road	Fuel tank in guest house lost contents		200 Gallons
2/26/2014	58 Hartland/Quechee Road	Small overfill into basement		1 Gallon
6/28/2014	25 Grout Road	Up to 30 gallons of miscellaneous waste reported as dumped off roadside adjacent to stream		unk --
7/24/2014	Pinkham Hill Road	Transformer leak due to severe storm		5 Gallons
9/3/2014	MM 66 I-91 NB	Vehicle fluid release across interstate		2 Gallons
12/8/2014	Sun Valley Rd	Track vehicle equipment failure		1 Gallon
1/19/2015	I-91 NB MM 66.4	TT unit on its side		40 Gallons
1/24/2015	91 NB MM 59.15	TT accident, vehicle fluids lost		45 Gallons
5/8/2015	605 Rte 5 North	Outside tank leaked - cause unidentified as yet.		2 Gallons
12/2/2015	29 Brownsville Rd	Fuel out vent and tank gauge		~2 Gallons
4/25/2016	26 Ferry Road	Fire resulted in multiple hazardous material releases		UNK --
9/22/2016	Independence Drive	Oil on road		--
10/18/2016	16 Mace Hill Road	Sheens on surface water		UNK --
1/4/2017	Across the road from 395 Rte 5	Complaint of a large propane release from a delivery truck		ukn --
6/22/2017	I91 NB MM 63	Vehicle/Equipment accident, cargo lost	used cooking oil	1,000 Gallons
11/1/2017	97 Webster Road	Transformer/Capacitor release		1 Gallon
11/7/2017	MM 66 I 91	Vehicle/Equipment accident, vehicle fluids lost		75 Gallons
2/13/2018	Fork Brook Road and Route 12	Vehicle/Equipment fluids release (non-accident)		unknown Gallons
5/12/2018	Route 5	Drum on side of road		--
7/6/2018	25A Linden Rd	Fuel dispenser/dispensing release		UNK --
9/24/2018	403 Rte 5	Abandoned tank left on property		7 Gallons
11/10/2018	55 Hartland Hill Rd.	Power pole down during windstorm		unk Gallons

12/11/2018	10 Bischoff Lane	Technician came for service call; found oil in basement		50 Gallons
4/4/2019	29 Lord Road	Downed transformer		2 Gallons
12/6/2019	I-91 Northbound	Truck smashed through guardrail on interstate bridge		10 Gallons

Although a relatively small number of major spills consisting of hundreds of gallons of hazardous material have occurred in the Town of Hartland over the past 20 years, the potential for a major spill is ever present and such events do occur, as noted in the table above. Numerous major roadways crisscross the Town's landscape, presenting opportunities for spills to occur throughout Hartland's boundaries. The majority of hazardous materials transported through the area by tractor trailer occur along Vermont Route 12, US Routes 4 and 5, and Interstate 91. 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 Hartland. A number of tractor trailer accidents have been reported along these major roadways, particularly on Route 5 and I-91. With so many properties and businesses located along these roadways as well as waterways, there is huge concern for impacts to health, safety, and property in the event that a hazard material disaster occurs in Hartland.

Although rare, rail accidents and spills do occur in the state. In the Vermont Commodity Flow Study, an analysis of rail accidents and spills was conducted. Data for this section of the study was gathered from the U.S. Department of Transportation. Since 1975, the federal government has been recording and tracking all types of rail accidents in spills by state and county. According to this data, there has been thirty-seven rail accidents/spills in Windsor County alone, the highest in the state. It is unknown if any of these spills or accidents took place in Hartland, as that data is not publicly available.

In order to prepare for hazardous material spills in the Town of Hartland, all members of the Hartland Volunteer Fire Department have up to date HAZMAT Awareness and Operations Level training. On a yearly basis, a review of the training materials is completed with volunteer members.

