

Town of Reading
2022-2027 Local Hazard Mitigation Plan

Adopted by the Town of Reading Selectboard on December 12th, 2022

Effective December 23rd, 2022 – December 22nd, 2027

Prepared by
Town of Reading, Vermont
and
Mount Ascutney Regional Commission

CERTIFICATE OF ADOPTION

Town of Reading, VT
Selectboard
**A Resolution Adopting the
Town of Reading 2022-2027 Local Hazard Mitigation Plan**

WHEREAS, the Town of Reading has worked with the Mount Ascutney Regional Commission to prepare an updated hazard mitigation plan for the town to identify natural hazards, analyze past and potential future damages due to natural and man-made caused disasters, and identify strategies for mitigating future damages; and

WHEREAS, duly-noticed public meetings were held by the Reading Hazard Mitigation Committee and Reading Selectboard on October 24 and November 14, 2022 to present and receive public comment on the draft Plan; and

WHEREAS, the updated Town of Reading 2022-2027 Local Hazard Mitigation Plan demonstrates the community's commitment to implementing the mitigation strategies and authorizes responsible agencies to execute their actions; and

WHEREAS, the updated Town of Reading 2022-2027 Local Hazard Mitigation Plan was submitted to Vermont Emergency Management on November 17, 2022 and to the Federal Emergency Management Agency for review on 11/17; and

NOW, THEREFORE BE IT RESOLVED that the Town of Reading Selectboard hereby adopts the Town of Reading 2022-2027 Local Hazard Mitigation Plan for municipal use and implementation.

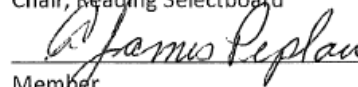
Duly adopted this 12th day of DECEMBER, 2022.

Reading Selectboard



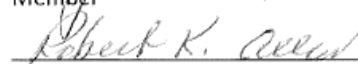
Chair, Reading Selectboard

Member



Member

Member



Member



FEMA

January 17, 2023

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

Dear Stephanie Smith:

As outlined in the FEMA-State Agreements for FEMA-4621-DR-VT, FEMA-4532-DR-VT, and FEMA-4474-DR-VT, your office has been delegated the authority to review and approve local mitigation plans under the Program Administration by States Pilot Program. Our Agency has been notified that your office completed its review of the Town of Reading 2022-2027 Local Hazard Mitigation Plan and approved it effective **December 23, 2022** through **December 22, 2027** 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 Sean Loughlin at (617) 832-4780 or Sean.Loughlin@fema.dhs.gov.

Sincerely,

Dean Savramis
Mitigation Division Director
DHS, FEMA Region I

DS:sl

cc: Brian McWalters, State Hazard Mitigation Planner, VEM
Caroline Paske, State Hazard Mitigation Planner, VEM
Ben Rose, Recovery and Mitigation Section Chief, VEM

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1. INTRODUCTION

This Local Hazard Mitigation Plan is intended to assist the Town of Reading in identifying and understanding the risks of natural hazard events to the community and developing strategies and actions that can be taken to improve the resiliency of the local community to hazard events. This is a single jurisdictional update on the 2017 Reading All Hazard Mitigation Plan.

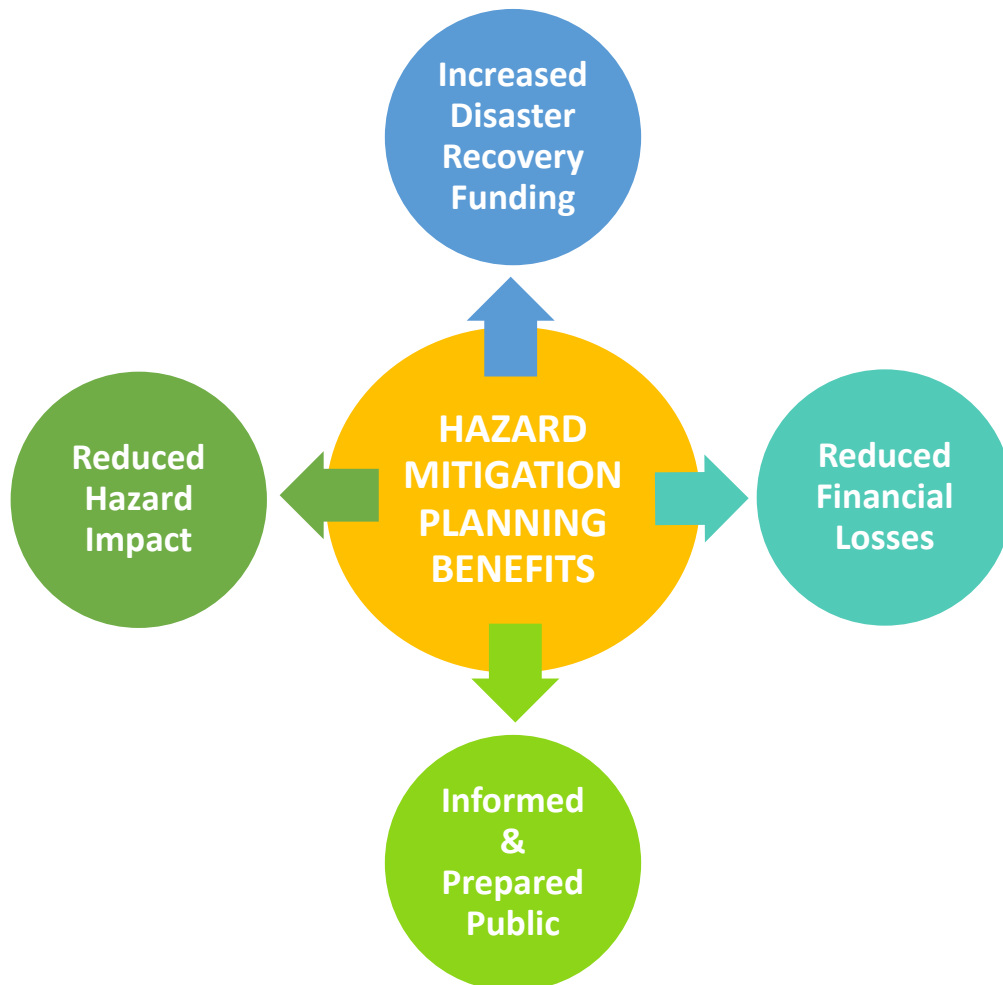
Local Hazard Mitigation Planning is the process of identifying strategies and policies to develop a long-term plan of action that will reduce or remove future risk and losses to a community caused by natural or man-made hazard events. This planning effort involved an assessment of local capabilities and resources, an awareness of historical and future hazard occurrences, an understanding of the potential impacts to life, local economy, infrastructure and the environment, and a determination of vulnerable areas and assets within the community. These efforts concluded with a list of actions that can be found in **Table 6** at the end of this plan that are to be monitored for progress over the next five-year period.

This plan will focus on assessing natural hazards and mitigating actions. The Reading community has provided input to this plan in the form of local and historic knowledge and experience.



2. PURPOSE

The Federal Emergency Management Agency (FEMA), Vermont Emergency Management (VEM), and local towns have come to recognize that it is less costly to take action to minimize the impact of natural hazards than to repeatedly repair damage after a disaster has struck. Hazards cannot be eliminated, but it is possible to determine what the hazards are, and which are more likely to occur and tend to have the greatest impact on a community. With some research and outreach, a local community can determine the extent and impact of these hazards and which assets and areas are most at risk. A culmination of these efforts is a working dynamic list of specific strategies and actions that can be taken to reduce the impact of these hazards on the community. This plan also recognizes and has identified opportunities for mitigation measures during all the other phases of emergency management: Preparedness, Response, and Recovery.



3. TOWN PROFILE

Reading is a small rural community located within Windsor County in southeastern Vermont, bordered by the towns of Bridgewater, Woodstock, West Windsor, Cavendish, and Plymouth. Reading is comprised of three small villages: Felchville, Hammondsville, and South Reading. State highways include VT Routes 44 and 106 connect with large population areas outside of town. Tyson Road, Twenty Mile Stream Road, and Knapp Brook Road are Class 2 town highways that serve as important connections to other communities. Tyson Road is notable as it provides access to South Reading and connects VT Route 106 in Felchville to VT Route 100 in Plymouth.

Reading is characterized by lower-density residential development, small commercial enterprises, and local employment opportunities based on agriculture, forestry, recreation, and other natural resources. The majority of land in Reading is characterized by steeply sloped and relatively inaccessible mountains and narrow stream valleys. There is little flat land, with only a limited amount of land having less than 10 percent slope. Elevations range from 2,600 feet on Long Hill to 700 feet along the banks of the North Branch of the Black River. These and other factors have naturally focused the most intensive development within a few small settlements.

Small and relatively flat corridors along the upper reaches of the North Branch of the Black River and Mill Brook are home to the more developed villages of Felchville and Hammondsville. Outside of these areas of concentrated development, especially along roads leading out of the villages, are lands that were traditionally used for agricultural purposes. Some of this land on the gentler hillsides and upland plateaus is still in use as farmland today, but a significant amount has been converted to residential use, both year-round and seasonal. The village of South Reading has a similar settlement pattern.

Most of the land in Reading, such as the more rugged and inaccessible areas mentioned above and other land such as long-abandoned farms, remains undeveloped and is used mainly for forestry, recreation, and conservation. Much of this land is publicly owned, either as Town or State Forest, and is at elevations above 1,500 feet. The prevailing topography of the land and limited access mean that Reading will likely remain a small community with its most intense development largely confined to the river valley lands along VT Route 106 (Table 3.1) (See Appendix A: Map 1 – Existing Land Use).

TABLE 3.1 - Distribution of Existing Land Cover

Land Cover Classification	Percentage of Total Land Cover
Developed*	1.2%
Farms and Open Fields	4.7%
Forested	89.7%
Wetlands**	4.8%

Source: Land Cover (VCGI, LiDAR Program, 2016)

*Developed land is derived from the Impervious Surfaces data set and is largely comprised of buildings and paved surfaces

**Since tree cover and wetlands often co-exist, there is considerable overlap between forested lands and wetlands

Because of Reading’s small population and limited financial resources, its transportation facilities consist exclusively of its road system and bridges. There are more than eight miles of private roads in Town, and 62 miles of public roads. The Town maintains 39.34 miles of Class 2 and 3 Town Highways. The Town has nearly 15 miles of Class 4 Town Highways. These are roads that belong to the Town but are maintained infrequently. Class 4 roads are valuable recreational resources for hikers, horseback riders, mountain bikers, snowmobilers, and cross-country skiers. There are also 0.25 miles of Legal Trails in Reading.

According to the 2020 American Community Survey 5-Year Estimates, Reading has a population of 439 individuals, showing a decrease of 230 residents (34%) since the 2010 ACS 5-Year Estimates, a staggering number when compared to the overall Windsor County decrease rate of 2.98% over the same period. The population of Reading is also aging, with 26.1% of residents falling in the 65 years and older age bracket.

Windsor County’s population of 55, 191 (2020 U.S. Census Bureau), experienced uninterrupted growth since 1950, averaging 7.9%. However, according to the Census, over the last decade from 2010-2020, the population of Windsor County has decreased by 2.98%, while the Vermont state population has increased by 2.77%. Windsor County’s population has been decreasing since 2000 from 57,481 to 55,275 in 2019. Conversely, over the same period, the median age and household income for the county have been trending up; now at 47.7 years of age and \$60,987, respectively.

As shown in Tables 3.2 and Table 3.3 below, the population of Reading has decreased by about 22.2%, decreasing from 564 in 1970 to 439 residents in 2020. In correlation with these changes, Reading’s age distribution has changed, resulting in increased percentages of residents aged 65 and older and lower percentages of individuals aged below 18 years old, exhibiting the obvious effects of an aging population in the area. The 65+ age group continued to grow steadily over time while other groups declined, illustrating the population’s age distribution changes over time. Median income for Reading in 2020 was \$58,906, falling slightly below the Windsor County average of \$60,987.

TABLE 3.2: Reading Population and Age Distribution (1970-2020)

Year	1970		1980		1990		2000		2010		2020	
Population	564		647		614		702		669		439	
Age	#	% of total	#	% of total	#	% of total	#	% of total	#	% of total	#	% of total
<5							37	5.3%	30	4.5%	12	2.7%
<18	195	34.6%			132	21.5%	7	1%	153	22.9%	49	11.2%
18-64							560	79.9%	373	55.7%	264	60.1%
>65	89	15.8%			109	17.75%	97	13.8%	113	16.9%	114	26%
READING: 439 total residents												

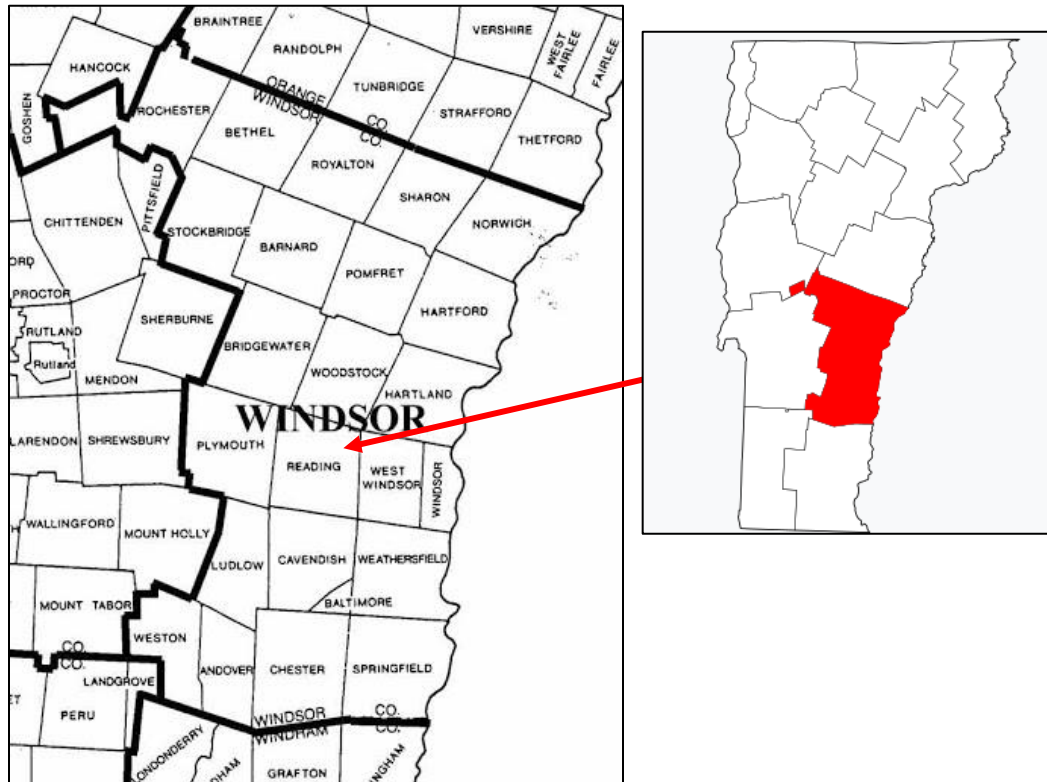
Source: U.S. 2020 Census Bureau

TABLE 3.3: Reading Population 65+ Age Distribution (1970-2020)

Age	Number of Residents	Percentage of Population
65-69 years	56	12.8%
70-74 years	22	5%
75-79 years	24	5.5%
80-84 years	10	2.3%
85 years and over	2	0.5%
TOTALS	Total Residents Aged 65+	Total % of Residents Aged 65+
	114	26.1%

Source: U.S. 2020 Census Bureau

Reading’s climate measures up to the rest of the state, as it is generally temperate with moderately cool summers and cold winters. Average annual rainfall is 47 inches, while the average annual snowfall is 84 inches. The weather can be unpredictable at times, with large variations in temperature, precipitation, and other conditions occurring both within and between seasons, particularly during fall and spring. This variation continues to grow with the effects of climate change.



Development Trends and Impact on Hazard Risk

The population of Reading is not anticipated to grow significantly for the next 20 years. Therefore, many of the identified public infrastructure goals are based upon maintaining the existing facilities, such as roadway maintenance and culvert replacements, as well as evaluating the feasibility of future water or wastewater infrastructure solutions. Considering recent trends, Reading aims to encourage economic development in ways that reinforce Village Center revitalization, maintain rural character, and preserve/enhance quality of life.

Floods are the most probable hazard event in Reading, with flash flooding posing the biggest risk for the community. Appendix A - Map 4: Water Resources Map shows surface waters as well as flood hazard and river corridor areas.

The floodplain for the North Branch of the Black River and tributaries that run into the North Branch widens out just south and east of the village of Felchville. North of Felchville is the Mill Brook watershed with flood hazard areas lying next to it and its two principal tributaries, Reading Hill Brook and Bailey Brook. Maintaining an undeveloped floodplain can provide a holding area for flood waters and can be important for filtering storm water runoff before it enters a waterway. Maintaining this area can also ensure that natural changes in channel form and alignment can be accommodated by the landscape. Natural readjustments that rivers and streams make can often prevent problems downstream in the future. Rivers and streams move over time. The mapped river corridors delineate those areas where development is subject to erosion hazard risks.

Tropical storm Irene demonstrated the importance of discouraging or preventing residential and commercial structures in floodplains and river corridors. These areas were inundated during the flood and were depositional sites for sediments and debris transported downstream during the event. While agricultural uses were negatively affected by flooding, losses were temporary and relatively less costly than if floodplain development had been permitted. A common but misguided post-flood response practice is to deepen stream channels and construct berms adjacent to floodplains to protect property from future flood damage. However, it has been proven such practices increase flood damage vulnerability rather than preventing or lessening the threat.

FEMA special flood hazard areas are designated along only the larger rivers and streams. Inundation flooding is possible along other watercourses. New developments adjacent to streams are discouraged to locate too close to stream banks to promote flood resilience. Wetlands, serve several important functions, including flood water retention. Maintaining this functionality of wetlands contributes toward mitigating flooding impacts in Reading.

Maintaining forest cover in rural upland areas and steep slope areas helps to maximize infiltration of water into the soil and minimize or slow down stormwater runoff in ways that mitigate flooding hazards to downstream locations. Efforts to minimize heavy cutting in forestry activities, limiting the extent and densities of developments, and properly managing stormwater in these uplands' areas will help contribute toward community flood resilience.

Reading's zoning bylaws include provisions for fifty-foot vegetated buffers along wetlands, streams, rivers, and public ponds to prevent erosion and sedimentation of surface waters. The Town adopted flood hazard regulations as an element in the zoning bylaws to minimize future flood damage and make properties eligible for flood insurance, whether located within or outside of the flood hazard areas. Adequate culvert and bridge sizing is an important consideration for reducing the potential for damages from future floods.

In the past 5 years, there have been no major developments or commercial permits issued in the town:

- 2017: None
- 2018: 1 new residential home
- 2019: 2 new cabins
- 2020: 1 new cabin, 1 new house
- 2021: 1 new cabin/camp
- 2022: Minor home additions (e.g. decks)

4. PLANNING PROCESS

The local planning process used to develop this hazard mitigation plan follows guidance by the Federal Emergency Management Agency (FEMA) and Vermont Emergency Management (VEM). The planning process began in April 2022 with a Reading Zoning Administrator (also a Selectboard member) reaching out to municipal staff and local volunteers to participate as members of a Hazard Mitigation Committee (HMC). A five-member Hazard Mitigation Committee was formed to direct the activities of the process with guidance from Mount Ascutney Regional Commission's (MARC) Community Development Specialist. All correspondence was via phone or email and meetings were conducted both virtually and in-person.

MARC staff had initial discussions with the Zoning Administrator of Reading to review the overall planning process. The discussion included the need for town input, the importance of the public participation and public notice procedure, VEM and FEMA review and approval process, and the timeline to complete the update. This information was forwarded to Committee also provided to committee members via email in April.

The Hazard Mitigation Committee was tasked with updating the plan and overseeing the public process. Committee members include representation from a cross-section of town departments and Boards. MARC staff conducted the meetings, provided data for the plan update, drafted the plan, and presented a review of the draft plan to the Selectboard during a Selectboard public meeting. Committee Members and participants are listed below.

Committee Members:

- Selectboard Chair/MARC Transportation Advisory Committee Representative
- Emergency Management Director
- Deputy Fire Chief
- Zoning Administrator/Selectboard Member
- Select Board Member

MARC Staff:

- Community Development Specialist
- Senior Planner
- Planner
- Assistant Planner

The Hazard Mitigation Committee members participated throughout the planning process either by scheduled virtual group meetings or via committee email correspondence and conference calls as outlined below.

The kick-off meeting with the Hazard Mitigation Committee began with an overview of the process with a discussion on the purpose of hazard mitigation planning, the planning process and timeline, and the importance of community outreach and public involvement. Hazard Mitigation Committee members and meeting schedules were determined at that time and a procedure was discussed on how to engage the

local community to participate. The process proceeded with the tasks and timeline as depicted in **Appendix C: Town of Reading 2022-2027 Local Hazard Mitigation Plan Process Flow Chart**. The sign-in sheets of attendees and public notice can be found in **Appendix B: Sign-in Sheets and Agendas**.

Early in the process each hazard was assessed for the probability of future occurrence and the potential impact each would have on life, infrastructure, the local economy, and the environment. Vulnerable areas and assets were identified during the hazard assessment as part of the discussion on historical impact (**Section 5.1: Hazard Probability of Occurrence and Impact Assessment**).