FIRE HAZARDS (STRUCTURE AND WILDFIRE/BRUSHFIRE)

In the 2015 Plan, structure fires and wildfires (brushfires) were separately analyzed and discussed. For the 2020 Plan, the committee felt that an all-encompassing approach to these hazards was more appropriate. Fire hazards, to include structure fires, wildfires, and brushfires, are a regular occurrence in Hartland, and the state as a whole.

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 U.S. Fire Administration, Vermont had 4.8 deaths per 1,000 fires in 2018. Nationally, there are 2.5 deaths per 1,000 fires. Although there have been requirements for smoke detectors in rental housing for over 20 years, and requirements for smoke detectors in single-family dwellings since 1994, the majority of residential fires do not have working smoke detectors.

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.

Generally speaking, a wildfire is an outdoor fire that is not controlled, supervised or arranged. Wildfire/brushfires may be sparked by natural or human activities. Lightning is one of two main natural causes of wildfire/brushfires. However, across the United States, approximately 90 percent of wildfire/brushfires are started by humans. According to FEMA, there are three types of wildfire/brushfires that can consume natural landscapes and man-made structures and features: surface fire, ground fire and crown fire. Surface fires are slow moving across the forest floor, and, as a result, kill and damage trees. Ground fires are usually caused by lightning strikes, and burn on or below the forest floor. Crown fires, so called for their location in the crown of trees, effortlessly spread through tree tops, often aided by wind. Wildfire/brushfires probability depends on local weather conditions; outdoor activities, debris burning and construction; and the degree of public cooperation with fire prevention measures. The Vermont landscape is especially vulnerable to wildfire/brushfires during the period of time in early spring when all the snow has melted, vegetation has not begun to develop leaves, and the land and vegetation are very dry and/or dead. It is important to note that the scale of wildfire/brushfires that burn in the state of Vermont tend to be smaller, and are therefore able to be extinguished more quickly than many of the wildfire/brushfires that rage in the western United States.

Approximately 80-85% of the Town of Hartland is forested land, with approximately 263 acres included within the Densmore Hill Wildlife Management Area. Owing to the fact that the large portion of the Town is forestland, Hartland is vulnerable to the impacts of wildfire/brushfires.

Call volumes in Hartland have steadily gone up since 2009. This puts a strain on an all-volunteer fire department.

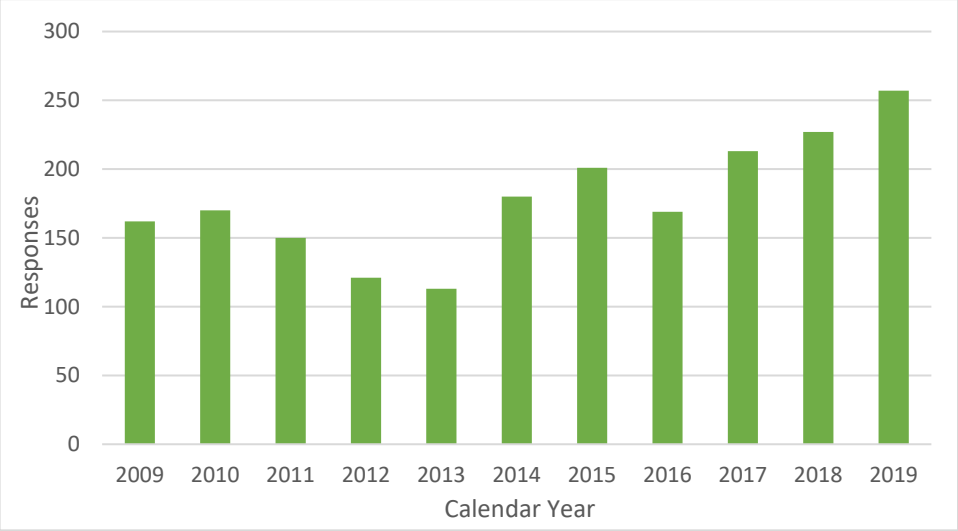


Figure 12: Call Volumes in Hartland

The majority of those calls in the past 10-years are car accidents on Interstate 91 and on town roads, fires, and a variety of other instances. Figure 12 breaks out the types of calls by year. In this graph, 'other' stands for the following types of incidents: mutual aid, public assistance, fire alarms (where there is no fire), hazardous materials spills, and downed power lines.

containing predominantly single-family dwellings and a few commercial establishments. North Hartland has a fire station and a community water supply system with fire hydrants.

The Town of Hartland typically experiences several brushfires per year. There can be as many as five to ten in a year in Hartland, of varying

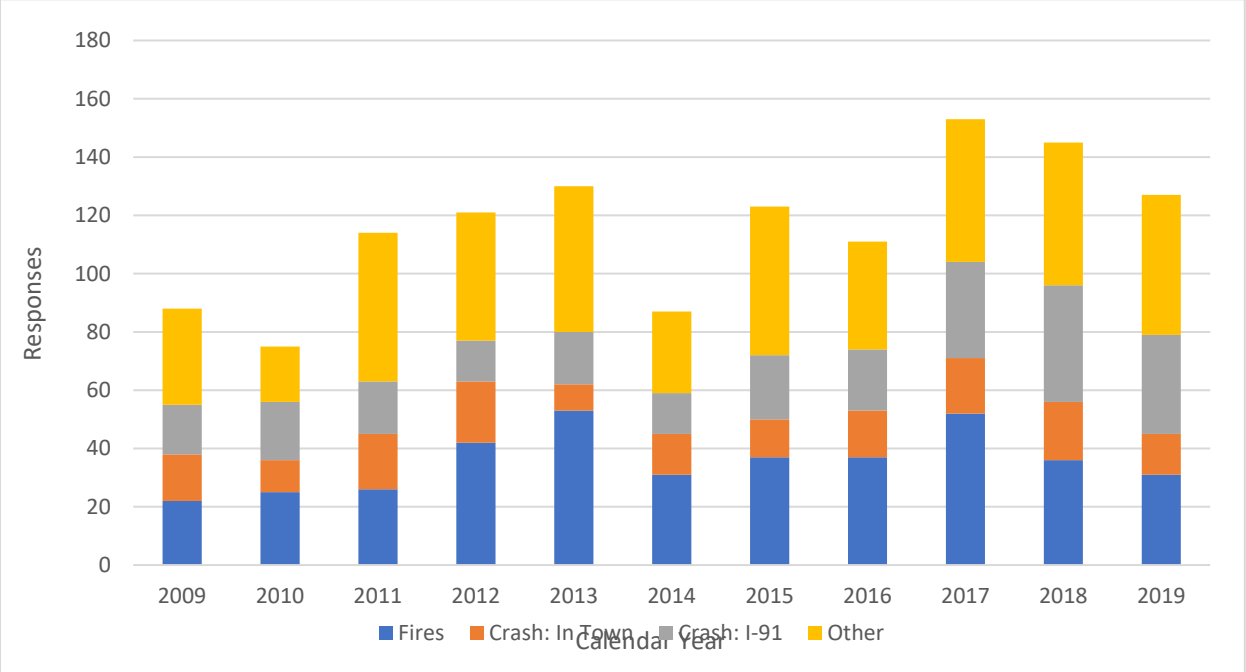


Figure 13: Types of Fire Calls in Hartland, VT

Poor access to fires, limited water supply for firefighting, and the distance of some homes from the fire station represent a few of the challenges that leave Hartland vulnerable to the impacts of structure fires. Some recreational and retirement homes with single access roads and no fire-fighting water supply are also vulnerable.