As part of the update process, the Hazard Mitigation Committee conducted a review of the status of prior plan actions and other progress made in mitigation and preparedness (**Section 4.3: Previous Plan Period Mitigation Actions**). Municipal capabilities and available resources for hazard mitigation planning and implementation were also discussed and suggestions made for improving effectiveness (**Section 4.3: Review of Town Progress, Resources and Capabilities**). A thorough review of the Town Plan policies and recommendations identified common strategies which generated ideas for new mitigation actions (**Section 4.3: Review of Reading Town Plan**).

This is an extensive update to the previous plan and includes a number of revisions and improvements. The following is a partial list of revisions:

- General updates to Town profile and town maps with new graphics and visuals.
- Inclusion of an easy-to-read Process Flow Chart to depict and manage the planning process.
- Reorganization/restructuring of the plan contents to better reflect required FEMA elements.
- Reevaluation of hazards with a new methodology for scoring similar to that of the Vermont State 2018 Hazard Mitigation Plan to better recognize the integral nature of hazard events and hazard impacts and how hazards can impact a community in different ways.
- Update of hazard data using new data sources and more local data.
- Prioritization of mitigation strategies/actions and correlation to plan goals and incorporation of phasing large projects.
- Recognition of specific prior actions completed but not previously identified in prior plan.
- Review and integration of new relevant reports and documents.
- A formalized Plan Monitoring process to maintain focus on plan goals and to encourage progress, annual reporting, recording of local hazard events, identification of new vulnerable assets, and public outreach over the plan period.

4.1 Public Involvement

Four planning meetings were held in total, and **three** were publicly noticed. Public Notices can be found in Appendix B. The notice was posted on the Town website, as is customary for the Town, and the [Reading Update page](#) on the MARC website. A link inviting the public to participate in the virtual meetings was offered. The webpage posted meeting schedule, agendas and planning documents and materials for public access. The notice and webpage encouraged participation and requested public comment on planning topics with templates to provide information on hazard events and local impact. The Town Manager and Selectboard members were tasked with keeping the Town Selectboard and relevant commissions abreast of the planning progress and noticed meetings and to encourage participation to attending public. No public input was received during the planning phase.

Public Release of First Draft

A first draft was released for public review on September 30, 2022. The Public Review Process included:

- An electronic copy posted on the Town website that circulated to individual members of the Board of Selectmen and Planning Commission, requesting comments from the local boards and community.
- An electronic distribution made to adjacent towns (Plymouth, Bridgewater, Woodstock, Hartland, West Windsor, Weathersfield, Cavendish, and Ludlow) via email to respective Town Clerks with a request to post the draft on their websites and provide a copy to their Planning Commission and Selectboard members. All distributions included the following:

"The Town of Reading is seeking comment on its 2022-2027 Local Hazard Mitigation Plan draft. The purpose of this planning effort is to improve Reading's resiliency to natural hazards through hazard assessment, recognition of vulnerable assets, and identification of mitigating actions and strategies to reduce the impact of these hazards on the community. The neighboring town communities are also invited to attend the Reading Hazard Mitigation Committee meeting of October 24 2022 at 6 PM for a review of the draft plan. Please feel free to forward any questions or comments to Bob Allen, Town Manager at readingvermont@comcast.net by November 7th, 2022. We welcome all input."

Following the public release of the first draft, an additional publicly noticed Select Board meeting was held to review the draft. There were no comments or questions at this meeting. The Town did not receive any feedback on the draft from the public or from neighboring communities. The final plan draft will complete the Vermont State Hazard Mitigation Officer review for referral to FEMA for Approval Pending Adoption (APA). Following APA, the Town may then adopt the Local Hazard Mitigation Plan and forward a copy of the adoption resolution for FEMA to complete the plan approval and adoption process. The final adopted Local Hazard Mitigation Plan will also be posted on the Town and Mount Ascutney Regional Commission websites and made available at the Reading Town Offices.

4.2 Resources Consulted

Several plans, studies, reports, and technical information and web data sources were consulted in addition to local input during the preparation of this plan. These sources provided data on hazard extent and historical trends, and ideas for new hazard mitigation actions. A partial listing of these sources includes the following:

- Local Hazard Mitigation Plan, Town of Reading (Adopted April 2017)
- Reading Town Plan (Adopted February 2022)
- Black River Corridor Plan, (July 2009)
- River Corridor Plan for Mill Brook (May 2015)
- Reading Zoning (2019)
- Bridge and Culvert Inventory (2016)
- Road Condition Inventory (2019)
- [U.S. Census Bureau](#)
- [NOAA Storm Events Database](#)
- [Vermont Division of Fire Safety](#)
- [U.S. Climate Data](#)
- [USGS WaterWatch](#)
- [FEMA Disaster Declarations](#)
- [Vermont Agency of Natural Resources-Flood Ready](#)
- [State of Vermont 2018 Hazard Mitigation Plan](#)
- [Drought.gov](#)
- [Valley News articles](#)
- [Mount Ascutney Regional Commission for mapping data](#)

4.3 Review of Town Progress, Resources, and Capabilities

Previous Plan Period Mitigation Actions

Table 4.1 below lists the mitigation and preparedness projects and actions from the previous Town of Reading 2017-2022 All Hazard Mitigation Plan (adopted April 10, 2017) and indicate the status of each as determined by the Hazard Mitigation Committee. Most of these actions have been completed. Other actions that are ongoing or uncompleted were reevaluated for inclusion in Table 6: 2022-2027 Mitigation/Preparedness Strategies and Actions at the end of this document. Others were deemed to be ineffective or unnecessary and have been dropped.

TABLE 4.1 Status of Previous Plan Mitigation Actions

2016 MITIGATION ACTION (*Indicates Action to be included in this update)	2022 STATUS
Create redundant power supply for critical facilities-Town and School	Completed for all critical facilities; School Board have been encouraged to consider installing school generators, but this will not be pursued further
Incorporate River Corridor Plan recommendations (Appendix C) into prioritization of capital spending on maintenance and upgrade of roads, bridges, culverts and ditches*	Ongoing; Since 2016 there has been work on many of the stone lined roads and at least 15% of hydraulically connected road segments and a Mill River Corridor Plan site level project (RE22) floodplain restoration in Bailey Mills area; This action has been modified and included in 2022-2027 Mitigation Actions as two separate actions to distinguish between MRGP compliance and other river corridor plan recommended actions
Identify vulnerable roadways and improve drainage through additional ditching and culverts with a focus on major evacuation routes*	Ongoing; Action has been modified and carried over to 2022-2027 Mitigation Actions to comply with MRGP program requirements
Assess the vulnerability of critical town infrastructure facilities in River Corridor and determine specific mitigation options	Completed. It was determined that critical town infrastructure is not within a flood hazard area or river corridor and not vulnerable to flooding
Provide informational materials and buyout options to at-risk residential and commercial structure owners within River Corridor*	Not completed; has been modified and carried over to 2022-2027 Mitigation Actions
Implement annual awareness program for residents in early fall on the hazards of home heating and chimney fires.	Completed; In-place and Ongoing; Action combined with other fire safety awareness actions in 2022-2027 Mitigation Actions
Review “FireWise” program, determine effectiveness, and incorporate new programs*	Completed; Continue to review annually, carried over to 2022-2027 Mitigation Actions
Work with SWCRPC to actively seek funding opportunities for HM recommendations in River Corridor Plans including conservation easements, bank restoration, debris and berm removal*	Ongoing; Carried over to 2022-2027 Mitigation Actions
Review identified site specific mitigation measures recommended in River Corridor Plans (Appendix C) and develop a plan to address those that are doable based on funding and available personnel*	Completed recommended site-level project (#RE22) floodplain restoration in Bailey Mills area; action item is ongoing and has been modified and carried over to 2022-2027 Mitigation Actions

2016 MITIGATION ACTION (*Indicates Action to be included in this update)	2022 STATUS
Work with SWCRPC to incorporate hazard mitigation plan into long-term planning process and Town Plans	Completed; the Town has updated flood regulations (2019) to include river corridor overlays to reduce flood risk and has recently updated the Town Plan (adopted 2022) to include a section on flood resiliency and specific flood and erosion mitigation actions that are listed in 2022-2027 Mitigation Actions
Work with SWCRPC to Update Flood Hazard Regulations to include river corridor overlay and discourage development in FEH areas (Appendix C)	Completed in 2019
Continued hazardous materials training	This action item is related to a man-made hazard and has been removed from the LHMP
Work with State agencies to update management plans for State Lands located in town to reduce fuel (woodland) for wildland fires*	Not completed; carried over to 2022-2027 Mitigation Actions for further consideration
Assess vulnerability to spread of fire of critical town infrastructure facilities in close proximity and determine specific mitigation options if needed	Not completed; Action has been dropped as there are no feasible mitigating actions to be implemented and vulnerability is low

*2016 Mitigation Actions carried over to this update and listed in **Table 6: 2022-2027 Mitigation/Preparedness Strategies and Actions.**

Review of the Town Plan

The Reading Town Plan was updated in 2021 and adopted February 14th, 2022. Compared to earlier plans, the community is making strides in its efforts to address sustainable development, natural resource conservation, flood resiliency, and hazard mitigation. The current Town Plan includes information that outlines the importance of:

- Maintaining wetlands
- Maintaining rural upland areas to minimize storm runoff
- Discouraging and preventing residential and commercial structures in the floodplain
- Creating and maintaining vegetative buffers along wetlands, streams, rivers, and public ponds
- Continuing to create adequate culvert and bridge sizing

The Reading Town Plan has outlined goals, policies, and recommendations related to hazard mitigation which can be found in **Appendix D**. Upon review, the Hazard Mitigation Committee has identified mitigation strategies and actions that will meet objectives for both the Town and Hazard Mitigation Plans. These proposed actions can be found as noted in **Table 6: 2022-2027 Mitigation/Preparedness Strategies and Actions.**

Status of Community Resources and Capabilities

Table 4.2 is a compilation of community resources and capabilities including town authorities, policies, and programs, which can be helpful in reducing hazard risk for the community. Each was evaluated for effectiveness in attaining hazard mitigation goals and for opportunities for improvement. These resources and capabilities are useful in regulating development, building design, environmental conservation, and best management practices to reduce flooding and erosion. They are critical in providing an effective local emergency response.

Reading currently participates in the National Flood Insurance Program (NFIP) and will continue to regulate floodplain use through the Flood Hazard Regulations (Section 5.5 of the Town Zoning Ordinance) as adopted in 2019. These regulations are based on flood elevations and floodway limits and data provided by the NFIP Flood Insurance Study and accompanying maps, or as provided by FEMA when not available through the NFIP. Continued enforcement of these regulations by the Reading Administrative Officer will maintain Reading’s compliance with the NFIP. The Administrative Officer is charged with implementing these regulations and, in concert with the Development Review Board, advising residents on floodplain development.

TABLE 4.2: Status of Community Resources and Capabilities

Resource	Description	Effectiveness in implementing HM Goals	Opportunities for Improving Effectiveness/Status
2022 Town Plan (updated and adopted 2/14/2022)	Plan for coordinated town-wide planning for land use, municipal facilities, etc., updated every 8 years.	Effective in addressing development in hazard areas, including floodplains. The most recent update adopted the LHMP to become part of the Town Plan to serve as the Flood Resiliency.	Last Town Plan update incorporated, by reference, the LHMP which will increase the effectiveness of the LHMP by drawing town planning and operational efforts to HM goals and actions.
Local Emergency Management Plan (LEMP) (Adopted 5/9/22)	Basic municipal procedures for emergency response Updated annually.	Effectively outlines procedures for call-outs, evacuation, etc.	VEM updated the LEMP process in 2019 to allow towns more planning flexibility. Additional planning resources available online at VEM . No improvements to be made by Town.
Mount Ascutney Regional Emergency Management Committee	Regional organization comprising of members from all MARC towns as well as other emergency services professionals, involved in regional hazard mitigation planning.	REMCs create an important partnership between residents, local government, and industries to protect communities from hazardous materials incidents, emergencies, and disasters.	The transition to REMCs will be more effective for hazard mitigation towns in small towns for hazards such as flooding. The REMC will produce a Regional Emergency Plan.

Resource	Description	Effectiveness in implementing HM Goals	Opportunities for Improving Effectiveness/Status
Regional Emergency Management Plan (Drafted in 2022, to be adopted)	Municipal and regional procedures, resources, and mutual aid agreements for emergency response. Updated annually.	Effectively outlines procedures, resources, and capabilities.	Review draft and vote to adopt at Regional Emergency Management Committee meeting.
School Emergency Response Protocol	School procedures for emergency response.	Utilizes template provided by state; provides a checklist of actions for use by administrators and first responders. Effective to reference during emergency situations.	Coordinating all three (Police, Fire and Ambulance) emergency response services and procedures is in progress and will improve effectiveness.
Mutual Aid – Emergency Services (MAES)	Agreement for regional coordinated emergency services and state assistance if requested. Member of Upper Valley Regional Emergency Services Association.	Effective in providing additional response capacity for the Town to be able to more effectively respond to a large-scale emergencies in Reading.	The Town has put in place a mutual aid agreement with its neighboring and surrounding towns to improve response time. Effectiveness can be improved through regular regional exercises.
State Road & Bridge Standards (Adopted 7/29/2019)	Town complies with State design and construction standards for roads and drainage systems.	Effective through their continued implementation.	Continued implementation of State Road standards is critical to effectiveness. No improvements to be made by Town.
Town of Reading Zoning Ordinance (Adopted 7/8/2019)	Zoning, Subdivision and Flood Damage Prevention Regulations are now consolidated into one ordinance document.	Effective in regulating, limiting, or guiding development in known hazard area and river corridors, and in ensuring conformance with Town Plan.	Consolidation of all bylaws and incorporation of river corridor regulations has improved effectiveness. No additional updates are planned at this time.
Zoning Administrator and Town Clerk	Ensures compliance with zoning codes and Flood Hazard Area Regulations.	Effective in implementing zoning bylaws to minimize flood hazard risk	Effectiveness determined by periodic updates in zoning and FHA regulations. Outreach to public to create awareness of regulations and their role in hazard mitigation may improve effectiveness.

Resource	Description	Effectiveness in implementing HM Goals	Opportunities for Improving Effectiveness/Status
National Flood Insurance Program (NFIP) (Compliant since 5/4/1989)	Provides ability for residents in participating communities to acquire flood insurance.	Covers damage caused by flooding and informs residents of flood risk and homeowner tools for flood mitigation. Effective in ensuring that future development is safe from flooding.	Town is committed to continued compliance. Public Outreach on program and flood maps.
Infrastructure & Road Maintenance Programs	Bridge & Culvert Inventory, updated every 3 years.	Effective at tracking and planning for upgrades to most vulnerable infrastructure.	Annually inventory updates and proactive planning to incorporate identified needed upgrades through available clean water and road improvement grant programs can improve effectiveness. Conducted regularly by Town Road Foreman.
Access Permits	Regulates driveway access along town-maintained roads and in flood hazard areas.	Effective in limiting the number of road cuts and in reducing the potential for transportation issues and flooding and erosion with culvert size requirements	Continued enforcement of access permit regulations and incorporating Flood Hazard Area requirements as updated. No improvements planned by Town at this time.
Municipal Roads General Permit (MRGP)	State Standards have been updated to include the MRGP to control runoff and drainage on hydrologically connected road segments. Compliance is being phased in over time.	Effective in controlling road erosion and stormwater run-off from roads with implementation of Best Management Practices. Current update requires prioritization and planned implementation schedule of identified road segments. Provides funding source for compliance.	Work with regional planners to actively pursue available funding opportunities to implement recommended improvements on hydrologically connected road segments. Be proactive in preparing and annually monitoring an implementation plan for compliance.
Mount Ascutney Regional Commission	Regional organization working to further Emergency Management and Hazard Mitigation goals.	Effective in assisting towns in Hazard Mitigation Planning and other municipal planning efforts and with application assistance for project funding.	The RC can improve the planning process and investigate additional sources of historical and statistical data for identified hazards.

Resource	Description	Effectiveness in implementing HM Goals	Opportunities for Improving Effectiveness/Status
Technical Resources			
Reading MRGP Road Segment Inventory (2019)	State Program provides an assessment of hydrologically connected road segments for erosion and requires a local plan for achieving compliance.	Effective in identifying road sections that are vulnerable to erosion and suggests Best Practices to improve resiliency and bring segments up to MRGP Standards.	The Inventory report prioritizes assessed segments and can be used to identify the higher priority or most vulnerable sections.
Town of Reading Road Erosion Inventory Report (2016)	These state funded reports were produced every few years to assess site specific vulnerabilities to erosion.	Identifies and prioritizes road erosion issues and recommended actions with cost estimates.	This report is most effective when considered for capital budgeting, infrastructure upgrades and planning. It is no longer produced but some identified sites may still be relevant.
2018 Tactical Basin Plan for Black and Ottauquechee Rivers (2018) and Black River Corridor Plan (2009)	These reports provide detailed analyses of current conditions and watershed-wide and site-specific recommendations.	Recommended actions are prioritized based on effectiveness for improving flood resiliency and water quality in rivers and streams.	Effectiveness can be improved if these documents are consulted for project implementation on a periodic basis and incorporate these projects into other town planning activities.
River Corridor Plan for Mill Brook in Windsor, West Windsor, and Reading, Vermont (2015)	This report provides detailed information about river and watershed status and recommendations for restoration projects.	Recommended actions are prioritized based on effectiveness for improving flood resiliency and water quality in rivers and streams.	Effectiveness can be improved if this document is consulted for project implementation on a periodic basis and incorporate these projects into other town planning activities.
Flood Ready Vermont	An online-map tool that provides mapping data to identify areas at risk of flood or fluvial erosion. Provides community risk assessment reports and references for reducing flood risk.	Effective at providing a wealth of public information on everything flood related in a community in a very concise and organized interactive web portal.	Effectiveness can be improved if the website can be better promoted through outreach or work with MARC to develop an instructional training program on Flood Ready tools.

5. HAZARD IDENTIFICATION AND ASSESSMENT

The following assessment addresses all of the hazards identified during the hazard analysis. The probability of occurrence and impact to the town were used to assess the town's vulnerability to each hazard and can be found in **Section 5.1**. Following this assessment, it was determined that only those hazards that were more likely to occur were further examined for historical occurrence and extent of impact, and trends and community risk as outlined in **Section 5.2**.

5.1 Hazard Probability of Occurrence and Impact Assessment

A hazard vulnerability assessment for Reading began with identifying all possible natural hazards as addressed in the *2018 Vermont State Hazard Mitigation Plan*. The group performed two assessment exercises, similar to the approach that was used in the State plan. This type of approach was helpful in that it distinguished between hazard events and hazard impacts. For example, **Wind** is a hazard impact from different hazard event types: Hurricanes, Thunderstorms and Winter Storms and **Erosion** can result from Tropical Storms, Ice Jams, Thunderstorms or spring melt during an extreme heat event. This new approach to the assessment allowed for better focus on the probability and risk of the impact of flooding, for example, rather than on the weather event itself.

The first exercise was to generate a **Hazard Event Probability Score** for each hazard event based on the frequency of historical occurrence and the projected occurrence over the plan period, given expected changes in climate. These scores are shown in **Table 5.1 Hazard Events Assessment** along with a listing of possible impacts from each event type.

The second exercise listed all possible hazard impacts and generated a **Potential Hazard Impact Score** by considering the potential severity and extent of damage and disruption to the population, property, public services, the economy, and the local natural environment. An overall **Hazard Assessment Score** was calculated by multiplying the Potential Hazard Impact Score times a Hazard Event Probability Score. These are shown in **Table 5.2 Hazard Impact Assessment**. The methodology used for each of these exercises is detailed below each table.

A discussion of each of the hazards is given in the proceeding **Subsections 5.2a through 5.2f**. Only natural hazards were further evaluated for this update. The **Hazard Profile and Assessment** in **Section 5** provided a basis for the selected implementation strategies and actions listed in **Table 6: 2022-2027 Mitigation/Preparedness Strategies and Actions**.

TABLE 5.1 Hazard Events Assessment

Hazard Events	Historical Occurrence	Probability of Future Occurrence	Event Probability Score	Types of Potential Hazard Impact from Event
Score Range	1 to 4	1 to 4	Average	(See Scoring Methodology)
Rainstorm / Thunderstorm	4	4	4	Fluvial Erosion/Erosion, Landslide/Slope Failure, Lightning, Inundation Flooding
Hurricane / Tropical Storm	1	2	1.5	Fluvial Erosion/Erosion, Lightning, Landslide/Slope Failure, High Wind, Inundation Flooding
Winter Storm	4	4	4	Ice, Heavy Snow, Extreme Cold, High Wind
Drought (Defined by committee as long periods of no rain even if there is rain a few times during the season)	2	2	2	Extreme Heat, Wildfire, Drought
Wildfire	2	2	2	Wildfire, Structural Fire, High Wind
Ice Jams	2	3	2.25	Ice, Landslide/Slope Failure, Inundation Flooding
Extreme Cold	4	4	4	Ice, Structural Fire, Extreme Cold
Extreme Heat (Defined by committee as 2 or 3 days in a row where the temperature reaches over 90 degrees)	4	4	4	Extreme Heat, Wildfire, Drought
Earthquake	1	1	1	None
Tornado	1	1	1	Lightning, Structural Fire, High Wind, Hail
Dam Failure	1	1	1	Fluvial Erosion / Erosion, Landslide / Slope Failure, Inundation Flooding
Infectious Disease	1	1	1	Infectious Disease
Transportation Incidents	4	4	4	None
Water Supply Contamination	N/A	N/A	N/A	N/A

Potential Hazard Impact Scoring Methodology

Historical Occurrence: Relative frequency of occurrence experience in the past 10 years

- | | |
|-------------------------|--|
| 1 = Rarely | 0 to 2 occurrences |
| 2 = Few Occurrences | 2 to 5 occurrences |
| 3 = Several Occurrences | 5 to 9 occurrences |
| 4 = Annual Occurrence | 10 or more occurrences or typically experienced at least once annually |

Probability of Future Occurrence: Probability of occurrence over next 10 years.