The villages of Hartland Three Corners, Hartland Four Corners and North Hartland have the most intensive development. Each of these centers contains a variety of housing types mixed with small retail businesses, personal services and offices. North Hartland and Hartland Four Corners are also areas of relatively greater density

sizes, but they are often relatively small. One of the larger wildfires to occur in Hartland was on November 12, 2012 when a brush fire that burned over three acres on Maxham Drive. According to newspaper archives, this wildfire was spreading rapidly before it was contained, and could have become more dangerous as this fire was relatively close to at least one residential property and the North Hartland dam. Nevertheless, the potential exists for brush fires to get out of hand rapidly, particularly in areas where there is a 15% slope which impedes firefighting efforts. According to members of the Committee, the entire Town is vulnerable to wildfires and areas that have repeatedly burned in the part includes those

surrounding Route 5, Route 12, Brothers Road, Merritt Road, and Clay Hill Road.

Areas of relatively dense development pose greater fire hazards due to the threat of the fire spreading to adjacent buildings. In addition, a fire in a multi-family building has the potential to injure or displace a larger number of people. Similarly, a structure fire in a mobile home park has the potential to spread to other structures, as the structures are often placed relatively close together. There is one mobile home park in the Town of Hartland, the Skunk Hollow Mobile Home Park. A structure fire occurred in this mobile home park on February 19, 2012, which led to a total loss of the structure and the owner's vehicle. According to news archives detailing this event, firefighting personnel were concerned that the fire had the potential to spread to other nearby structures. Luckily, the February 2012 fire did not spread to other structures, but the event demonstrates the potential for future fires to do so.

To help combat structure fires, members of the Hartland Fire Department attend monthly firefighting trainings, and receive recertifications when necessary. In addition, the Town of Hartland has installed dry hydrants along the following roads: Clay Hill Road; County Road; Evarts Road; Garvin Hill Road; Hartland Hill Road; Martinsville Road; Maxfield Lane; McCabe Street; Merritt Road; Mill Street (in two locations); Quechee Road; Reeves Road; Route 5 (in 5 locations); and Wood Circle. The Hartland Fire Department is looking for new locations to install additional hydrants, but overall, they view the hydrant coverage in the Town as satisfactory.

By virtue of being a rural town, forested areas exist in the Town of Hartland where ground-based firefighting efforts would be very difficult, due to their remoteness or steep slopes. This creates the potential for wildfire to impact private land and property and any logging operations occurring at the time of the wildfire. A wildfire would likely impact or result in the damage of wildlife habitat and recreational lands used for hunting, hiking, mountain biking, and ATV and snowmobiling trails (maintained by VAST, Vermont Association of Snow Travelers).

MITIGATION

Overall Mitigation Goals

1. The reduction of injury and losses, including loss of life and to infrastructure, structures and businesses, from fire hazards (structure and wildfire/brushfires).
2. The reduction of injury and losses, including loss of life and to infrastructure, structures and businesses, from the hazard of hazardous material spills.
3. The reduction of injury and losses, including loss of life and to infrastructure, structures and businesses, from the hazard of extreme cold/ice/snow.
4. The reduction of injury and losses, including loss of life and to infrastructure, structures and businesses, from the natural hazard of flash flood/flood/fluvial erosion.
5. The reduction of injury and losses, including loss of life and to infrastructure, structures and businesses, from the natural hazard of severe wind.

Excerpted Town Plan Goals & Objectives Support Local Hazard Mitigation

- To provide Town services and facilities that meet the education, public safety, and health needs of current residents and the

anticipated needs of a growing population in a cost-effective manner (page 5).