- | | |
|-------------------|--|
| 1 = Not Likely | Not expected to occur |
| 2 = Occasionally | Could plausibly occur at least once |
| 3 = Likely | Likely to occur in any one year |
| 4 = Highly Likely | Highly likely to occur at least once in any one year |

Types of Hazard Impacts: Examples of types of impacts should a hazard event occur.

Fluvial Erosion/Erosion	Landslides/Slope Failure	Inundation Flooding
Ice/Ice Jam	Heavy Snow	Hail
Extreme Heat/cold	Drought	Wildland/Structural Fire
High Wind	Lightning	Infectious Disease
Invasive Species	Transportation Incidents	
Water Supply Contamination		

TABLE 5.2 Hazard Impact Assessment

<i>Hazard Impacts</i>	Probability Score	<i>Potential Hazard Impact (Score 1-4)</i>					<i>Hazard Assessment Score</i>
		Infrastructure	Life	Economy	Environment	Avg.	
<i>Inundation / Flash Flooding</i>	4	3	1	1	2	1.75	7
<i>Fluvial Erosion</i>	4	1	1	1	3	1.5	6
<i>Erosion</i>	3	2	1	1	2	1.5	4.5
<i>Slope Failure</i>	2	1	1	1	1	1	2
<i>Ice Jam</i>	2	1	1	1	3	1.5	3
<i>Heavy Snow</i>	3	1	1	1	2	1.25	3.75
<i>High Winds</i>	3	1	1	1	2	1.25	3.75
<i>Hail</i>	2	1	1	1	1	1	2
<i>Lightning</i>	2	1	1	1	1	1	2
<i>Extreme Cold</i>	4	2	1	1	1	1.25	5
<i>Extreme Heat</i>	4	2	1	1	1	1.25	5
<i>Wildfire</i>	2	3	1	1	3	2	4
<i>Structural Fire</i>	3	3	1	1	3	2	6
<i>Earthquake</i>	1	1	1	1	1	1	1
<i>Drought</i>	2	1	1	2	2	1.5	3
<i>Dam Failure</i>	2	1	1	1	2	1.25	2.5
<i>Invasive Species</i>	2	1	1	1	2	1.25	2.5
<i>Infectious Disease</i>	3	1	3	3	1	2	6

Potential Impact: Probability of a Significant Impact defined as ‘Severity and extent of damage and disruption to population property, environment and the economy’

- 1 = Negligible Isolated occurrences of minor property and environmental damage, minor disruption of critical facilities and infrastructure, potential for minor injuries, no to minimal economic disruption
- 2 = Minor Isolated occurrences of moderate to severe property and environmental damage, brief disruption of critical facilities and infrastructure, potential for injuries, and minor economic disruption
- 3 = Moderate Severe property and environmental damage on a community scale, temporary shutdown of critical facilities, injuries or fatalities, short-term economic impact
- 4 = Major Severe property and environmental damage on a town-wide or regional scale, shutdown of critical facilities, and/or multiple injuries or fatalities, significant economic impact

5.2 Hazard Profile

While the assessment scores in **Table 4b** are not intended to prioritize hazard risk, they can be used to get a general sense of which hazards are of greatest concern to the Reading community. The Hazard Mitigation Committee had decided that only those natural hazards which scored over a "3" or greater out of a possible 16 were considered for evaluation and are profiled in this plan. These are highlighted in the **Table 4b** above.

The HMC decided to exclude infectious disease outbreak from detailed profiling, as these are human-caused events rather than natural disasters. The HMC decided that the following additional hazards (described below) will be excluded from detailed discussion given that the likelihood of occurrence is either very low with no account of recent local occurrence or the hazard impact is very isolated or minimal. Accordingly, and due to a lack of resources and capacity at the town, these hazards will not be discussed in detail in this plan.

Subsections 5.2a through 5.2f provide additional detail of each of the hazards determined to be most relevant to the Town of Reading. and include a description of the hazard and its general impact on a community; a discussion of historical local occurrences and extent of the hazard impact based on available data; and hazard trend and determination of populations and community assets at risk.

The following hazards were determined to be of lower priority for reasons noted below. For more information on these hazards, the reader is directed to the [2018 Vermont State Hazard Mitigation Plan](#).

Slope Failure is a real threat along river corridors as a result of erosion. Should they fail and block an underpass, some isolated flooding could occur. The scope to mitigate this hazard is beyond the jurisdiction and capability of the Town and is not covered here. Flood mitigation efforts upstream may help to reduce this risk. During Irene, upstream debris from a mass failure up on Bailey's Brook blocked a bridge at the junction of Baileys Mill and Town Hill Roads. However, this is not a populated area, and a future occurrence is low.

Hail and **Lightning** do occur but very rarely and have not resulted in reported damage to the Town of Reading. These incidents are very difficult to predict or mitigate and can only be addressed through preparedness and effectiveness of emergency response. Regional weather warnings and safety measures are issued when an extreme event is projected. The Town indicated that homeowner's insurance provides sufficient assistance with any damages.

Although **Earthquakes** can be significant hazards, the likelihood of occurring in Reading over the plan period would be negligible for New England per the Vermont State Hazard Mitigation Plan. Local regional recollection of this type of hazard occurring has been the sensation of minor tremors felt from distant events.

Dam Failure may occur with small ponds or beaver dams but would cause very isolated flooding issues.

Invasive Species is a recognized hazard and has increased since the ravaging of Tropical Storm Irene in 2011. Infestations of local plant species can be considered here in future planning as the impacts of the

Emerald Ash Borer and White Pine Needle Disease progress with regional mitigation efforts. This is recognized as a secondary hazard with risk to town infrastructure and residents.

Reading is a small rural town, and much of the town-specific data for these natural hazards does not exist. Previous occurrence hazard data specific to Reading has been provided where available. Where no town-specific data exists, the most relevant available data or information has been provided, such as county, regional or state data, or data from a neighboring town. Reading will strive to improve the recording and maintenance of local hazard data and has included this as part of the monitoring process for this plan.

Changes from Prior Plan Hazard Assessment

A comparison was made to the prior plan's hazard assessment with notable changes listed below. Changes in the methodology used for the hazard assessment exercise and recent and trending climate extremes in wind, temperature and precipitation events are reflected in these differences.

- Flooding and related erosion continue to be a priority given the Town's geographical characteristics; Reading sits in the headwaters of Mill Brook, Ottauquechee River, and the Black River
- High Wind is now identified separately as a significant hazard impact from winter storms and severe weather events with a high probability of occurrence and prevalence of higher wind gusts.
- Structure Fire and Wildfire continue to be a priority given a high probability of occurrence from a number of natural and manmade events and risk of death or injury.
- Drought is now recognized as a notable and increasing risk to the community with more frequent extended periods of extreme heat and variability in precipitation events.
- Plant Infestations due to climate change are beginning to gain recognition. While more information is needed, the Town recognizes that this could become a hazard for town roads and infrastructure.
- Transportation incidents are not considered a natural hazard by FEMA although they are closely tied to road conditions following a hazard event. Therefore, the Town recognizes that transportation related hazards would be addressed through mitigation of natural hazards such as ice and heavy snow.

The types of hazards having the greatest impact on a regional basis can be gleaned from **Table 5.3**, a listing of **FEMA Disaster Declarations for Windsor County** since 1990. It can be seen from this table that these are typically severe storms with heavy rains that cause flooding. Severe Winter Storms also occur; however, harsh winters are a "way-of-life" in Vermont and the Reading Town Highway Department is accustomed to operating in heavy snows and low temperatures. Other hazards such as flooding, wildfires, ice jams and landslides are more localized and characteristic of a town's topography, roadways, infrastructure, location of critical facilities, and land use and less likely to result in a federally declared disaster.

TABLE 5.3 Federal Disaster Declarations for Windsor County VT¹

Federal Disaster Declarations: Windsor County 1970 – 2020(current)			
FEMA Disaster	Date of Declaration	Description	Date Occurred
3567-EM-VT	August 22, 2021	Tropical Storm Henri	August 22, 2021
DR-4532-VT	April 8, 2020	Vermont COVID-19	January 20, 2020
EM-3437	March 13, 2020	Vermont COVID-19	January 20, 2020
DR-4445-VT	June 14, 2019	Severe Storms and Flooding	April 15, 2019
4330	August 16, 2017	Severe Storms and Flooding	June 29, 2012
4207	February 3, 2015	Severe Winter Storm	December 9-12, 2014
4140	August 2, 2013	Severe Storms and Flooding	June 25-July 11, 2013
4022	September 1, 2011	Tropical Storm Irene	August 27-September 2, 2011
1790	September 12, 2008	Severe Storms and Flooding	July 21-August 12, 2008
1715	August 3, 2007	Severe Storms and Flooding	July 9-11, 2007
1698	May 4, 2007	Severe Storms and Flooding	April 15-21, 2007
1488	September 12, 2003	Severe Storms and Flooding	July 21-August18, 2003
1336	July 27, 2000	Severe Storms and Flooding	July 14-18, 2000
1307	November 10, 1999	Tropical Storm Floyd	September 16-21, 1999
1228	June 30, 1998	Severe Storms and Flooding	June 17-August 17, 1998
1101	February 13, 1996	Storms and Flooding	January 19-February 2, 1996
938	March 18, 1992	Flooding, Heavy Rain, Ice Jams	March 11, 1992

¹ [FEMA Disasters Declaration Website](#)

5.2a Wildfire

Probability of Occurrence:	2
Average Hazard Impact:	2
Hazard Assessment Score:	4

Wildfire was identified as a notable hazard for the Town primarily because of the high probability of occurrence, although the impact of fire incidents is typically isolated.

Wildfires, which for discussion here include forest, brush, crop or grassland fires, are defined as “*An uncontrolled burning of woodlands, brush or grasslands.*”² While relatively uncommon within Vermont and the Town of Reading, large **wildland fires** are always a threat particularly for rural communities with large tracts of forested and vegetative land and have the potential to damage structures and utilities and croplands. A major wildfire can leave a large amount of scorched and barren land susceptible to erosion for many years, particularly on steep slopes and ridgelines.

Wildfire hazard can result directly from natural events such as lightning, particularly during periods of extended drought and extreme heat. These conditions provide more surface fuel for combustion and can extend underground along tree root systems following extended periods of drought. More often uncontrolled burns occur from a combination of dry conditions, high winds and human neglect or other human influences. Improperly disposed fire ashes and lit cigarettes are common causes. Unintentional human causes would include sparks from downed power lines, railcars and other vehicles or farm equipment. Continued and consistent enforcement of ‘red flag’ warnings is used to restrict controlled burning during the dry seasons.



A fire in the root system of a forest in Killington is difficult to contain and snuff out. Photo by Murray McGrath

² 2018 Vermont State Hazard Mitigation Plan

Wildfire History and Extent of Impact

The State Hazard Mitigation Plan’s analysis of wildfire threat states that *“Wildfire conditions in Vermont are typically at their worst either in spring when dead grass and fallen leaves from the previous year are dry and new leaves and grass have not come out yet, or in late summer and early fall when that year’s growth is dry”*.³ Wildfires can be ignited by lightning during a thunderstorm; however, this is rare in Vermont. More typically, brush fires or burning debris are the major causes for igniting wildland fires, according to the Vermont Department of Forests, Parks, and Recreation.

According to the State of Vermont Hazard Mitigation Plan, “There has not been a major wildfire in Vermont in the last 50 years. Vermont has a reliable system of local fire suppression infrastructure coordinated at the state level. Vermont’s climate, vegetation type, and landscape discourage major wildfire.”⁴

In addition to a wildfire event reported in NOAA’S Storm Events Database in Windham County, just south of Reading, the following incidents have been locally reported:

- 26-acre forest fire in Andover, a neighboring town, caused by a re-kindled brush fire;
- 47-acre forest fire in Brattleboro, sparked by a downed powerline;
- 137-acre forest fire in Norwich, also caused by a downed powerline; and
- 1/3 acre in Killington in 2021 that continued burning underground for three days.

Both structural and wildland fires have historically been reported in the annual Vermont State Fire Marshal Report, which provides yearly fire statistics from FEMA’s Nation Fire Incident Reporting System (NFIRS). **Table 5.5: Fire Statistics for Vermont, Windsor County and Town of Reading** shows historical fire reporting data (where available) for Vermont, Windsor County and the Town of Reading as reported to NFIRS.

The fire statistics reported by the State Fire Marshal no longer breakout data for wildfire and structure fire separately. Instead, the NFIRS Series 100 reporting has been used since 2015 and includes both structure and wildfire type incidents, as well as vehicle fires. It can be estimated from **Table 5.5** that there

National Weather Service Criteria for Issuing a ‘Red Flag Warning’

- Winds sustained or with frequent gusts > 25 mph
- Relative Humidity at or below 30% anytime during the day
- Rainfall amounts for the previous 5 days less than 0.25”
- Lightning after an extended dry period
- Significant dry frontal passage dry thunderstorms
- Keetch-Byram Drought Index values of 300 or greater (in summer)

³ 2018 Vermont State Hazard Mitigation Plan

⁴ 2018 Vermont State Hazard Mitigation Plan

is an average of 10 fires reported for Reading. However, the Town did not experience any wild fires over the summer of 2022.

The average wildfire impact in Vermont between 2012 and 2016 was 109 fires and 317 acres per year, or 2.9 acres per wildfire incident.

Wildfire Trends and Vulnerability

Wildland and brush fires pose a unique danger to local rural communities and controlling them can be challenging given a small town's limited capacity to respond to a major wildfire. The greater hazard for Reading is the smaller, uncontrolled brush fires which may burn between 1 and 10 acres if uncontrolled.

Wildfires can threaten people who are living in remote forested areas. Protecting these structures from fire poses special problems, given the longer response time and limited resources. In addition to precipitation, a particular town's vulnerability to large wildfires is directly related to the proportion and continuity of acreage that is forested, pasture and cropland. In Reading, this represents 96% of total town land cover. It can be anticipated that small brush and wildfires will continue to occur throughout the Town of Reading at a similar rate in coming years, however, given the current land cover and correct seasonal conditions the threat of a large wildfire remains. (See **Appendix A: Map 3-Natural Resources**). The Town encourages new development in or near village areas in order to preserve these natural resources and conserve municipal infrastructure resources. This policy also helps to reduce the risk of structure damage losses to wildfire.

Vermont is seeing an increase in the average annual maximum temperature and likelihood of drought (See **Section 5.2f**). These trends are also recognized by the Reading Hazard Mitigation Committee. According to the State Plan, only five statewide burning bans have been issued over the last 55 years since 1965. Four of those were over the last 22 years in 1999, 2001, 2005-2006, and most recently in 2012, supporting the trend toward drier conditions and increasing the risk of a major wildfire.

Community structures are not particularly vulnerable to wildfires because they are typically located in town centers and away from large tracts of forested and vegetative land, though their proximity to each other increases vulnerability if a structure fire is triggered by accident. Reading's recreational areas, however, are more vulnerable on the outskirts of the town center, including snowmobile and hiking trails.

The Town will plan to use available resources and outreach programs to educate the community on how to minimize the risk of brush and wildfires and to issue and enforce dry weather alerts when the risk wildfire is high (i.e. during early spring when there is dead leaf buildup).

5.2b Structure Fire

Probability of Occurrence:	3
Average Hazard Impact:	2
Hazard Assessment Score:	6

Structure Fire was identified as a notable hazard for the Town primarily because of the higher probability of occurrence. Although the impact of fire incidents is typically isolated, risk of catastrophic loss of life and property is high.

Structural Fire is not a natural hazard but an important secondary hazard from natural events with a high probability of occurrence and potential for catastrophic loss. Structure fires are common throughout Vermont during the winter months as residents heat their homes with wood or wood pellet burning stoves and other open flame methods. For this reason, structure fire can be considered a secondary hazard to severe winter weather and extreme cold temperatures together with other state risk factors noted below.

With little or no warning, these fires can affect a single residential structure or spread to other homes, businesses or apartment complexes and can result in loss of property and life. Residential structure fires are common in Vermont. The National Fire Protection Association reports that 25% of all structure fires nationwide are in residential construction. In Vermont, residential-related fires accounted for 74% of total structure fires statewide in 2020, according to the State Fire Marshall report, with home heating as the leading cause followed by cooking fires.

Over the past 10 years, the top cause for residential fires in Vermont has consistently been related to home heating. While the fire problem varies across the country, there are several other common contributing factors such as poverty, climate, education, code enforcement, demographics, rural communities that influence the statistics.

Fires can be caused by improperly disposing of ashes with live coals from wood stoves, misuse of space heaters, failure to clean creosote from solid-fuel heating equipment chimneys, as well as faulty electrical wiring and lit smoking materials.

Structure Fire History and Extent of Impact

Historically, Vermont has had a disproportionately high per capita fire fatality rate due to risk factors contributing to home heating fire related incidents, as compared to other states.⁵

- Age of Housing Structures - 44% of Vermont homes were built before 1950, 2nd oldest in the nation behind Maine.
- Vermont is the second least populated state - Remote rural communities can be difficult to reach with firefighting equipment in a timely manner.
- Extreme Winter Temperatures – Vermont is the 7th coldest state.

⁵ 2021 Vermont Fire Marshal Annual Report

- Higher Risk Population -3rd oldest median age where the elderly is at higher risk. Over the past 5 years, 31% of Vermont’s fire deaths have been seniors over the age of 65. This is a drop from 2021-2016, which was 48%.
- Home Heating Methods - 1st for per capita use of wood for heating.

It is not unusual for structures to be severely impacted by fire each year. Historically, structure fires had been more frequent during winter months with wood burning but local incidents seem to have become more consistent through-out the year. This could be due to the higher frequency of brushfires which can be close to barns and other outbuildings.

Statistics from the State Fire Marshal Annual Reports indicate a relatively consistent number of structure fires and total fires (NFIRS Series 100) over the past several years. This is the case for the State, Windsor County and the Town of Reading. (See **Table 5.5 Fire Statistics for Vermont, Windsor County and Town of Reading**).

Estimated Dollar Loss compiled for **structure fires** in Vermont is shown here.⁶ Reported dollar loss by insurance companies is trending up with approximately \$85,100 lost per claim in 2020, up from \$48,535 in 2015.

TABLE 5.4 Estimated Dollar Loss from Structure Fires in Vermont

Year	Fire Departments Reporting	Fires Reported	Estimated Dollar Loss by Fire Departments	Insurance Companies Reporting/ Total	Fire Claims Reported	Reported Dollar Loss by Insurance Companies
2012	194	2,233	\$ 17,840,192	860	839	44,510,095
2013	194	2,116	\$ 26,485,951	615	878	50,911,724
2014	228	2,114	\$ 30,412,139	615	1,130	50,589,356
2015	230	2,198	\$ 25,112,224	606	939	45,574,673
2016	228	3,138	\$16,919,906	644	706	57,098,292
2017	172	2,458	\$ 21,029,493	615	1,104	54,359,205
2018	170	1,708	\$ 22,628,798	611	844	57,204,711
2019	157	2,302	\$ 21,511,729			
2020	168	2,678	\$17,889,976	580	667	56,762,499
2021	170	2,376	\$19,894,943	Data not currently available		

⁶ NFIRS and Insurance Company Data, 2021 Vermont Report of the State Fire Marshal

TABLE 5.5 Fire Statistics for Vermont, Windsor County and Town of Reading⁷

YEAR	Vermont State				Windsor County			Reading			
	Fire-NFIRS Series 100 ³	Structure Fire Responses	Wildland Fire Responses	Total	Structure Fire Responses	Wildland Fire Responses	Total	Fire-NFIRS Series 100	Structure Fire Responses	Wildland Fire Responses	Total
2010	-	1956	475	2431	181	70	251				
2011	-	2366	1144	3369	181	70	251				
2012	-	2225	667	2892	201	101	302				
2013	-	2114	625	2739	229	86	315				
2014	-	2232	470	2702	205	61	266				
2015	3575	-	-	3575	239	89	328	17	-	-	17
2016 ¹	3269	-	-	3269	-	-	-	17	-	-	17
2017	2458	-	-	2458 ¹	-	-	-	4	-	-	4
2018	2660	-	-	2660 ²	-	-	-	5	-	-	5
2019	2274	-	-	2274	-	-	-	8	-	-	8
2020	2693	-	-	2693	-	-	-	11	-	-	11
2021	2376	-	-	2376	-	-	-	5	-	-	5
Annual Average ²											

NA – Not Available / Did not report

¹ As of 2016, the Vermont Fire Marshall Report no longer reports fire statistics by county nor by fire type (structure and wildland). Active Fire departments reporting vary from 68% (2019) to 74% (2017)

² Annual Averages are based on available data shown in table.