- To protect agricultural and forestry land uses by promoting practices that are economically viable and that protect natural resources.
- To conserve natural areas, unique habitats, and the quality of ground and surface waters (page 5).
- In all areas where soils have severe limitations, development shall be permitted only where it can be adequately proven that such development will not be harmful to the environment or to the health of the community (page 10).
- New culverts in the town of Hartland should be at least 18 inches high and will contain
  headers to protect integrity of structures. Road maintenance will also consist of stone
  lined ditches, grass lined ditches, disconnected ditches from surface water, and road
  crowning, where appropriate. Hartland's road standards will continue to follow statutes
  put forth by the State of Vermont, and will abide by current and future Better Backroads' Codes and Standards. (page 36)
- Maintain and improve the quality of Hartland's surface waters (page 35).
- Prohibit all new development in the 100-year floodplain (page 41).
- Prohibit new development within mapped river corridor areas (page 41).
- Revise Hartland's Flood Hazard Area regulations to prohibit new development
- (excluding small ancillary structures in the 100-year floodplain, or area that has a 1% chance of annual flooding). (page 43)
- Modify Hartland's Flood Hazard Area regulations to prohibit commercial, industrial,
- and residential uses within ANR's mapped river corridor areas. (page 43)
- Continue to update Hartland's Flood Hazard Area Regulations as needed to comply with FEMA's requirements for participation in the National Flood Insurance Program and to reflect new understanding of wise floodplain development (page 43).
- Maintain and improve the quality of Hartland's surface and ground waters. (page 44).
- Provide and maintain a safe, efficient and cost-effective transportation system which meets the needs of the public in a manner consistent with the other goals, policies and recommendations of this Town Plan (page 55).

The Hartland Town Plan was updated and adopted on 05/15/2017, and has an 8-year lifespan.

The Town of Hartland has no intentions, at this time, to take steps to enroll in the NFIP's Community Rating System (CRS).

Hazard Mitigation Strategies: Programs, Projects & Activities

Vermont Emergency Management 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, Hartland'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.

The Town of Hartland understands that, in order to apply for FEMA funding for mitigation projects, a project must meet more formal FEMA benefit cost criteria, and a project seeking FEMA funds will 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 Hartland'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 and flood hazard/fluvial erosion hazards (FEH) bylaws. The incorporation of the goals and strategies listed in the Local Hazard Mitigation Plan into the municipal plan and flood hazard/FEH 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.

Mitigation Actions	Local Leadership	Prioritization	Possible Resources	Time Frame
All Hazards				
Ensure that Hartland's Local Emergency Management Plan (LEMP) is kept up-to-date.	Town Manager	High	Local resources;	Annually by May 1

Mitigation Actions	Local Leadership	Prioritization	Possible Resources	Time Frame
			TRORC; VEM	
Develop a policy on effective communication of hazards to town departments and residents of Hartland.	Town Manager; Selectboard	Medium	Local Resources	2022-2023
Develop a methodology the Town can use for consistently documenting infrastructure damage after weather events.	Road Foreman	High	Local resources; TRORC	2021-2022
Meet with VEM regarding setting up VT Alert in Hartland.	Selectboard/ Town Manager	Low	Local resources; VEM	2022-2023
Develop an educational program for Hartland residents regarding mitigation actions homeowners and renters can undertake to lessen risks to their lives and properties.	EMD (Town Manager), Health Officer, Fire Department	Low	Local resources; TRORC	2 years after date of Plan Approval, then annually
The Town and the Volunteer Fire Department should work closely together to address safety issues related to hazards.	Town Manager; Selectboard; Planning Commission; Volunteer Fire Department	Low - Medium	Local resources	2021-2022
Fire Hazards (Structure and Wildfire / Brushfires)				
Ensure that fire department personnel maintain their Firefighter certifications.	Hartland Volunteer Fire Department	High	Local resources (FD); VT Fire Academy; mutual aid departments	Annually / As Needed
Conduct a public education program on fire prevention at the three schools in Hartland.	Hartland Volunteer Fire Department	High	Local resources (FD); small prevention budget; mutual aid departments	Annually