⁷ Vermont Annual Report of the State Fire Marshal, for years 2010 through 2021

TABLE 5.6 Fire Statistics for Town of Reading (Fires and Incidents)

Year	Total Number of Fires	Total Number of Incidents*
2015	17	84
2016	17	96
2017	4	47
2018	5	44
2019	8	58
2020	11	70

*Total incidents include Fires, Overpressure Rupture/Explosion/Overheat (No Ensuing Fire), Rescue & Emergency Medical Service (EMS) Incidents, Hazardous Condition (No Fire), Service Calls, Good Intent Calls, False Alarm and False Calls, Severe Weather and Natural Disasters, Special Incident Type, & N/A

Structure Fire Trends and Vulnerability

Structure fires are influenced by many factors independent from climate change and can fluctuate from year to year. As a result, the probability of occurrence remains high although it is difficult to project trends over time for Reading. However, it may be reasonable to expect an increase in incidents, as seen over the past few years, if the Town population increases, housing and the population continue to age, and extended periods of extreme cold and drought become more frequent.

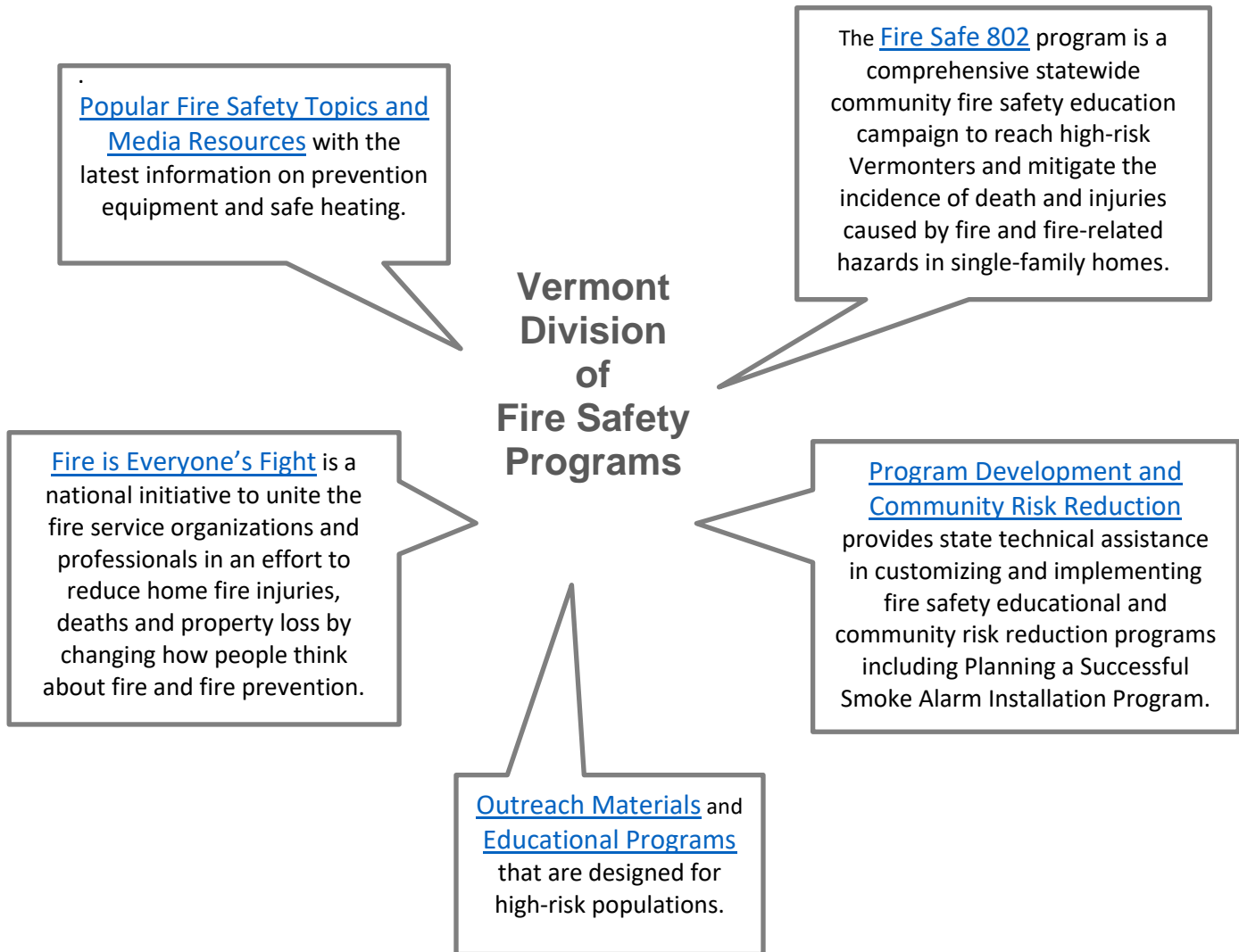
A growth in tourism and bed & breakfast accommodations can also increase the likelihood of structure fires from improper operation and maintenance of solid-fuel heating systems and campfires during the dry seasons due to lack of knowledge on the part of residents, renters and campers. The number of log homes in the region, which are more vulnerable, may also be a factor.

An assessment of town assets vulnerable to **structural fire** would be based on age and proximate location to other high-risk structures. Community structures are not particularly vulnerable to wildfires because they are typically located in town centers and away from large tracts of forested and vegetative land, though their close proximity to each other increases vulnerability if a structure fire is triggered by accident. Improper brush burning is a relatively common cause of structure fires in rural areas. Extended periods of drought and extreme heat, combined with high winds, can be expected to increase this hazard risk. The Town has considered using natural fire breaks to reduce risk.

Reading residents, however, remain vulnerable to **structure fires**, which are more likely to cause physical harm and damage to homes, as many of the residents heat their homes using open flame options, such as wood or pellet burning stoves. The elderly living alone are also more at risk, according to statistics, and the average age of Reading's population has been rising. For instance, Reading has a handful of residents that are vulnerable because they live at the end of private dirt roads. Structure fire risk may also increase as home heating oil prices increase, if homeowners use alternative fuels such as wood.

Local education and outreach programs continue to be the most effective way to reduce a community's risk to fire. [Firewise](#), is a community outreach program through the National Fire Protection Association that provides guidance, resources, and training on protecting homes and property from wildland fire. [Smokeybear.com](#) provides information for the prevention of wildfire geared towards kids' education, residential home burning tips and campfire safety. The Vermont Annual Fire Marshal Report also offers informational resources for municipalities and property owners regarding fire safety. In addition, the

[Vermont Division of Fire Safety](#) conducts a number of public educational events throughout the state and provides a toolbox of resources to educate communities which the town takes advantage of continuously and annually.



5.2c Inundation & Flash Flooding

Probability of Occurrence:	4
Average Hazard Impact:	1.75
Hazard Assessment Score:	7

Fluvial & Other Erosion

Probability of Occurrence:	4
Average Hazard Impact:	1.5
Hazard Assessment Score:	6

Flooding, including **flash flooding** and overbank or **inundation flooding**, and **Fluvial Erosion** are significant natural hazard events for Vermont and Windsor County. Both **Flooding** and **Fluvial Erosion** have a high probability of occurrence and directly impact mostly those properties located near or in flood prone areas. However, during severe events they can indirectly impact the whole community. Both hazards are profiled here as they are intrinsically linked.

Flash flooding can occur near smaller upstream tributaries in mountainous terrain. It is characterized by intense, high velocity torrent of water moving downstream following a heavy rainstorm. Flash floods are very dangerous and destructive causing severe land erosion and property damage. This type of flooding threatens high-elevation drainage areas call alluvial fans where water transitions from steep grades to flatter terrain. These events typically occur during summer when a single or series of weather events result in excessive rainfall over a short period of time on already saturated soils from a spring melt. Flash floods can also be triggered by a dam breach causing further damage downstream.

The damage from spring flooding events can vary greatly depending upon the amount of precipitation, snow cover, spring melt, soil saturation, existing erosion, and topography. Road infrastructure within the narrow stream valleys receive drainage from the higher elevations and are often the most vulnerable to damage from flash flooding.

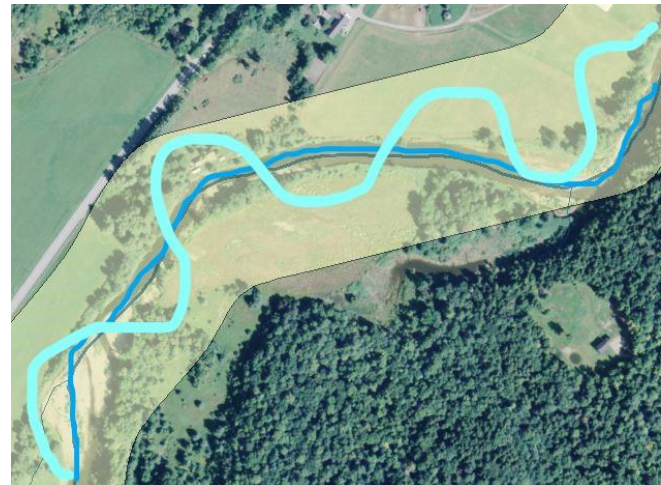
Inundation Flooding occurs in lower lying areas when water levels rise overflowing the banks of a river or lake. In hilly or mountainous areas, drainage from higher elevations flows to the lower reaches or valleys of a watershed causing these waters to rise quickly. Instances of inundation type flooding can occur long after precipitation has ended or when no precipitation has occurred, such as an extreme winter warming event causing river ice to melt resulting in ice jams obstructing the flow of river waters. These waters often carry with it debris which can block culverts or a bridge underpass exacerbating flooding.

Stable river channels naturally meander adjusting with periodic flooding. Floodwaters will rise and enter low lying **floodplain** areas temporarily which lessen the volume and velocity of water flowing downstream reducing the flood risk to downstream properties, villages and town centers. When floodwaters are restricted from their natural corridor, water velocity increases and **fluvial erosion** occurs with the scouring of riverbeds and riverbanks as the river tries to adjust. This action destabilizes nearby roads, bridges, residential properties and other man-made structures built within the river's natural corridor.

TABLE 5.7 Flood Zone Definitions

Floodway	The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height; also known as the regulatory floodway. As designated and determined by FEMA.
Special Flood Hazard Area (SFHA)	The land in the flood plain within a community subject to a 1 percent or greater chance of flooding in any given year; also known as floodplain . As designated by FEMA. Key part of the <i>National Flood Insurance Program</i> (NFIP). Includes Floodway Fringe (Zone A and Zone AE).
River Corridor	The land area adjacent to a river that is required to accommodate the dimensions, slope, planform, and buffer of the naturally stable channel and that is necessary for the natural maintenance or natural restoration of a dynamic equilibrium condition and for minimization of fluvial erosion hazards. Generated automatically as a 50-foot buffer on each side of the meander belt width. As delineated by the Agency of Natural Resources in accordance with river corridor protection procedures. (See figure below)
Fluvial Erosion	The erosion or scouring of riverbeds and banks during high flow conditions of a river. Fluvial erosion can be catastrophic when a flood event causes a rapid adjustment of the stream channel size and/or location. These areas are found within the River Corridor.

The land area that a river accesses to meander and overtop its banks to release flood energy without excessive erosion is known as the **River Corridor**. This is a depiction of a typical stream with its River Corridor area highlighted and an example of the meandering pattern of the stream over time within that corridor.



Areas within the river corridor are considered areas of both flood and erosion risk as rivers and streams seek equilibrium in accommodating the high flows causing major flood and erosion damage even outside of SFHAs.

River corridors and **floodplains** are different, but related. The *river corridor* is the area that provides the physical space that the *river* needs to express its energy and meander without causing it to dig down. A floodplain is the area where water flowing out over the *river* bank spreads out.⁸

⁸ The ANR FLOOD READY link shows river corridors overlays and FEH zones, http://floodready.vermont.gov/assessment/vt_floodready_atlas.

Vermont Agency of Natural Resources has mapped River Corridors for the Black River and Mills Brook stream segments along with SFHA which are shown in **Appendix A: Map 4- Water Resources** and can be found on-line.⁹ River Corridors are currently being modified to reflect the valley topography more closely and will allow for improved identification of elevated fluvial erosion hazard areas.

Fluvial Erosion, which often accompanies flood events, is the predominant form of flood damage in Vermont and in mountain valley towns like Reading. Rivers are dynamic and move both water and sediment. As a result, river channels may move vertically or horizontally. High flows can cause sediment to become detached from a riverbed or riverbank, which can range from gradual bank erosion or massive slope failure to catastrophic changes in river channel location and dimension. The sediment and stone that is dislodged can expose tree roots and wash away vegetative buffers which are carried downstream blocking culverts and bridges causing further flood damage.

Vermont is vulnerable to this hazard because of its topography, extreme climate, deep snows, destructive ice jams and intense rainstorms. Centers of commerce in villages and towns became concentrated along riverbanks, forests were cleared, and, over time, many rivers moved or were channelized to accommodate this development rendering them unstable and prone to fluvial erosion.¹⁰ Fluvial erosion can severely threaten mountain communities like Reading as most of rural town development lies in valley areas along rivers and streams.

Ice Jams can also cause a secondary event of flooding and threaten many of the same properties located within the FEMA Special Flood Hazard Area. Common in New England, ice jams occur during winter and spring months when river water levels rise, or a spring or mid-winter thaw breaks the ice into large chunks which become jammed at manmade and natural obstructions. Ice can build up against bridge abutments and expanses, undersized structures, and other obstructions to create a temporary dam impounding large volumes of water that has the potential to damage infrastructure and flood surrounding areas.



⁹ The ANR FLOOD READY link shows river corridors overlays and FEH zones, http://floodready.vermont.gov/assessment/vt_floodready_atlas.

¹⁰ Municipal Guide to Fluvial Erosion Hazard Mitigation, Vermont Agency of Natural Resources

Flooding and Fluvial Erosion: History and Extent of Impact

Flooding and fluvial erosion are the most common types of natural hazards that occur frequently in Vermont. During the hazard assessment exercises, flooding and erosion hazards were identified as outcomes from various weather events including **hurricanes, tropical storms, ice jams, severe thunderstorms, or heavy rain events.**

Although **hurricanes and tropical storms** rarely impact Vermont, they have historically caused the greatest state natural disasters. Prior to Tropical Storm Irene in August of 2011, Vermont was impacted by Tropical Storm Floyd in November of 1999, causing major flooding and power outages. However, the Hurricane of 1938 may have been the most powerful tropical storm to hit Vermont in modern times, with sustained winds of 74mph which was claimed to have changed the landscape of the state with the extensive tree damage.

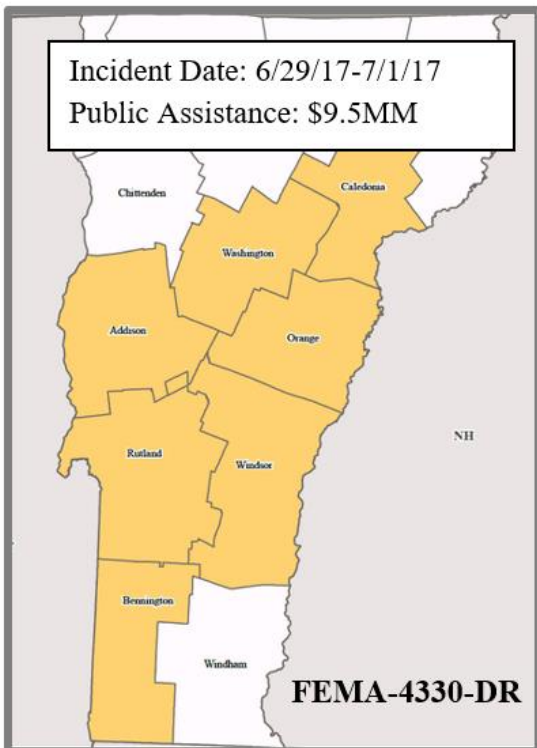
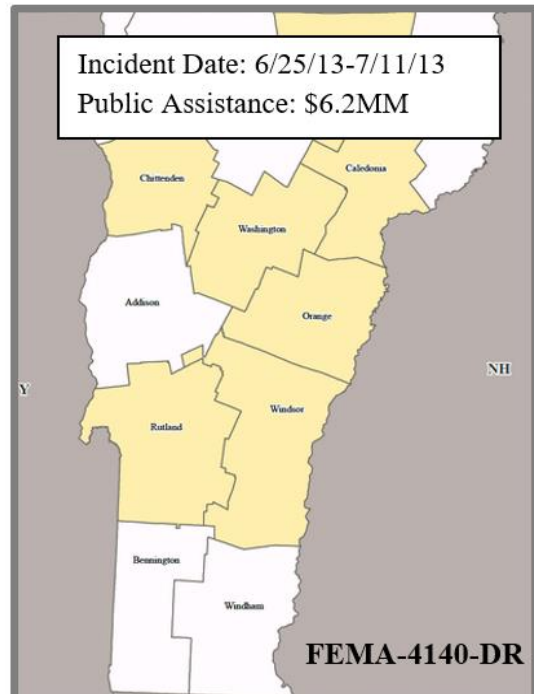
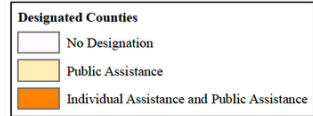
The Flood of 1927 termed ‘the greatest natural disaster’ was a 500-year flood event caused by a tropical system in Vermont with over 9 inches of rain falling on frozen ground that caused the most extensive flooding and structural damage and greatest loss of life in recorded history for the state. Widespread flooding more recently occurred in June of 1973, when up to 6 inches of rain fell resulting in a Disaster Declaration for all 14 counties and \$64 million in damage. In 2011, four regional disaster declarations were issued in Vermont due to flooding and fluvial erosion. The fourth was Tropical Storm Irene, estimated at over a 100-year flood event, occurred in late August when up to 11 inches of rain fell in some areas of the State. The most significant state-wide historical flooding events and their impact on the region are detailed in **Table 5.8 Vermont Historic Flood Events.**

On a regional level, of the 16 FEMA Disaster Declarations for Windsor County since 1992, 13 were related to flooding, one to a winter storm and the most recent two to COVID-19. Two of the flood related disasters were the result of Tropical Storms; Floyd in 1999 and Irene in 2011. FEMA assistance for the most recent of these Declared Disasters impacting Windsor County is shown in **Figure 5.1 Regional Impact of Federally Declared Disasters.** These flood damages are associated with inundation flooding and fluvial erosion; however, data indicate that greater than 75% of flood damages are associated with fluvial erosion.

TABLE 5.8 Vermont Historical Flood Events

Event	Date	Description	Impact or Extent of Damage
Great Flood of 1927	November 3, 1927	After a wet October, rivers were swollen, and the ground was saturated. Nine inches of rain fell in a 36-hour period triggering disastrous flooding. The month of October saw 150% greater rainfall than normal and lack of vegetation due to de-forestation may have reduced the ground’s ability to absorb water. Though all of New England was affected, Vermont was devastated. The state flooded from Newport to Bennington, with the Winooski River Valley the hardest hit. Deadliest disaster in Vermont history.	<ul style="list-style-type: none"> ➤ 84 people perished ➤ 9,000 left homeless ➤ Many roads, countless homes and over 1,200 bridges washed away ➤ Over \$28 MM in damages (\$404 million in current \$s)
The Great New England Hurricane of 1938	September 21, 1938	One of the most powerful and destructive hurricanes to hit southern New England and the region of Southeast Vermont with winds over 100 mph. Authorities were unaware of the magnitude, so no evacuation procedures were instituted and very few precautions were taken. The only tropical cyclone to make a direct hit on Vermont in recorded history. Hurricane-force winds caused extensive damage to trees, buildings, and power lines.	<ul style="list-style-type: none"> ➤ 600 people perished in southern New England, only 5 in Vermont ➤ Over 2,000 miles of roads were blocked taking months to reopen ➤ Vermont maple and sugar groves were damaged ➤ Over \$300 MM in damages (\$5 Billion in current \$’s)
Tropical Storm Irene	September 1, 2011	Tropical Storm Irene tracked north northeast across eastern New York and western New England producing widespread flooding, and damaging winds across the region. The greatest impact across central and southern Vermont was due to catastrophic flash flooding as a result of 4 to 7+ inches of rainfall which occurred across all of Windham and Windsor County, especially in the foothills of the Green Mountains. Several dozen roads (state and local), including Routes 4, 12, 12A, 100, 103, 107 and 131, as well as several bridges were washed out or suffered severe damage. Several communities within Windsor County were isolated due to loss infrastructure. Dozens of homes and businesses experienced severe flooding as well as major losses to farms and livestock.	<ul style="list-style-type: none"> ➤ Frequent wind gusts of 55-60 mph, peak gusts at 85 mph. ➤ 18,000 customers in Windham County lost power. ➤ Greatest single-day rainfall in Vermont’s recorded history. ➤ Rainfall averaged 4 to 8 inches, and up to 11 inches in some areas over a 12-hour period. ➤ There were nearly 2400 roads, 800 homes/businesses, 300 bridges and a half dozen railroad tracks destroyed or damaged from the flooding caused by Irene. ➤ \$18.7M estimated in Public and Individual FEMA Assistance.