Mitigation Actions	Local Leadership	Prioritization	Possible Resources	Time Frame
Develop a pre-plan program for significant structures in the Town of Hartland. For each significant structure, develop a pre-fire plan and tour the structure to familiarize FD members with the layout of the structure.	Hartland Volunteer Fire Department	Medium	Local resources (FD)	Continuous
Seek funding to draft a Community Wildfire Protection Plan (assesses and maps the community wildfire risk, discusses the ability to respond and recommends actions to reduce wildfire risk). (Mitigation)	Hartland Planning Commission/ Town Manager	Low	Local resources; Vermont Rural Protection Task Fore	2024-2025
Develop a public education program to educate residents about wildfire/brushfire risks and how to minimize the occurrence of wildfire/brushfire. (Mitigation)	Hartland Volunteer Fire Department	Medium	Local resources (FD)	2022-2023
Complete a comprehensive survey of potential dry hydrant sites to determine the need for additional sites and potential location, and install dry hydrants. (Mitigation)	Hartland Volunteer Fire Department; Planning Commission; Road Foreman	Medium	Local resources (FD)	2024-2025
Hazardous Material Spill				
Ensure that all emergency response and management personnel continue to receive HAZMAT Awareness training at a minimum.	Hartland Volunteer Fire Department	High	Local resources (FD)	Annually
Conduct a tabletop exercise to run through a hazardous materials incident scenario.	Hartland Volunteer Fire Department, EMD	Low	VEM; TRORC; local resources	2022-2024
Work with Tier II Facilities in Hartland to properly plan for hazardous material incidents.	Hartland Volunteer Fire Department	Medium	Local resources	Annually

Mitigation Actions	Local Leadership	Prioritization	Possible Resources	Time Frame
Determine areas of Hartland that have a high volume of hazardous materials (such as transportation routes or Tier II facilities) and plan for potential incidents.	Hartland Volunteer Fire Department	Medium	Local resources	2021-2022
Continuously stock gear to help contain small spills when they occur (booms, absorbent materials, etc.).	Hartland Volunteer Fire Department	High	Local resources (FD)	Annually
Flash Floods / Floods / Fluvial Erosion				
Maintain the geo-referenced culvert inventory.	Road Foreman	High	Local resources; TRORC;	As culverts are replaced and/or upgraded
Maintain the program to regularly inspect culvert and bridges, as well as keeping to the culvert replacement schedule as recommended in the culvert inventory.	Road Foreman	High	Local resources; TRORC	As culverts are replaced and/or upgraded
Update the Hartland Road Erosion Inventory in order to properly identify and mitigate high erosion areas in town.	Road Foreman	High	Local resources; VTrans	2024-2025
Clear and maintain town road rights-of-way, and work with local utilities to request that utility corridors are cleared and maintained, as needed. (Mitigation)	Road Foreman	High	Local resources	As needed
Identify frequently flooded roads and bridges. (Mitigation)	Road Foreman and Town Manager	Medium	Local resources	Annually
Extreme Cold / Snow / Ice				
Plan for, budget and maintain roads for safe winter travel.	Road Foreman, Selectboard, Town Manager	High	Local resources	Annually
Identify populations that are vulnerable to extreme cold and make a plan to assist them, if necessary, in the event that it occurs.	EMD (Town Manager), Health Officer, Fire Department	High	Local resources	Annually / On-Going

Mitigation Actions	Local Leadership	Prioritization	Possible Resources	Time Frame
Develop a plan for communicating shelter information to residents and especially to populations that are vulnerable to extreme temperatures.	EMD (Town Manager); American Red Cross	High	Local resources; VEM	2021-2022
Severe Wind				
Identify hazard trees in town rights-of-way (and those at risk at damaging other public infrastructure) and remove them to mitigate damage from severe wind storms.	Road Foreman; Conservation Commission	High	Local resources	On-going/as needed
Work with Green Mountain Power to identify vulnerable power lines and other infrastructure in Hartland.	Road Foreman	High	Local resources	2021-2022
Develop an educational program for private landowners on hazard trees and safety issues associated with them.	Road Foreman; Conservation Commission	Low-Medium	Local resources	2022-2023
Work with utilities to bury power lines and other utilities to prevent major power outages during severe wind storms.	Town Manager; Selectboard	Low	Local resources, Vtrans	2024-2025

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

IMPLEMENTING THE PLAN

Hazard Mitigation Plans have a life of five years once formally approved by FEMA. During those five years, it is up to the town to conduct an annual review of the mitigation actions laid out in this Plan to see what is

accomplished and what is to be accomplished. Figure 14 lays out the complete process of implementing and maintaining the Hazard Mitigation Plan.