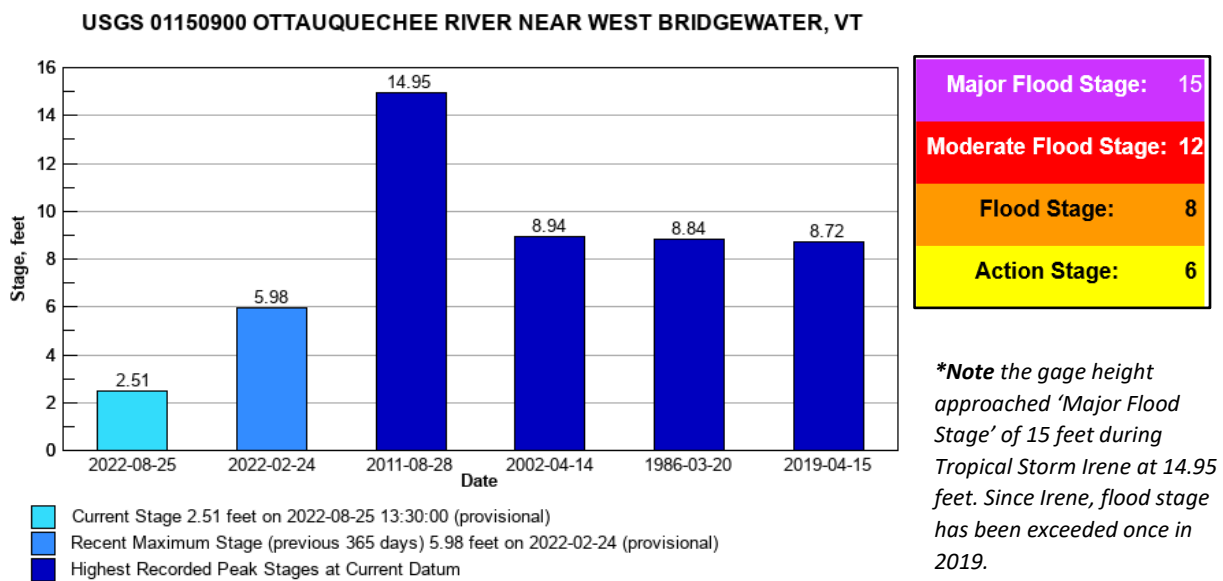
FIGURE 5.1
Regional Impact of
FEMA Declared Disasters
Severe Storms and Flooding



The **extent of impact from flooding and erosion** events is difficult to assess on a local level and, therefore, this plan relies primarily on regional and state data for these hazards.

The United States Geological Survey (USGS) maintains a streamgage on the Ottauquechee River in West Bridgewater, VT which is the closest daily monitored gauge location unimpeded by instream structures. During Tropical Storm Irene, gage height approached major flood stage as shown below in **Figure 5.2**. Although there is no USGS flow gage on Mill Brook, based on records in neighboring watersheds the discharge likely exceeded the 100-year flood.¹¹

FIGURE 5.2 Historical Gage Heights for Ottauquechee River near West Bridgewater, VT¹²



¹¹ [2015 River Corridor Plan for Mill Brook for Windsor, West Windsor, and Reading, Vermont](#)

¹² <http://waterwatch.usgs.gov> accessed in August 2022, Toolkit, Flood-Tracking Chart

Following Tropical Storm Irene, the Town of Reading incurred damage on over 50% of the local roads with infrastructure damage. The photos below were taken by residents the day of the storm, August 28, 2011 and the following day, and show the significant storm impact on local structures.



A tropical storm event, like Irene, is unusual as flooding in Vermont is primarily the result of **Severe Storm** events. Over the past several years since Irene, flooding and fluvial erosion damage have occurred in limited areas of the State from intense, scattered storm events and ground saturation from persistent and excessive rainfall. Damage from more recent localized flooding events impacting Reading is described below. Data on the physical extent of fluvial erosion and its impact in Reading is not available and is difficult to quantify.

- In July 2013, two to three inches of rain fell in two hours over eastern Windsor County. This followed a record spring rainfall and resulted in flash flooding (Estimated damage: \$25k).
- In July 2014, a stationary thunderstorm developed that dropped three inches of rain an hour resulted in significant damage to transportation infrastructure, residential and commercial properties, and agricultural areas. Main access roads to dozens of homes within the watershed were severed (Estimated damage: \$1M).
- In April 2019, neighboring towns of Ludlow and Cavendish, endured a flooding event from heavy rain that had little impact on Reading. (Estimated damage: \$100K)
- On Tyson Road, the Alder Meadow Brook runs close to the road. During Tropical Storm Irene, two settlement ponds flooded but have since been rebuilt; three damaged bridges on Tyson Road have also been replaced.

Below are photos of the more recent flooding events in the neighboring towns of Cavendish and Chester.

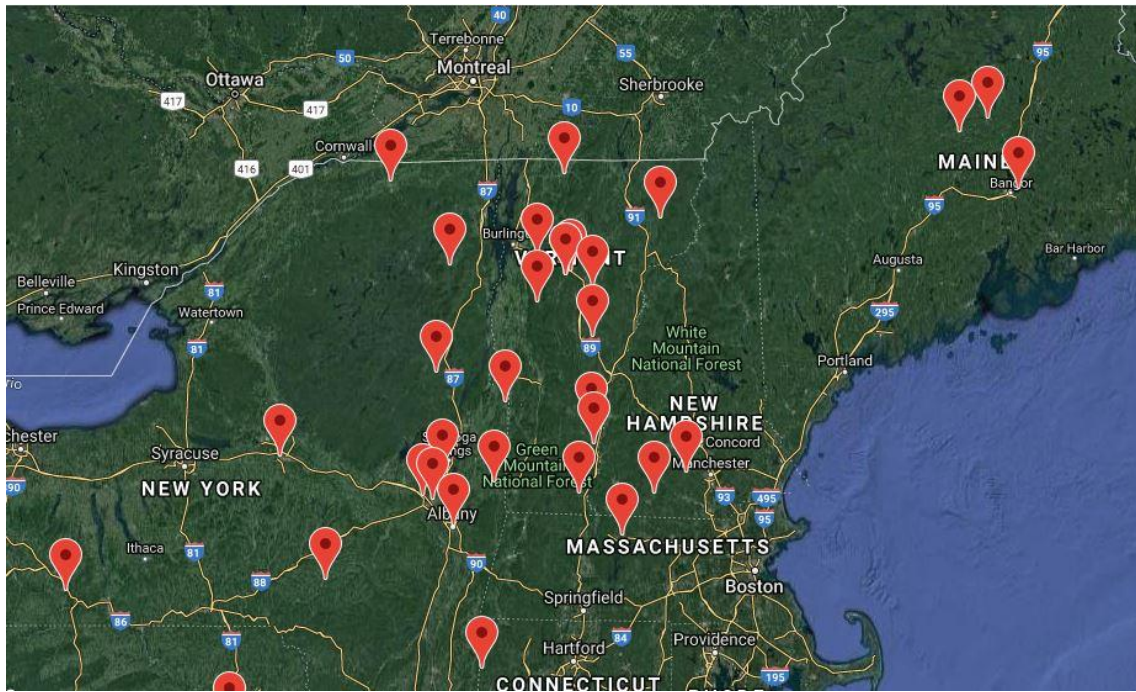


The most devastating winter floods have been associated with a combination of heavy rainfall, warm temperatures, and rapid snowmelt. Winter weather with less than average snowfall can result in greater ice buildup on streams and rivers, potentially resulting in greater ice jam damage.¹³

Vermont ranks tenth with a total of 987 ice jam events in 310 locations between 1/1/1785 and 2/26/2017, according to the Ice Jam Database State Summary Report, which is maintained by US Army Corps of Engineers' Cold Regions Research and Engineering Laboratory (CRREL). **Figure 5.3** below identifies the location of ice jam events in the region during 2019.¹⁴ Vermont had experienced more ice jams in 2021 than any other New England state.

CRREL has recorded nine ice jams in the Black River and one jam in Mill Brook since 1990. Many additional ice jams have occurred in Town, historically, but most have not been recorded. The Town experienced a large ice jam event in 1993, but since then they have no longer been a significant concern and tend to occur in less populated areas with little impact. The Town typically experiences snow/ice thawing events in January.

FIGURE 5.3 2019 Ice Jam Locations, CRREL Database



¹³ [CRREL Ice Jam Database](#)

¹⁴ [CRREL Ice Jam Database](#)

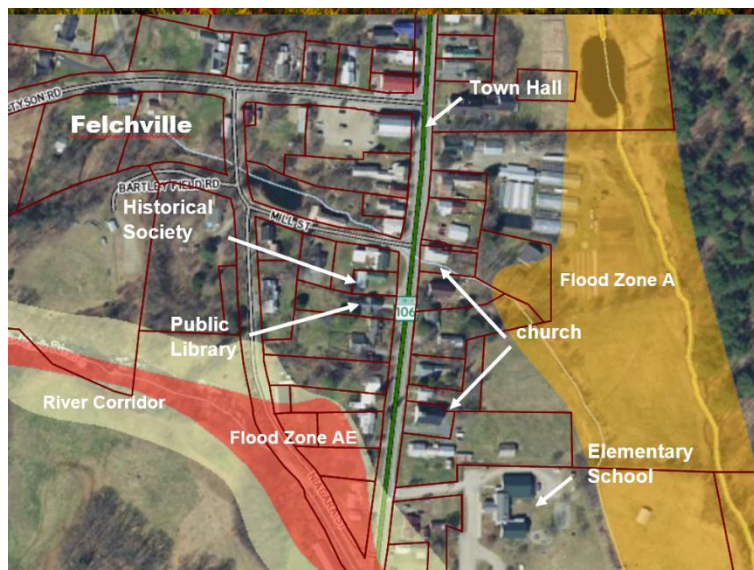
Flooding and Fluvial Erosion: Trends and Vulnerability

Over the past several years, flooding has occurred in limited areas of the State from intense, scattered storm events and ground saturation from persistent and excessive rainfall. Since Irene, Vermont has experienced nine FEMA declared disasters from severe storms and flooding, three of which have impacted Windsor County. In recent years, flood intensity and severity appear to be increasing. According to prior *State of Vermont Hazard Mitigation Plans*, studies show that areas of the State can expect a greater frequency of flooding with an increase in extreme rainfall amounts.¹⁵ Extreme changes in temperature during winter months with late winter rainstorms is also a factor causing more frequent ice jams and can be expected to increase in frequency with climate change.

A region's **vulnerability** to flooding and erosion depends on topography, as well as meteorological events. The Town of Reading is comprised, primarily, of two regional local basins which drain to the Connecticut River Drainage Basin. It is home to the headwaters of the North Branch Black River, a sub-watershed of Basin 10, Ottauquechee River-Black River, and to the headwaters of Mill Brook, a sub-watershed of Basin 13, Lower Connecticut River.

Areas of concentrated population and services, namely the Villages of South Reading, Hammondsville, and Felchville can be found within the narrow stream valley floor with sections that lie either within floodways, Special Hazard Flood Zones, River Corridors/Fluvial Erosion Hazard areas or floodplains. Given the historic social and economic function of river valleys, development within these Vermont villages is often well established. Extreme channelization, berming and armoring of local rivers to accommodate past development, has reduced the river's access to its natural floodplain.

A significant flood event in this area could disrupt evacuation routes, and could impact many residences, town services, and hazardous waste storage sites.



¹⁵ 2018 State of Vermont Hazard Mitigation Plan

The community areas most at risk of flooding and erosion became apparent following Irene and more recent storm events. Many of the roads impacted by the Tropical Storm Irene remain vulnerable areas of town although repairs made at that time have reduced the Town's flooding and erosion risk with upgraded culverts and other best management practices to control stormwater runoff. The following areas, identified by the Town during planning meetings, continue to be problem areas vulnerable to reoccurring flooding and erosion during a hard rain:

- Private residences vulnerable to flooding at the intersection of Grasshopper Lane and Tyson Road, between Alder Meadow Brook and Bailey Brook which lies in a flood plain and river corridor area.
- The intersection of Niagara Rd and Main St was entirely washed out during Tropical Storm Irene and is an area of high risk to flooding. The Town should consider initiating the process to formally close the road.
- At the intersection of Bailey Mills Rd and Town Hill Rd, the "alluvial fan" area on Bailey Brook was severely damaged during Irene, with flooding upstream of the bridge between the two roads. This area has increased flood vulnerabilities given the unstable conditions in Bailey Brook upstream.
- The Knapp Brook creates a flood hazard problem area on the southeast corner of Reading, along Knapp Brook Rd.
- At the intersection of Rt 106 and Agony Hill Rd, there is a confluence area of Mill Brook and Reading Hill Brook that may be vulnerable to flooding.
- Privately owned settlement ponds along Rt 106 may be vulnerable.
- The fields at the Hall Art Foundation are vulnerable to flooding, located near the North Branch of the Black River.
- Undersized bridges and culverts along Knapp Rd, Agony Hill Road, and Rt 106.

These areas can be viewed in further detail with the [ANR Atlas tool](#) with special flood hazard areas and river corridor overlays.

TABLE 5.9 Summary of Reading Structures within Flood Hazard Zones and River Corridor ¹⁶

Flood Zone	Building Type	# Units	%
River Corridor	Single-Family	25	68%
	Multi-Family	0	0%
	Mobile Homes	3	8%
	Commercial	1	3%
	Other	8	22%
Total in RC		37	100%
Floodway	Single-Family	0	0
	Multi-Family	0	0
	Mobile Homes	0	0
	Commercial	0	0
	Other	0	0
Total in Floodway		0	0%
Floodway Fringe	Single-Family	6	43%
	Multi-Family	1	7%
	Mobile Homes	2	14%
	Commercial	2	14%
	Other	3	21%
Total in Floodway Fringe		14	100%

Table 5.9 lists the number and types of vulnerable structures in Reading that lie within the Special Flood Hazard Zones (Floodway and Floodway Fringe) and the River Corridor.

Of the 51 structures, 37 structures or approximately 73% are residential structures.

National Flood Insurance Program (NFIP)

Reading has been a participatory, non-sanctioned member of the National Flood Insurance Program since May 4, 1989 and regulates development in the floodplain through the enforcement of 2019 by-laws in the Flood Damage Prevention Regulations which are now included in the Zoning Ordinance, Article 6 - Flood Damage Prevention Standards. NFIP policies and claims are summarized in **Table 5.10¹⁷**.

TABLE 5.10 Reading National Flood Insurance Program Statistics (Report Date 6/26/2018)

# of Policies	Total Premium	Total Coverage	# LOMCS	# of Policies in A Zone	# of Claims Since 1978	Claims Paid Since 1978	# of Repetitive Losses
8	\$6,338	\$2,410,000	5	2	3	\$75,605	0

Bridges and culverts are also vulnerable to flood and fluvial erosion damage, as much of this infrastructure remains undersized constricting flow or is poorly aligned. Blocked culverts compromise the structural integrity and safety of the road crossing resulting in damage to adjacent properties. [Bridge and Culvert Inventory](#) assessments are conducted every three years and provide the Town with information used to plan for infrastructure replacements and upgrades. In addition, the Black River and Mill Brook Corridor Plans identify culvert and bridge upgrades or removal projects for reducing flood and erosion hazard risk, as well as opportunities for increasing access to natural floodplains.

¹⁶GIS analysis using E911 building points (2022), FEMA-mapped floodplains (2015), and ANR-mapped River Corridors (2015). Some structures may have been removed from SFHA or RC since this data was compiled.

¹⁷ Vermont Flood Ready FEMA Policy & Claim Statistics for Flood Insurance -Claim Information by Town, https://floodready.vermont.gov/assessment/community_reports#Flood

Vermont State has focused its efforts over the past four years on “hydrologically-connected” road segments as part of the **Municipal Roads General Permit (MRGP) Standards**. These standards will help to increase flood resiliency and reduce the risk of road erosion. A new road inventory, completed in 2019 based on these new standards, provides the Town with information on roads most vulnerable to erosion and is consulted in prioritizing road work each year. Reading has made significant progress in bringing high priority segments into compliance.

These assessments help guide the Town’s annual work on infrastructure improvements and are critical to reducing the Town’s risk to flooding and erosion.

5.2d Heavy Snow

Probability of Occurrence:	3
Average Hazard Impact:	1.25
Hazard Assessment Score:	3.75

Ice

Probability of Occurrence:	2
Average Hazard Impact:	1.5
Hazard Assessment Score:	3

Heavy Snow and **Ice** are significant natural hazard events for Vermont and Windsor County. Both have a high probability of occurrence and have the greatest impact on town infrastructure and can isolate some vulnerable residents.

Winter storms and **blizzards**, with **snow**, **ice**, **wind** and **extreme cold** in varying combinations, are fairly commonplace in Vermont, Windsor County and occur town wide in Reading. Heavy accumulation of snow can be accompanied by strong winds, cold and low wind chills. Drifting of snow from high winds cause low visibility and make it difficult to keep roads cleared. Heavy wet snows of early fall and late spring, as well as ice storms and **freezing rain**, often result in power outages and property damage, leaving people without adequate heating capability. Ice glazed roadways and sidewalks, difficult to detect, are extremely hazardous to pedestrians and motorists. Power and communication loss is often the result of downed trees from heavy wet snow or ice accumulation combined with strong wind gusts which pull down utility lines and can disrupt traffic and emergency response by making roads and driveways impassable.

Severe winter storms in the northeastern United States develop through the combination of weather and atmospheric conditions including the moisture content of the air, direction of airflow, collision of warm air masses coming up from the Gulf Coast, and cold air moving southward from the Arctic.¹⁸ Winter weather related Warnings, Watches and Advisories are issued by the local National Weather Service office based on local criteria.

A Nor’easter is a large weather system traveling from South to North, passing along, or near the Atlantic seacoast. Cyclonic winds impact the coast and inland areas from a northeasterly direction. The sustained winds may meet or exceed hurricane force.

¹⁸ 2018 State of Vermont Hazard Mitigation Plan

Blizzards are defined by the National Weather Service as “sustained winds or frequent gusts of 35 mph or greater (and) considerable falling and/or blowing snow reducing visibility frequently to 1/4 mile or less for a period of three hours or more¹⁹.”

Ice Storms are defined by the National Weather Service as “occasions when damaging accumulations of ice are expected during freezing rain situations. Significant accumulations of ice are considered to be of ¼" or greater.”²⁰ Multiple sources state that a ¼ inch of ice accumulation from an ice storm can add 500 pounds of weight on the lines between two power lines.

Flash Freeze occurs when temperatures rapidly fall below freezing during precipitation with sudden severity in travel conditions. Extreme variations in topography and altitude on Vermont roadways make this a common hazard for motorists. Bridges and overpasses are particularly dangerous because they freeze before other surfaces.

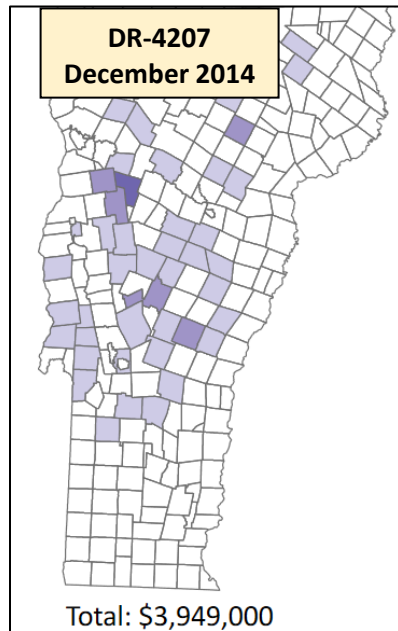
Black ice is a deadly driving hazard defined as patchy ice on roadways or other transportation surfaces that cannot easily be seen. It is often clear (not white) with the black road surface visible underneath. It is most prevalent during the early morning hours, especially after snow melt on the roadways has a chance to refreeze over night when the temperature drops below freezing. Black ice can also form when roadways are slick from rain and temperatures drop below freezing overnight.

Extreme Cold temperatures are part of Vermont’s climate tendency to stray above or below expected temperature values. What constitutes ‘extreme cold’ can vary and is based on what a population is accustomed to in their respective climates. For Reading, a valley town, this hazard was assessed as having a relatively high probability of occurrence but a low potential impact.

¹⁹ National Weather Service Glossary

²⁰ National Weather Service Glossary

Heavy Snow and Ice: History and Extent of Impact



There are no standard models or methodologies for estimating loss from winter storm hazards, however, extreme winter weather is considered a way of life in Vermont and many rural Towns are accustomed and prepared for these events.

While the history of winter storm events in Vermont and the historical damage caused is extensive, Windsor County has been a designated area in only one federally declared disaster event over the past 20 years. DR-4207 occurred over a four-day period in mid-December 2014 when heavy, wet snow and ice resulted in more than 175,000 power outages in the region, the 2nd most power outages due to weather in Vermont.²¹ The damage assessment for Windsor County was estimated to be over \$200,000 and impacted the northwest corner of the county.

A review of [NOAA's database](#) for Winter Storm events for Windsor County suggests that a snowfall of over 10 inches is likely to occur two

to three times in a winter/early spring season. Snowfalls of over 24 inches have occurred at least once most winters but typically just in higher terrains in Reading. Reports of ice accumulation of 1/10th inch or more are common over the course of a winter season.

Over the past five years the NOAA has recorded 23 Winter Storm events for Windsor County, an average of four per year with most impactful events occurring in the month of March. **Table 5.11** below is a sampling of historical winter storm events and the extent of their impact.

²¹ 2018 Vermont State Hazard Mitigation Plan

TABLE 5.11 Notable Winter Storm Events in Windsor County, Jan/2016 – Jan/2021²²

Occurrence Date	Estimated Property Damage	Event Description
11/29/2016	\$25,000	Ice accumulation less than one tenth of an inch. Numerous vehicle accidents from icy roads. Accident between a vehicle and a tractor-trailer resulted in a fatality.
3/14/2017	\$20,000	Snowfall totals across Windsor County generally ranged from 12 to 24 inches.
3/31/2017	\$25,000	Widespread 8 to 16 inches of a heavy, wet snow across the region. Scattered power outages from the snow loading on trees and power lines.
4/1/2017	\$25,000	Widespread 8 to 16 inches of a heavy, wet snow fell across the region with scattered power outages from snow loading on trees and power lines.
12/12/2017	\$20,000	A widespread 8 to 16 inches of snow fell across the region.
3/7/2018	\$40,000	A long duration snow event dropped 12 to 26 inches across the region, with highest totals along the southern Green mountains. Scattered to numerous power outages occurred in areas of the heaviest snow fall.
3/13/2018	\$20,000	Long duration snowfall event eventually delivered 10 to 20 inches across the region. Some isolated to scattered power outages were reported.
11/26/2018	\$250,000	Light rain changed to a pasty, heavy wet snow that resulted in downed tree limbs and power outages. across VT. Snow accumulated 3 to 6 inches in the valleys but quickly rose to 12 to 20 inches above 1000 feet.
1/19/2019	\$20,000	A widespread snowfall of 10 to 18 inches occurred across the region.
3/22/2019	\$15,000	A heavy wet snow fell across the region with snowfall totals of 8 to 12 inches and higher totals in the higher elevations.
3/23/2020	\$5,000	A period of heavy snow with 2-3 inches per hour rates moved through during the evening hours with storm total snowfall of 7-10 inches. Minor, isolated power outages.
12/16/2020	\$ 20,000	Record snowfall described below
1/16/2021	\$50,000	A heavy, wet snow fell across the region with totals ranging from 3 to 5 inches in the valleys to 18 inches in the higher terrain. Numerous power outages reported.

²² [NOAA, National Centers for Environmental Information](https://www.noaa.gov/)



Valley News, December 17, 2020

Local snow totals can vary tremendously. A recent snowfall event in December 2020 recorded snow rates of 4+ inches per hour for 6 to 8 hours across much of Windsor County. Storm total snowfall ranged from 8-12 inches in the north to 30-40 inches in the southeast upslope hilly terrain. Local reports for the December snowfall event had nearby towns of Springfield and Ludlow the hardest hit with recorded totals of 41

inches. The National Weather Service is investigating a snowfall report for this event of 44.8 inches in Peru, VT, which, if verified, will become Vermont's highest 24-hour snowfall on record. The current state record stands at 42 inches from 1995 in Jay Peak.²³

Below are historical data for snow and temperatures for the nearby Town of Springfield obtained from U.S. Climate Data from 2008 to current.²⁴ Selected temperature data for the month of January, which is typically the coldest winter month in Vermont, is shown along with seasonal snowfalls. It can be seen that temperature trends reflect a general winter warming with the average low temperature during the month of January above the normal average low of 7°F for eight of the last eleven years. It is also worth noting that the area is seeing a greater range in temperature extremes which make for more hazardous conditions for flooding and icing. In the current year, 75-degree swings in winter temperatures ranged from -20.9 to 53.1°F in January and -2.9 to 72.1°F in February.

²³ <https://snowbrains.com/peru-vermont-record-snowfall/> (December 21, 2020)

²⁴ [US Climate Data](#), accessed May 2021

TABLE 5.12 Winter Temperatures & Snowfall for Springfield, VT

	January Low Temperature °F		Snow Fall (inches)				Total
	Lowest	Avg Low	Dec	Jan	Feb	Mar	
2008	-11	10.8	0	17	32	9	58
2009	-18	-0.8	28	30	12	5	75
2010	-4	11	19	9	23	0	51
2011	-20.9	7.4	14	35	30	5	84
2012	-11.9	14.1	0	9	2	13	25
2013	0	8.6	18	11	19	12	59
2014	-18	5.4	20	11	27	10	68
2015	-13	1.2	7	15	31	2	55
2016	0	15	5	4	6	10	25
2017	-5	19.2	23	7	26	13	69
2018	-20.9	8.6	0	13	23	25	61
2019	-20.0	10.0	0	24	12	7	43

There is no specific region in Vermont that is more vulnerable to ice storms, according to the 2018 Vermont State Hazard Mitigation Plan. The state plan identifies accumulations for ice storms in December 2008 and January 1998 of 1/2-3/4" of ice plus 1-2" of sleet and 3" of ice, respectively. Local data for ice storms is not available. "There are no standard loss estimation models or methodologies for the winter storm hazards. Potential losses from winter storms are, in most cases, indirect and therefore difficult to quantify."²⁵

The HMC also noted that Reading has undeveloped State land which takes up a major percentage of the northwest corner of the Town. Most of the population is located on the eastern and southern sides of the Town. Therefore, the Town does not have one area experiencing ice or extreme cold not experienced Town-wide. Ice could accumulate in higher elevations, but is not common at lower elevations or settlements like Felchville and Hammondsville. There have been very few occurrences like this in the past 10-15+ years.

²⁵ 2018 Vermont State Hazard Mitigation Plan

Heavy Snow and Ice: Trends and Vulnerability

“According to the 2014 National Climate Assessment, there is an observable increase in severity of winter storm frequency and intensity since 1950. While the frequency of heavy snowstorms has increased over the past century, there has been an observed decline since 2000 and an overall decline in total seasonal snowfall.”²⁶

Statewide, damage from winter storms can vary depending upon wind speeds, snow or ice accumulation, storm duration, tree cover and structural conditions such as heavy snow and ice accumulation on roof tops, barns or aged structures in deteriorating condition. A roof may collapse with little or no warning, and one common misconception is that only flat roofs are susceptible to collapse. Residents can expect at least 60 pounds of weight per square foot on their infrastructure during winter months. Older residents need to be vigilant when clearing snow from walkways and driveways.



Vermont communities are well prepared to handle heavy snowfall. However, it is typically the secondary hazards that are most concerning to the town. Depending on the event, particularly with heavy, wet snow or ice, electricity may be down for a few hours or days due to downed powerlines from falling trees. This is a time when residents are most vulnerable to structure fire hazard or carbon monoxide poisoning. Many residents heat their homes with open flame heating sources including fireplace, wood or pellet stoves, and will supplement with electric or kerosene space heaters. Extended periods of extreme cold or loss of power during the winter months require continued vigilance on the safety of heating to reduce the risk of a structure fire as a secondary hazard.

Green Mountain Power, the utility company that currently serves Reading, follows a regular tree-trimming schedule. Town officials believe this to be satisfactory to mitigate damages and power outages caused by downed trees and tree limbs during events. However, with major state thoroughfare Rt 106 also serving as a local emergency access road in Reading, keeping surfaces clear of snow and ice is critical to the safety of residents.

Extreme weather conditions, such as moisture, snow, and rain can also lower the distribution of cellular signals from a cell tower to the receiving device such as a smartphone whether you are outdoors or indoors. Reliability of these communications for reporting an emergency can be compromised during

²⁶ 2018 Vermont State Hazard Mitigation Plan

extreme winter weather events. This can become a greater concern as there is a trend to eliminate home landlines to save utility costs is growing.

5.2e High Wind

Probability of Occurrence:	3
Average Hazard Impact:	1.25
Hazard Assessment Score:	3.75

High Winds can be generated from a thunderstorm, hurricane or tropical depression, a localized microburst, Nor'easter, or simply just a wind storm. Any of these events can produce wind gusts up to 50 mph or greater causing property damage and disruption in electric and telecommunication utilities, transportation, and commercial businesses. Although difficult to predict, these events also pose a high risk of injuries and loss of life but tend to be localized.

Severe thunderstorms are a relatively common hazard in Vermont, particularly in the spring and summer months. Although typically short in duration, they can produce damaging winds, heavy rain and flooding, dangerous lightning and large hail. Multicell cluster thunderstorms are likely to cause local flash flooding. It is the winds from these storms have most impacted the town.

The downward draft from these storms can produce **microbursts** which are not uncommon in Vermont. These events can come with wind speeds in excess of 80 mph, and pose an additional threat to low flying aircraft, making it difficult for them to maintain altitude. Although less common in Vermont, **super cell thunderstorms** are the largest, longest lasting, and most devastating thunderstorms, which can produce **tornadoes** and widespread destruction of crops and property. **Tropical storms, hurricanes, nor'easters,** and **winter storms** can also cause high wind damage throughout the state.

The **Beaufort Wind Scale** shown below in **Table 5.13** can be used to predict damage based upon wind speeds. The National Weather Service will issue Wind Advisories when sustained winds of 31-39 mph are reached for at least one hour or gust between 46-57 mph and High Wind Warnings for winds of 58 mph

or higher. Thunderstorm winds tend to affect areas of Vermont with significant tree stands as well as areas with exposed property and infrastructure and aboveground utilities.²⁷

Power Failure is a common secondary hazard caused by high winds and occurs frequently within Windsor County. Power outages are most often isolated but can occur on a town-wide scale and are typically the result of power lines damaged by high winds, heavy snow or ice storms, but may also result from disruptions in the New England or national power grid as occurred in the Northeast Blackout of 2003. Dead or dying trees in proximity to power lines pose a particular threat for power failure, as these trees are often brought down by triggering events such as high winds during a thunderstorm or a Nor’easter.

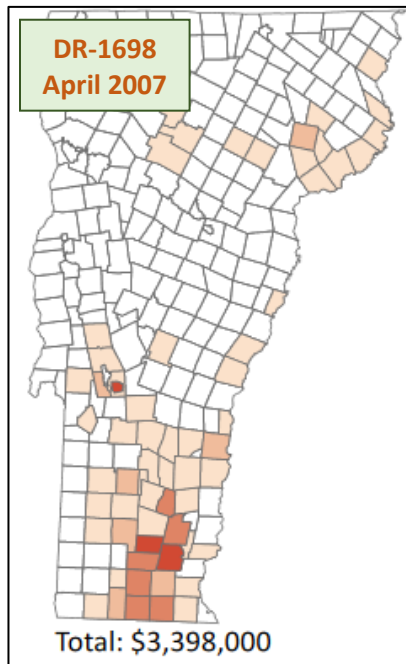
TABLE 5.13 Beaufort Wind Scale

Classification #	Wind Speed	Land Conditions
6	25 to 31 mph	Large branches in motion; whistling in telephone wires
7	32 to 38 mph	Whole trees in motion; inconvenience felt walking against wind
8 to 9	39 to 54 mph	Branches can break off trees; wind generally impedes progress; slate blows off roof; slight structural damage
10 to 11	55 to 72 mph	Damage to chimneys and TV antennas; trees broken or uprooted; considerable widespread structural damage
12 to 13	73 to 112 mph Hurricane	Peels surfaces off roofs; windows broken; mobile homes overturned; moving cars pushed off road; devastation
14 to 15	113 to 157 mph	Roofs torn off homes; cars lifted off ground; widespread devastation

**For the purposes of the Hazard Mitigation Plan, the scale is only shown above wind force 5; Data from NOAA*

High Wind: History and Extent of Impact

²⁷ 2018 State of Vermont Hazard Mitigation Plan



*For the purposes of the Hazard Mitigation Plan, the scale is only shown above wind force 5; Data from NOAA

Since 2000, there have been six (6) Federal Disaster Declarations for high wind events in Vermont, excluding those related to Tropical Storm Irene and Hurricane Sandy. One example of the extent of a **high wind** event in Vermont was the Nor'easter of April 2007 that resulted in a Federal Disaster Declaration, DR-1698. "High winds during this April storm resulted in many trees down and damage to some private homes and public infrastructure, primarily in Southern Vermont."²⁸ Total Public Assistance for this event was \$3,398,000 with the costliest damages in neighboring Windham County.

Since 2000, [NOAA National Centers for Environmental Information's Storm Events Database](#) recorded 30 High/Strong Wind events and 103 Thunderstorm Wind events that impacted Windsor County causing tree damage and power outages. Three of the strong wind events were the result of Tropical Storm Irene in August 2011, Hurricane Sandy in October 2012 and remnants of Tropical Storm Isaias in August 2020. Most of the thunderstorm wind events recorded sustained winds of 40-45 mph with damaging wind gusts of 50-65 mph and isolated damage. Other High Wind events are more widespread causing power outages up to 25,000 countywide. Most of the wind reported damage is due to **thunderstorm** activity from June through September and winter storms with **heavy snow** and **ice**.

Reports of damage due to downed trees in Windsor County are common when wind gusts begin to exceed 40 mph. Damage is typically localized in the form of downed trees and powerlines and isolated structural damage to buildings and vehicles. The most damaging local incident in recent history occurred in July 2003. A strong storm with heavy rain, lightning and severe winds ravaged the neighboring Town of Cavendish and portions of Reading.

July 21, 2003: Classified as a tornado, the storm destroyed one mobile home (while occupied), blew apart several outbuildings, damaged several other homes in Cavendish, VT.

Winds: > 100mph

Damage: \$100,000 (estimated)

"A path of tree damage approximately 3 to 4 miles long was about 1/4 mile wide at the beginning impact point and about 3/4 mile wide at the end of the damage path. An estimated 500 to 700 trees were destroyed. Pine trees were snapped while hard wood trees were uprooted. Power lines were blown down with a number of residents without power. The actual thunderstorm winds were reported to have lasted 30 seconds or less. In the town of Reading, a number of trees were uprooted with some structural damage."³¹

²⁸ 2018 State of Vermont Hazard Mitigation Plan

High Wind: Trends and Vulnerability

Thunderstorms and associated hazards can occur anywhere in Vermont at any time of the year; however, spring and summer are the most common times for severe thunderstorms.²⁹

The frequency of high wind events has increased. It is anticipated that extreme weather conditions, due to climate change, will continue to impact the community in the form of high winds in Windsor County. This is supported by the NOAA data which shows that of the 103 reported Thunderstorm Wind events since 2000, 66 have occurred over the past 10 years. The Town has noted however that the mountains in Okemo and Ascutney provide some protection from high wind damage.

Power failures often have only minimal impact to people and property; however, longer duration events may result in major disruptions and business losses. Outages in Reading typically last only a few hours but can last for days if the outage is regional. The Town states that GMP is adequately responsive in making any needed repairs to bring the power back online. Potential loss estimates are difficult to predict as they are typically isolated in geographic area and short in duration. Power outages in winter months may result in the loss of home heating, ruptured water pipes, and the resulting structural damage. The loss of home heating may be a contributing factor to the increase in structure fires during the winter months. Local data on historical occurrences, extent of outage and associated costs are not available.

Town assets are located in developed downtown areas with less trees and are not particularly vulnerable to this hazard. The expected magnitude for future high wind events will fall between around 40 and 50 mph, or Beaufort scale number 8-9, and will likely result in downed trees, power lines, and small damage. However, the possibility does remain for larger high wind events such as the 1998 F3 tornado on the Enhanced Fujita Scale and localized microbursts. In 2018, a localized microburst occurred in the Town of Windham near Magic Mountain leaving a swath of damaged trees, either downed or with the crowns sheared off, and home damage.

Heavily tree-lined roads can experience frequent outages. Clearing overhanging, leaning, and dying trees near power lines is part of annual town-wide maintenance to minimize impact from high winds. Green Mountain Power has worked well with Reading in managing and removing trees that threaten lines utility lines.

²⁹ 2018 State of Vermont Hazard Mitigation Plan

5.2f Extreme Heat

Probability of Occurrence:	4
Average Hazard Impact:	1.25
Hazard Assessment Score:	5

Drought

Probability of Occurrence:	2
Average Hazard Impact:	1.5
Hazard Assessment Score:	3

Extreme Heat and prolonged hot weather and resulting **Drought** have not been of concern to Vermonters, historically. Only recently have these potential hazards captured the concern of Windsor County communities. They are profiled here for the first time in Reading’s hazard mitigation planning.

Extremely high temperatures can occur when a high-pressure system (under which air is descending toward the Earth’s surface) develops and intensifies. Under such conditions, the potential for a heat wave exists. A heat wave is a period of three or more consecutive days during which the maximum temperature meets or exceeds 90°F. Extreme hot temperatures can have significant effects on human health and commercial and agricultural businesses, as well as primary and secondary effects on infrastructure. Prolonged periods of above normal temperatures along with increases in average annual temperature, also have direct and indirect effects on other hazards such as drought, wildfire, invasive species, and infectious disease.³⁰

What is considered “extreme heat” can vary around the world and across the country. Populations in warmer climates are more accustomed to higher temperatures and have acclimated to withstand higher temperature thresholds and developed ways to cope with heat and humidity as a way of life.

The Heat Index is a measure of how hot it actually feels when relative humidity is considered in with the actual air temperature. For example, if the air temperature is 88°F and the relative humidity is 70%, it will feel like 100°F. The National Weather Service heat related advisories are shown below.

TABLE 5.14 National Weather Service Heat Advisories

Classification	Advisory	Expected Conditions
Excessive Heat Outlook	Warning	A period of excessive heat is possible within next 3 to 5 days.
Heat Advisory	Take Action	The combination of hot temperatures and high humidity will create a situation in which heat related illnesses are possible. Heat Advisories are issued when heat indices are expected to reach at least 95°F.
Excessive Heat Watch	Warning	A prolonged period of dangerous excessive heat is possible within about 48 hrs.
Excessive Heat Warning	Take Action	A prolonged period of dangerous excessive heat is expected within about 24 hours. The combination of hot temperatures and high humidity will create a situation in which heat related illnesses are possible. Excessive Heat Warnings are issued when heat indices are expected to reach at least 105°F.

³⁰ 2018 State of Vermont Hazard Mitigation Plan

Drought can be defined as a shortage of water relative to need. Is a complex hazard in that it develops slowly during extended periods of low or no precipitation combined with extreme heat and high winds. It is typically widespread and can linger after normal precipitation returns. Although the surface waters may appear to have recovered from a period of drought following a return to normal precipitation, replenishing groundwater levels is a longer process.

The severity of a drought depends on the duration and extent of the water shortage, as well as the demands on the area's water supply. Drought classification categories range from 'D0' for abnormally dry conditions to 'D4' for widespread crop devastation and water emergencies. Vermont has experienced D2 drought conditions characterized by likely crop and pasture losses, common water shortages and imposed water restrictions.

Extended periods of drought during a Vermont growing season can be devastating for state agriculture and can result in loss of potable water when wells run dry. Drought conditions are also favorable for wildfires while small town fire departments that rely on river water will have limited capacity for fighting fires.

Extreme Heat and Drought: History and Extent of Impact

The HMC noted that the Town is small and does not have any specific areas extreme heat. If extreme heat or drought occurs, it is experienced town-wide.

The following notable **historic heat events** were gleaned from the Vermont Hazard Mitigation Plan:

- Between 2000 and 2017, the number of recorded days per year with a daily temperature high greater than or equal to 85°F peaked during the 2016 summer at 45 days, closely followed by the summer of 2015 at 41 days in Burlington.
- August 2006, temperatures rose into the 90s but significantly more important were dewpoints that reached the middle to upper 70s to produce excessive heat index values of 100°F to 105°F, some of the highest values in nearly a decade.
- In July 2011, during a 4-day heat wave, temperatures across southern Vermont warmed into 90s. With dew points in the 70s combined with the hot temperatures, heat indices reached 104°F. Heat index values reached 100°F to 108°F across the Champlain and Connecticut valleys as well as some interior valleys. One death is attributed to this event in Windsor County.

A review of summer temperature data over the past 10 years (2010 to 2019) for the Town of Springfield, suggests no identifiable warming trend between 2010 and 2019. In July and August, average high temperatures varied from 79 to 86°F with highest maximum summer temperatures ranging from 90 to 98°F. Three to five consecutive days of >90°F occurred in 2011, 2013, 2015 and 2019. In 2018, there were six consecutive days of >90°F in July and three in August.