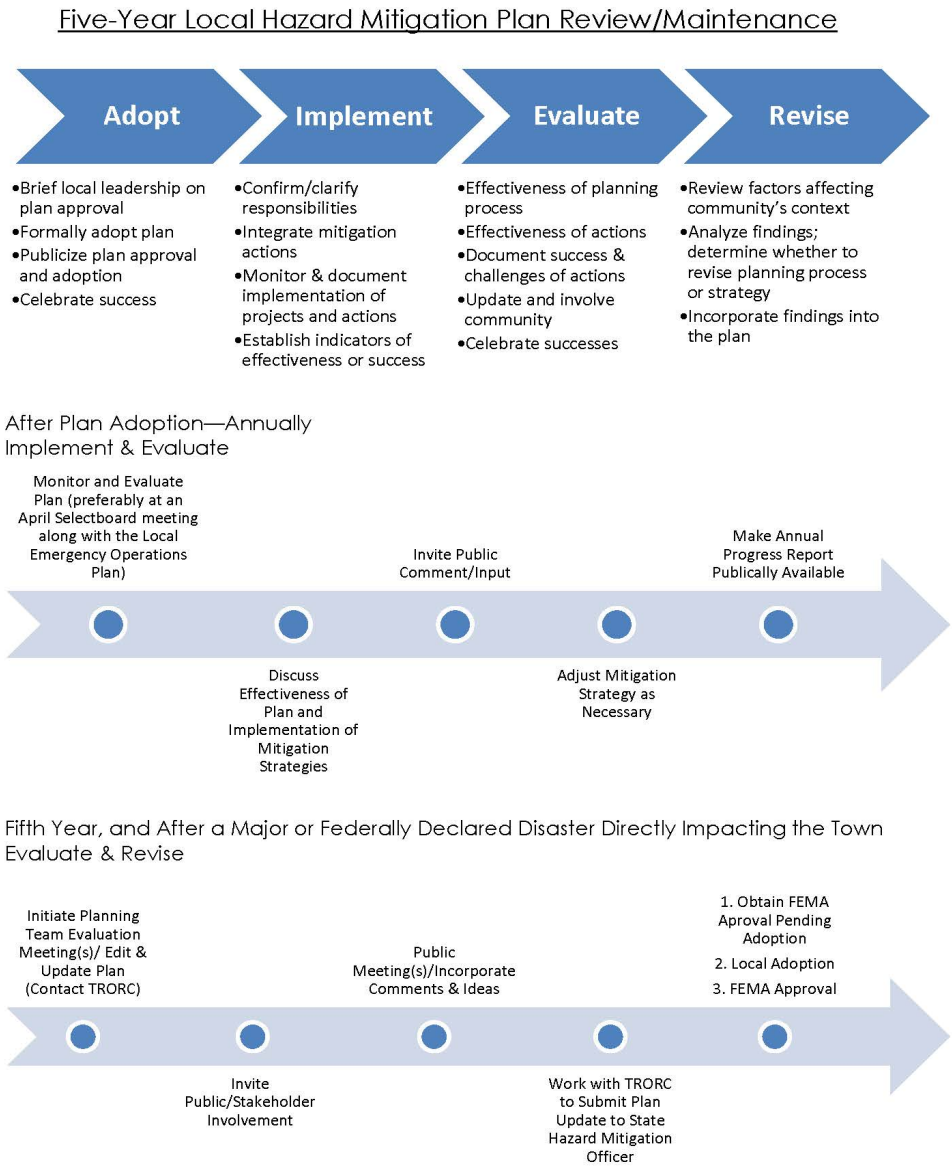


Figure 14: Five-Year Local Hazard Mitigation Plan Review/Maintenance