For Windsor County, in the summer of 2018, high temperatures in the upper 80s to upper 90s with dewpoints in the 60s and 70s created dangerous heat indices in the 95-to-110-degree range between June

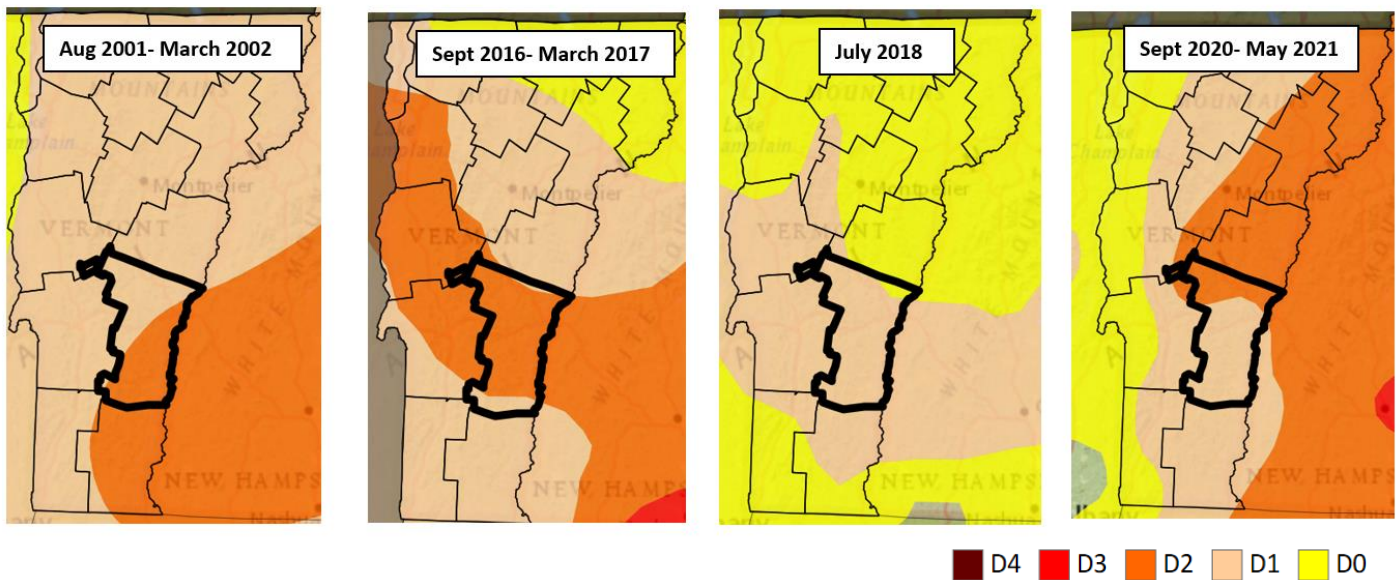
30th and July 5th. A substantial increase in hospitalizations occurred due to the excessive heat and duration and at least 3 deaths were contributed to the heat. Burlington VT witnessed the warmest 5- and 6-day consecutive stretch since records have been kept in 1892. Also, the ALL-TIME warmest minimum daily temperature was recorded on July 2nd of 80°F, breaking the old record of 78°F.

The 2nd longest heatwave in modern history (1900-onward) occurred across portions of NY and VT in 2020 from June 18th through June 23rd. Temperatures exceeded 90°F for up to 6 consecutive days in portions of the Champlain and Connecticut River valleys. Daily High temperature records were set at Burlington on June 22nd and June 23rd with high temperatures of 96°F for both days.

Vermont droughts are infrequent as precipitation in the northeast is fairly reliable. According to the State plan, there were two declared statewide droughts in the summer of 1995 resulting in water usage restrictions and loss of crops in some areas. A third, more severe drought affected Southern Vermont late summer of that year.

Figure 5.4 together with **Figure 5.5**, show regional and statewide historical occurrences since 2000 and level of drought as a percent of the State affected. Since 2000, there have been four distinct periods of Severe to Moderate Drought in Vermont. In 2001-2002, drought which began in early winter and continued through July impacting nearly 100% of the state in at least Moderate Drought (D1). In 2016-2017, a Severe Drought (D2) from October through April, affected 29% of the State with 80% in at least Moderate Drought (D1). As of the writing of this plan, Moderate Drought (D1) which began in September 2020 continues through May 2021 but has ended by July 2021. Windsor County was affected by all of these recent droughts as shown in **Figure 5.4** below.

FIGURE 5.4 Extent of Historical Drought in Windsor County (2000 – 2021)³¹



Extreme Heat and Drought: Trends and Vulnerability

Heat-related events are, historically, less likely to occur compared to other areas of the country. However, taking a more regional view, they are beginning to occur in much greater frequency. Both state annual minimum and maximum averages show a steady increase from 1960 (Figure 5.6³²), with a greater rise in the minimum average rate, or winter temperatures. The **Northeast region warmed** more than any other region in the lower-48 over the last five decades, according to data from NOAA, and is projected to warm at a rate 50% greater than the global rate by some analysis.³³

The primary impact of extreme heat or prolonged periods of hot weather is to human life, especially when combined with high humidity. Exposure to hot conditions can lead to heat exhaustion or heat stroke which require medical attention and can be fatal. Older adults, children, and people with chronic medical conditions, such as asthma, are at greater risk for serious heat-related illnesses. Studies by the Vermont Department of Health suggest that the heat threshold in which hospitals in the State see a rise in heat-related emergency room visits is 87°F.³⁴

³¹ [U.S. Drought Monitor](#)

³² 2018 State of Vermont Hazard Mitigation Plan

³³ <https://www.usgs.gov/center-news/northeast-warming-faster-rest-us>

³⁴ 2018 State of Vermont Hazard Mitigation Plan

FIGURE 5.5 Vermont Drought Monitor (accessed 6-9-2021)

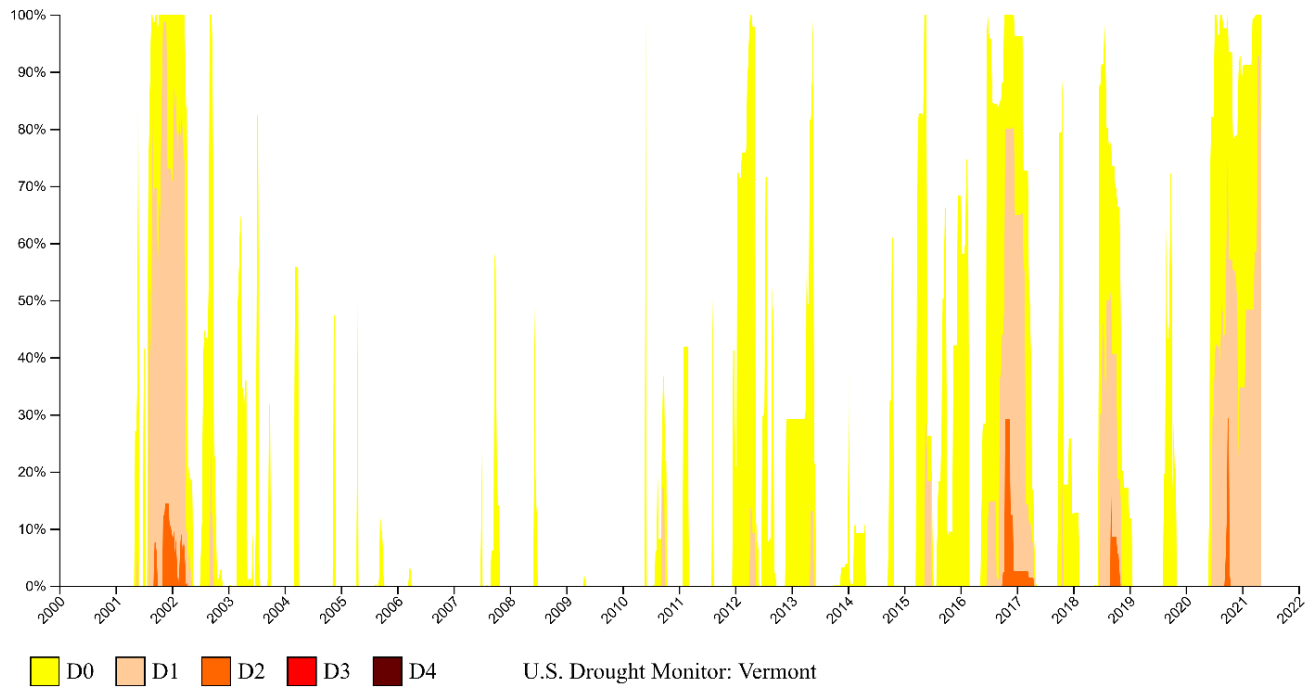
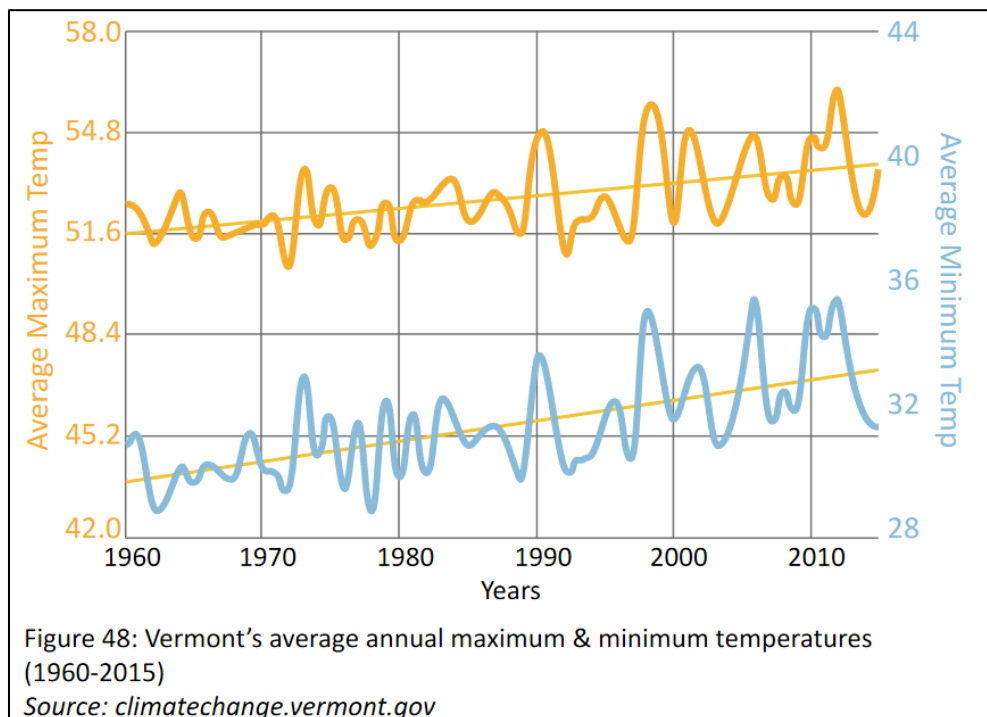


FIGURE 5.6 Vermont Average Annual Maximum and Minimum Temperatures (1960-2015)



Warmer conditions also favor insect populations that cause Lyme, West Nile and Eastern equine encephalitis and other vector-borne diseases which have become more prevalent earlier in the spring and later in the fall. Much of Vermont recreational and agricultural economies rely on outdoor activities and are at greater risk of tick and mosquito borne illnesses.

Some types of cyanobacteria proliferate in warmer waters and can release natural toxins into the water. Swimming or wading in these waters can cause minor rashes and stomach problems or more serious health problems. Children and pets are at higher risk of exposure because they are more likely to play and drink water while swimming.

Periods of drought for Vermont and Windsor County are also expected to occur with more frequency as can be surmised from the timeline above in **Figure 7** obtained from NOAA's National Integrated Drought Information Systems (NIDIS) at drought.gov.

Critical Vermont economic sectors such as logging, farming, maple sugaring, and dairy farming can be disrupted by impacts from a warming climate. Reading has experienced only isolated issues with extreme heat and drought, but specific data is not available. The Town anticipates this trend continuing and has included these hazards for the first time in their local Hazard Mitigation Plan. Effort will be made to better monitor local incidents of extreme heat and drought, and to identify cooling centers and shelters for vulnerable populations.

The Town reduces their risk of wildfire by routinely removing dead underbrush in forested areas. Loggers typically assist with this work.

Town residents can visit the following cooling sites during hot weather: Reading Public Library, Mary L. Blood Library, Stoughton Pond Recreation Area, and Kennedy Mill Pond. Other nearby sites can be identified at the following website, provided by Vermont Department of Health: <https://www.healthvermont.gov/health-environment/climate-health/hot-weather>.

6. MITIGATION PROGRAM

The following sections detail the mitigation goals and potential mitigation strategies identified by the Town and compiled and organized by the Hazard Mitigation Committee to reduce the impact of the hazards assessed in this plan. The implementation schedule that follows in **Table 6: 2021-2027 Mitigation/Preparedness Strategies and Actions** is a comprehensive list of actions that the town has targeted for implementation during the five-year cycle of this plan.

6.1 Mitigation Goals and Objectives

Following the Hazard Analysis and Hazard Profile and review process as described in **Section 4**, the Hazard Mitigation Committee then agreed upon the following overarching goals and associated objectives below. Note that the numbers do not indicate goal priority but are used to identify actions that support it.

Hazard Mitigation Goals and Objectives

1. Provide protection and reduce risk to the community from the Impact of Hazard Events.
 - a. Implement action items that reduce the risk of potential loss of life, injuries, negative health impact, and property damage.
 - b. Implement action items to minimize financial losses due to hazard events incurred by the community including residents and business owners.
 - c. Implement action items to improve resiliency of our built and natural environment including public infrastructure, and recreational, cultural and historic assets.
 - d. Maintain, enhance and raise awareness of the Emergencies Operation Plan.
2. Raise community awareness of the Hazard Risks, Resiliency Resources and Mitigation Planning.
 - a. Encourage hazard mitigation planning to be incorporated into other municipal and community planning efforts.
 - b. Review progress on implementation of the hazard mitigation plan during publicly noticed meetings (Selectboard, Planning Commission).
 - c. Improve and enhance efforts to increase public knowledge of hazards and resources.
3. Improve effectiveness of future Hazard Mitigation Planning efforts.
 - a. Develop a process for tracking plan implementation over the plan period and incorporate phased planning for large or complex projects.
 - b. Be proactive in seeking funding opportunities for hazard mitigation projects.
 - c. Improve local engagement in reporting vulnerabilities and hazard events.

6.2 Hazard Mitigation/Preparedness Strategies and Actions

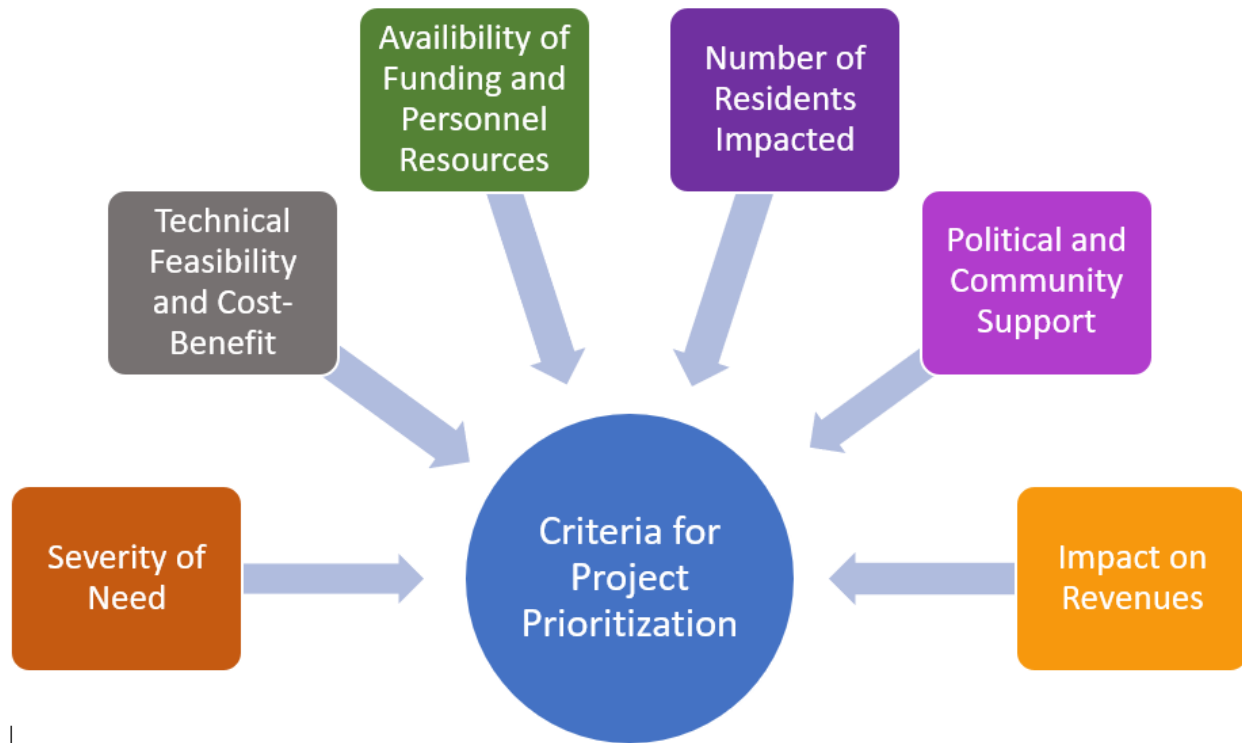
Throughout the planning process, efforts were made to identify actions that would address the town's vulnerabilities and achieve the goals and objectives outlined above.

These mitigation actions have been chosen by the committee as the most effective and feasible actions to be taken during this plan period to lessen the impacts of the hazards identified in **Section 5**. Some of the actions from the previous plan have been carried-over or modified either because they have been expanded or because of their on-going cyclical nature. Compared to the previous Hazard Mitigation Plan, below are changes in the selection of hazards addressed and changes in the approach on formulating goals and actions:

Changes from Prior Plan

- The Town's **method of hazard assessment** was modified to resemble that used by the State. The hazard impact assessment was expanded to differentiate between the probability of a weather hazard event and the probability of the hazard impact which can be common to other weather events. Community impact was broken-down into four categories (life, economy, infrastructure, and environment) and assessed individually.
- **Heavy Snow** and **Ice** have risen in priority compared to the prior plan and **High Wind**, **Extreme Heat** and **Drought** are profiled for the first time as new hazards to be addressed. This is, in part, a result of the way these hazards are now scored, but there is also greater concern about the higher probability of occurrence of these hazards given recent and trending climate extremes in wind, temperature and precipitation events.
- Identifying **Extreme Heat** as a notable hazard is, in part, due to the growth in number of residents over 65 years of age who are most vulnerable.
- **Infectious Disease** and **Invasive Species** are new hazards to be recognized in the assessment exercises with recent experiences from the COVID Pandemic and tree infestations. Action items have been identified for these hazards.
- **More local hazard data** has been obtained and presented.
- Changes were made with the development of **specific mitigation goals and objectives** and in **methodology for prioritizing actions** to be sure they address these goals to improve plan effectiveness.
- A formalized process for **plan monitoring** was developed to improve plan effectiveness and an effort was made to better **correlate mitigation actions** to the Town Plan goals and recommendations.
- Recognizing the **high percent of seasonal residents** and new influx of people that have settled either as second home owners or as permanent residents over the course of the pandemic, this plan will focus on enhancing efforts to reach this population through **targeted outreach** to raise awareness.

Prioritization of Strategies and Actions



For this update, the Committee selected a method for prioritization of strategies and actions based on three categories – High, Moderate, and Low compared to a more ad-hoc basis in the prior plan. It was decided that this methodology would improve overall progress on implementation with a focus on higher priority actions. Compared to a specific scoring process, this methodology for prioritization offers the following benefits:

- Provides needed flexibility as priorities can change over time.
- Allows the Town to take advantage of all funding opportunities as they arise.
- Implies that several actions can progress simultaneously.
- Works well for larger or complex phased projects.
- Encourages the Town to keep all proposed actions in mind.

To assign action priority, a number of criteria were taken together, in addition to the Hazard Analysis Score in Section 5.1, but weighted subjectively. These criteria are depicted above and listed below.

As an example, a “High” priority action would typically score higher in the Hazard Analysis and have greater weight for the first two criteria listed below than those with a “Moderate” priority.

- Severity or immediacy of need. This subjective assessment would consider the potential extent of risk in terms of structural damage repair costs, level of safety risk to residents, and probability of occurrence.
- Number of residents impacted that would benefit from mitigation.

- Availability of funding and personnel resources to implement the project. Availability of town, state or federal funds, and availability of town personnel and MARC staff.
- Strong community support and little or no political opposition or reduction in revenue.
- Project feasibility and cost-benefit. Note that Reading is a small town and does not currently have the capacity to determine the cost/benefit of each proposed action. However, prior to pursuing any mitigation project, the Town would consider the costs and benefits of the project using FEMA methodology.

Table 6. Reading Hazard Mitigation Actions and Strategies 2022-2027

High Priority
Moderate Priority
Low Priority

MITIGATION ACTION OR STRATEGY (**Indicates Action is from Prior Plan)	TYPE ¹	HAZARD ADDRESSED	RESPONSIBLE PARTY ²	TIME FRAME	FUNDING SOURCE ³
**Work with MARC to provide a concise and comprehensive list of available funding sources to include a description/examples of eligible project types and application schedules to better coordinate efforts in implementing mitigation projects.	M	All	MARC, Town Administration	2022-2023	TOB
**Maintain and enhance seasonal fire safety awareness program for residents, landowners, and rental properties. Explore Firewise and other State fire safety outreach ideas for applicable programs, such as campfire and brush burn safety, and household fire hazards .	M	Wildfire, Structure Fire, Drought	Emergency Management Director , Fire & Rescue Services	Annually 2022-2027	TOB, VDFS
Allocate enough funding each budget cycle early in the fall season in anticipation of ice events over the season and possible supply issues.	M	Ice	Highway Dept. , Town Administration	Annually 2022-2027	TOB
**Review identified site specific mitigation measures recommended as flood and erosion hazard mitigation projects in river corridor plans for the Black River and Mill Brook River and Town Plan review (Appendix D – Priority Watershed Improvements) to develop a phased approach to implement actions that improve and protect natural system function, ecological integrity, and water quality; and that are feasible based on available funding.	M	Flood, Erosion, Ice Jam	MARC, Town Administration	2024-2027	TOB, VEM, ANR, CP, VTrans

Evaluate the feasibility to develop a phased plan for upgrading bridge on 20 Mile Stream Rd , as recommended in the Black River Corridor Plan, to increase bankful width to accommodate high stream flows.	M	Flood, Erosion, Ice Jam	Highway Dept. , Town Administration, Selectboard, MARC	2024	TOB, ANR, VTrans
Make continued progress on Municipal Roads General Permit (MRGP) standards for implementing best management practices on hydrologically-connected road segments with a focus on segments at the highest risk for erosion during severe rain events as assessed in the Road Erosion Inventory as very high and high priority (Tattle, Stone Chimney, Newton, Mann, Jenne, Grasshopper, Brown Schoolhouse).	M	Flood, Erosion	Highway Dept. , Town Administration, Selectboard, MARC	2022-2027	TOB, VTrans, ANR
Conduct annual review of Hazard Mitigation Plan progress as noted in Section 6.3 prior to capital budgeting process and recommend incorporating projects selected from this plan, if feasible and funding is available.	M, P	All	Hazard Mitigation Committee , Town Administration, Selectboard, MARC	2023, then Annual Review	TOB
Work with MARC to maintain hazard mitigation awareness of mitigation/preparedness actions in other town planning efforts.	M	All	MARC , Hazard Mitigation Committee, Town Administration	Ongoing	TOB, VEM
Evaluate and assess available options for removal of debris from streams to prevent blocking bridges and culverts during future storm events.	M	Flood, Erosion	Road Foreman , Highway Dept., MARC	2023-2025	TOB, ANR
**Work with MARC to develop a training program on Vermont Flood Ready tools, to provide residents with flood mitigation guide materials and NFIP informational materials.	M	Flood, Erosion	Town Clerk/Administration , MARC	2025-2027	TOB
Work with MARC and Town residents to consider FEMA buy-out feasibility for vulnerable residential properties on Grasshopper Ln and Tyson Road to mitigate flood risk.	M	Flood, Erosion	MARC , Hazard Mitigation Committee, Town Administration	2023-2025	TOB, VEM

Develop a more proactive approach and seek possible funding for improving tree maintenance to better assess and mitigate the potential impact of heavy snow, ice, and wind to protect vulnerable utility infrastructure.	M	High Wind, Heavy Snow, Ice	Road Foreman, Highway Dept.	2022-2024	TOB, UCF, VTrans
Identify opportunities to enhance public outreach and awareness of hazards with recent climate trends identified in this plan, including extreme heat and drought, particularly for vulnerable populations.	M	All	Emergency Management Department, Hazard Mitigation Committee, MARC	2022-2024	TOB, VDH, VEM
Inform residents of local shelter sites (Town Hall, Fire Station) and informational resources prior to anticipated severe weather and extreme temperature events , with a focus on vulnerable populations.	P	Extreme Heat, Extreme Cold	Town Administration, Emergency Management Department	2022, then annually	TOB, VEM
Consider annual updates for bridge and culvert inventories and maintain a priority list for upgrades and repairs to reduce risk of damage and infrastructure failure from flooding and erosion.	M	Flood, Erosion	Road Foreman, Highway Dept.	2023, then Annual Review	TOB, VTrans
**Work with the state agencies to update management plans for state lands located in town to reduce fuel for wildland fires.	M	Wildfire	Fire Chief, Planning Commission	2025-2027	TOB, ANR, VDFS
Initiate the process to formally close the lower section of Niagara Road , which is currently designated as a Class 3 road and located in a flood hazard zone; it was entirely washed out during Tropical storm Irene.	M	Flood, Erosion	Highway Dept., Town Administration	2023	TOB, VTrans

Key

1. Type
 - a. **M – Mitigation**
 - b. **P – Preparedness**
2. **Responsible Party: Responsible Party is shown in Bold and others listed are support entities**
3. **Funding Sources:**
 - a. Town Funding
 - i. **TOB - Town Operating Budget**
 - b. FEMA and Vermont State Department of Emergency Management (VEM)
 - i. **HMA - Hazard Mitigation Assistance Grant Program (VT State Department of Emergency Management)**
 - ii. **HMGP – Hazard Mitigation Grant Program (acquisition, infrastructure, planning, outreach)**
 - iii. **BRIC – Building Resilient Infrastructure and Communities Grant Program**
 - iv. **FMA - FEMA Flood Mitigation Assistance Program**
 - v. **EMPG – Emergency Management Performance Grant (VT State Department of Emergency Management)**
 - vi. **FPSG – FEMA Fire Prevention & Safety Grant**
 - c. Vermont Department of Health (VDH)
 - d. Vermont Agency of Natural Resources (ANR)
 - i. **ERGP - Ecosystem Restoration Grant Program**
 - ii. **DIBG – Design/Implementation (Clean Water) Block Grant Program**
 - iii. **RCCEG – River Corridor Conservation Easement Grant (ERPG)**
 - e. Vermont Agency of Commerce and Community Development (ACCD)
 - i. **CDBG – VT ACCD Community Development Block Program**
 - ii. **HPG – Historic Preservation Grant Programs**
 - f. Vermont Department of Fire Safety Programs (VDFS)
 - g. Vermont Transportation Agency (VTrans)
 - i. **MRGIA – Municipal Roads Grants-In-Aid Program**
 - ii. **BRGP – Better Roads Grant Program**
 - iii. **THSGP – Town Highway Structures Grant Program**
 - iv. **THC2RP – Town Highway Class 2 Road Program**
 - v. **MHSMP – Municipal Highway Stormwater Mitigation Program**
 - vi. **TAP – Transportation Alternatives Program**
 - h. Conservation Programs (CP)

- i. **VMG – Vermont Watershed Grant**
 - ii. **VLT – Vermont Land Trust**
 - iii. **CRC – Connecticut River Conservancy**
 - iv. **VRC – Vermont River Conservancy**
- i. **American Rescue Plan Act (ARPA) - Coronavirus State and Local Fiscal Recovery Funds & related future funding opportunities**
- j. **MARC Brownfields Reuse Program Grants (MBRP) – EPA Brownfields Grants through MARC**
- k. **Vermont Urban & Community Forestry (UCF)**
 - i. **EABG - Emerald Ash Borer Grant Program**
 - ii. **CCFC-Community Caring for Canopy Grants**
- l. **Other**
 - i. **VCF-Vermont Community Foundation**
 - ii. **VCC-Vermont Conservation Commission**
 - iii. **SGSG- Vermont Natural Resources Council Small Grants for Smart Growth**
 - iv. **New England Grass Roots Environmental Fund**

HMC – Hazard Mitigation Committee

MARC- Mount Ascutney Regional Commission

6.3 Plan Monitoring and Maintenance Process

Plan Monitoring Process

With the Selectboard Chair as lead responsible party, the Hazard Mitigation Committee will be monitoring this plan as outlined below, to ensure that progress is made and identified mitigation actions are implemented as resources or opportunities become available. The Town will work with its regional partners, including MARC, to identify funding opportunities and for assistance with funding applications.

New to this plan update is an effort to formalize a method for monitoring and evaluating the Town's progress on action items and to improve local hazard data collection and public awareness and participation. The monitoring process has been identified as an action item to be implemented annually (at a minimum) over the plan period and will include a noticed annual meeting of the Hazard Mitigation Committee, to review and track the following:

- Progress on **Mitigation/Preparedness Strategies and Actions** listed in **Table 6**;
- Changes or improvements in effectiveness of **Community Capabilities and Resources** in **Table 4.2**;
- Updates to local, regional, or State hazard data occurrences and extent;
- Changes in prioritization of identified hazards;
- Consistency with other Town Plan goals, policies, and recommendations, and
- Whether stated goals and objectives are being met.

This new method for monitoring plan progress will be implemented gradually over the plan period. Once fully established, it will include an annual review to be conducted by the Hazard Mitigation Committee prior to the Town's annual budgeting process each fall with the completion of **Hazard Mitigation Plan Monitoring Form** in **Appendix E**. Monitoring forms will be completed identifying any progress made for each action and plans for the coming year. Completed forms will become part of this plan and distributed to the appropriate boards and commissions and made available for public viewing on the Town website. Following the review meeting by the Committee, an update on plan progress is to be reported once each year at a scheduled Selectboard meeting which is publicly noticed with an agenda.

For these scheduled public meetings, representatives of the Planning Commission, Emergency Management, Fire and Highway Departments, and interested members of the public will be encouraged to attend. Participants will be asked during these review periods to express their concerns and experiences with natural hazards, identify new vulnerabilities and suggest additional mitigating measures. All public input during the annual plan monitoring process will be noted.

During the monitoring process, the Town will consider and incorporate appropriate hazard mitigation actions from **Table 6** as part of the budgeting process each year and as part of the planning process for updates to the Town Plan, Planning and Zoning Regulations, and Flood Damage Prevention Regulations, as well as for future community development projects, as appropriate. The Hazard Mitigation Committee will also be responsible for ensuring proposed mitigation actions remain in line with current town goals, strategies, and policies.

Plan Maintenance Process

The Town will reconvene the Hazard Mitigation Committee at the direction of the Selectboard Chair in the latter half of 2025 to kick-off the update process with an initial meeting to discuss grant funding and contracting services for assistance in the planning process. The Selectboard Chair will again reach out to the community for additional volunteers to participate as members of the Hazard Mitigation Committee for the new plan period.

The Town will review the prior plan progress and monitoring forms. The Committee will conduct the planning activities as outlined in the Process Flow Chart (**Appendix C**) and incorporate the plan monitoring information, updated hazard data, town and regional plans, and new relevant reports and studies. All public meetings will be warned following town protocols.

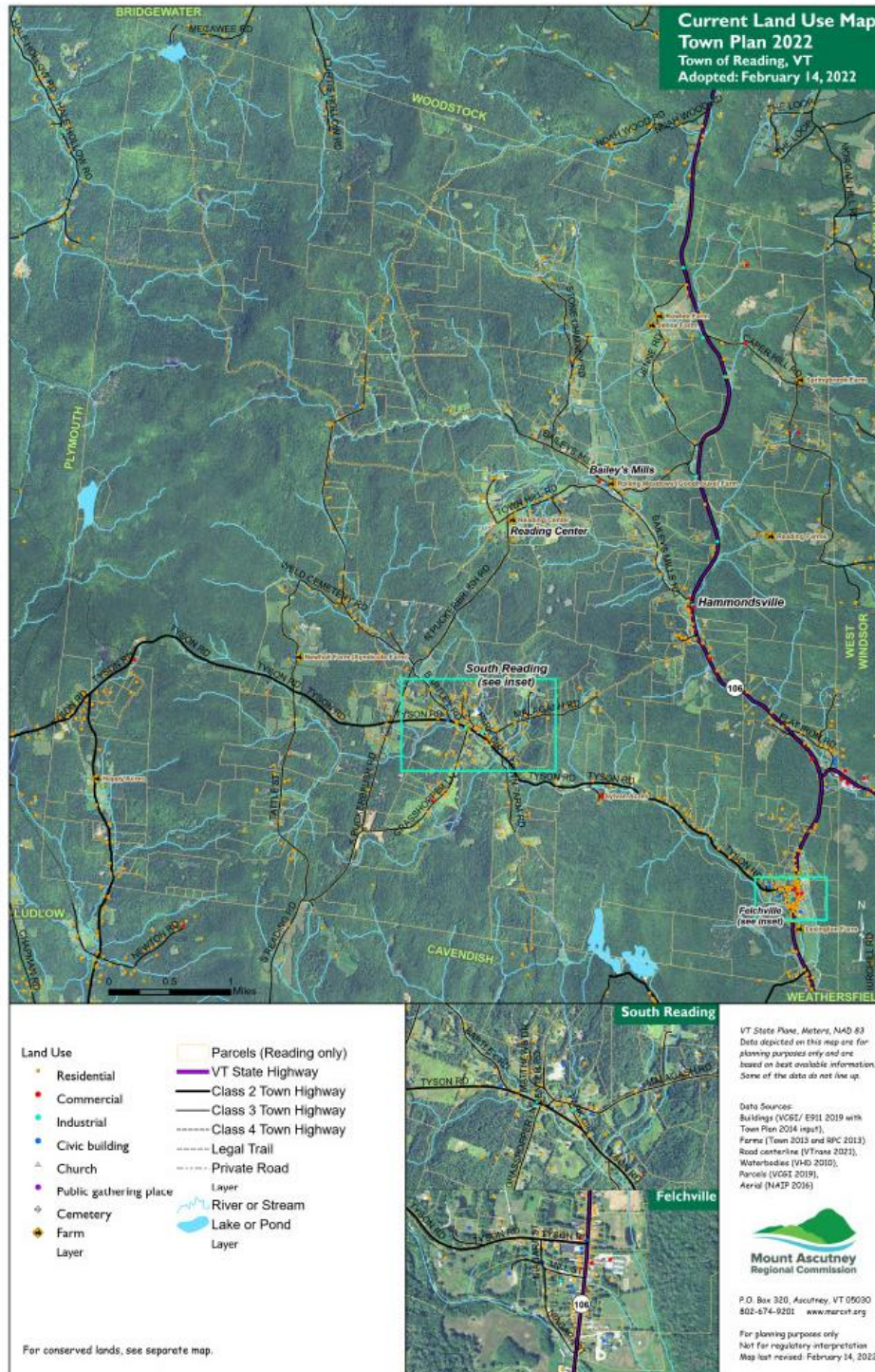
A preliminary draft plan will be made available for public comment. The plan will be available on the town and regional websites, and hard copies will be available at the town office. A second publicly warned meeting will be held in the 3rd quarter 2025, during which any substantial revisions gathered during the public input period will be discussed. All final edits and revisions will be made, and a final draft will be provided to the Hazard Mitigation Committee for final review by end of 2026.

Subsequently, the plan will be sent to Vermont Emergency Management for review, approval, and referral to FEMA for Approval Pending Adoption (APA) to be completed in 1st quarter 2027. Following the receipt of APA, the Reading Town Selectboard may then adopt the updated Local Hazard Mitigation Plan and forward a copy of the adoption resolution to FEMA to complete the plan approval and adoption process before this plan expires in 2nd quarter 2027.

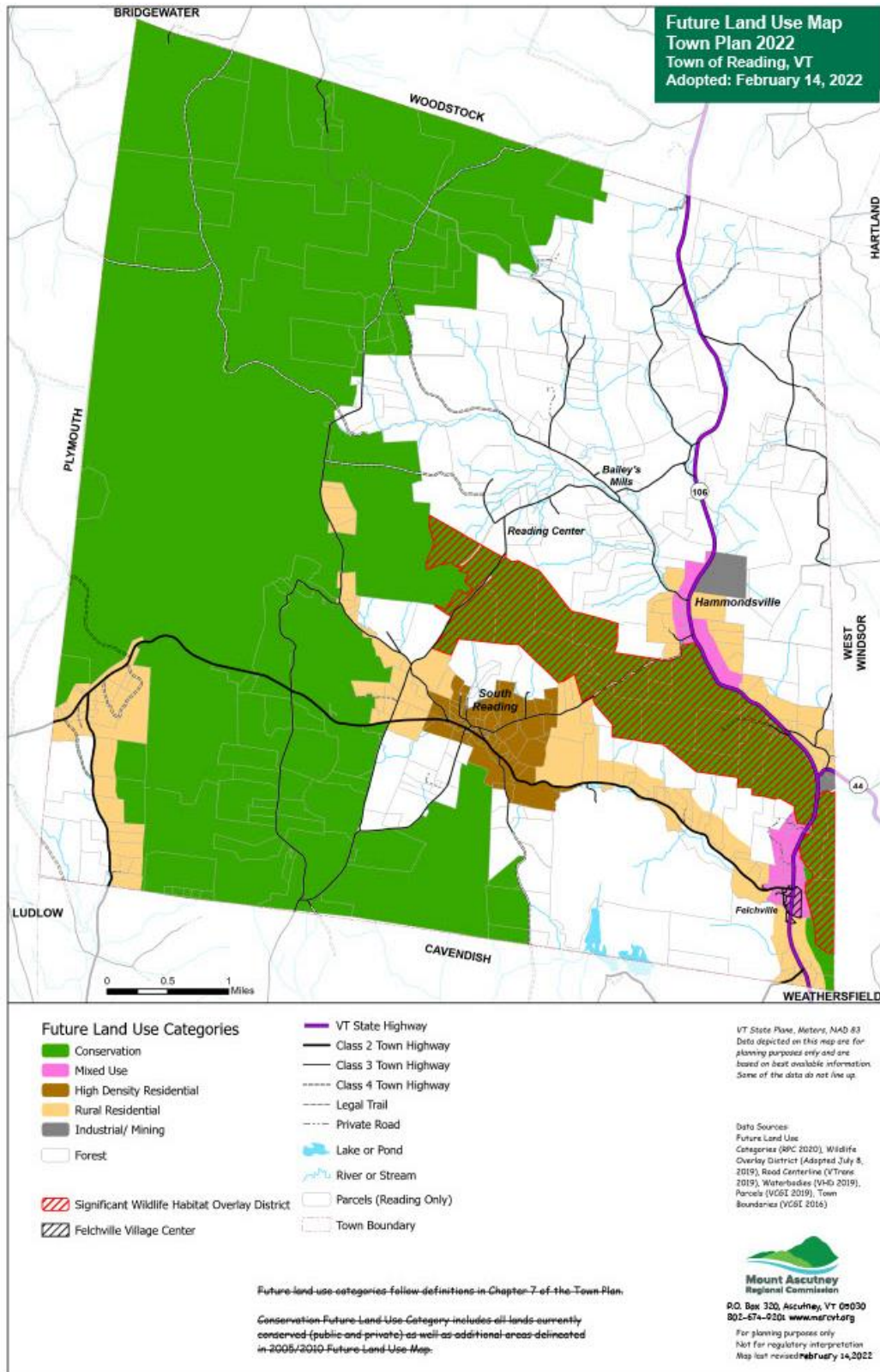
7. Appendices

APPENDIX A: MAP 1: EXISTING LAND USE

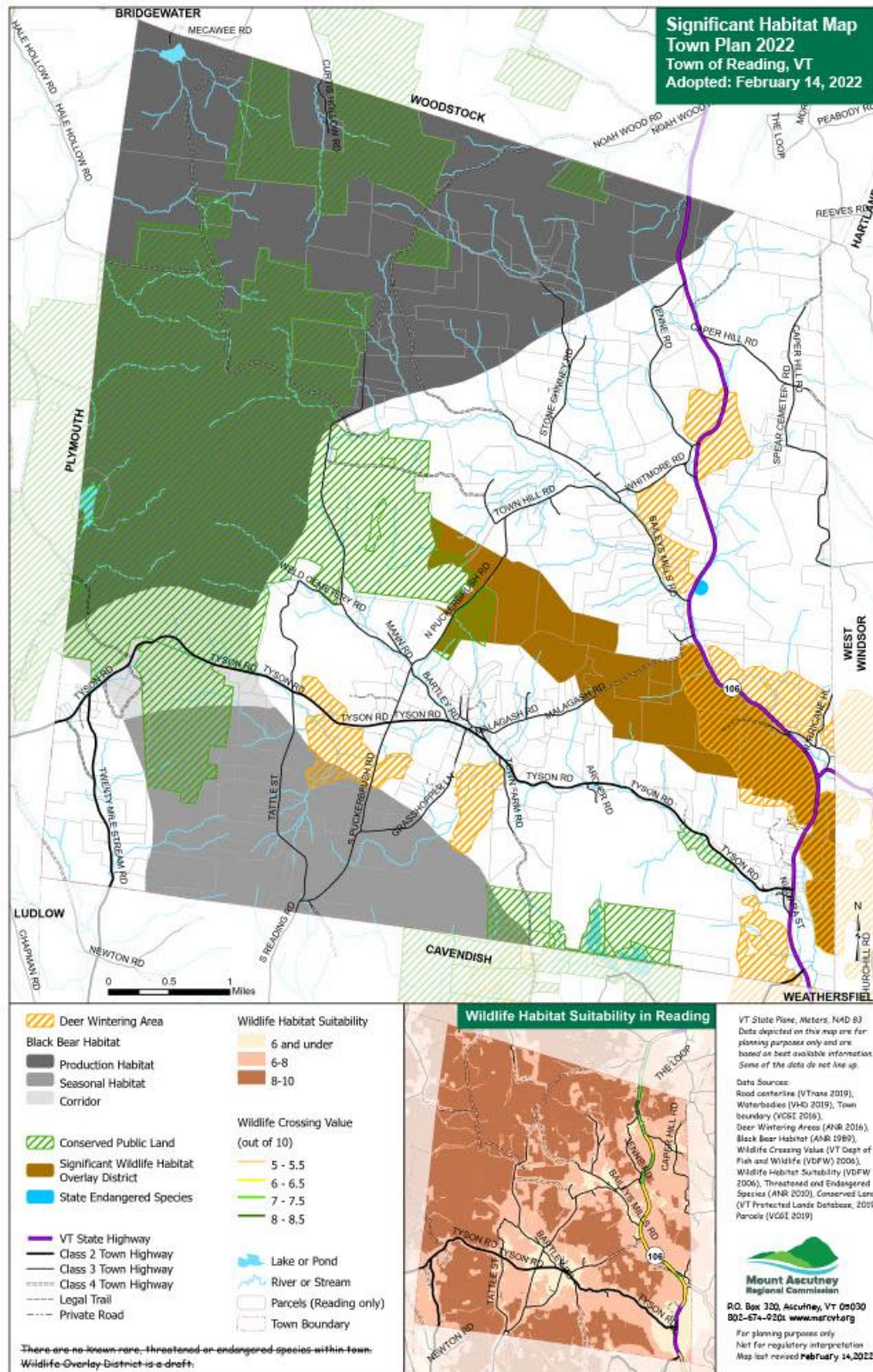
*Full page versions of Town maps are available digitally at: <https://marcvt.org/reading-town-plan/>



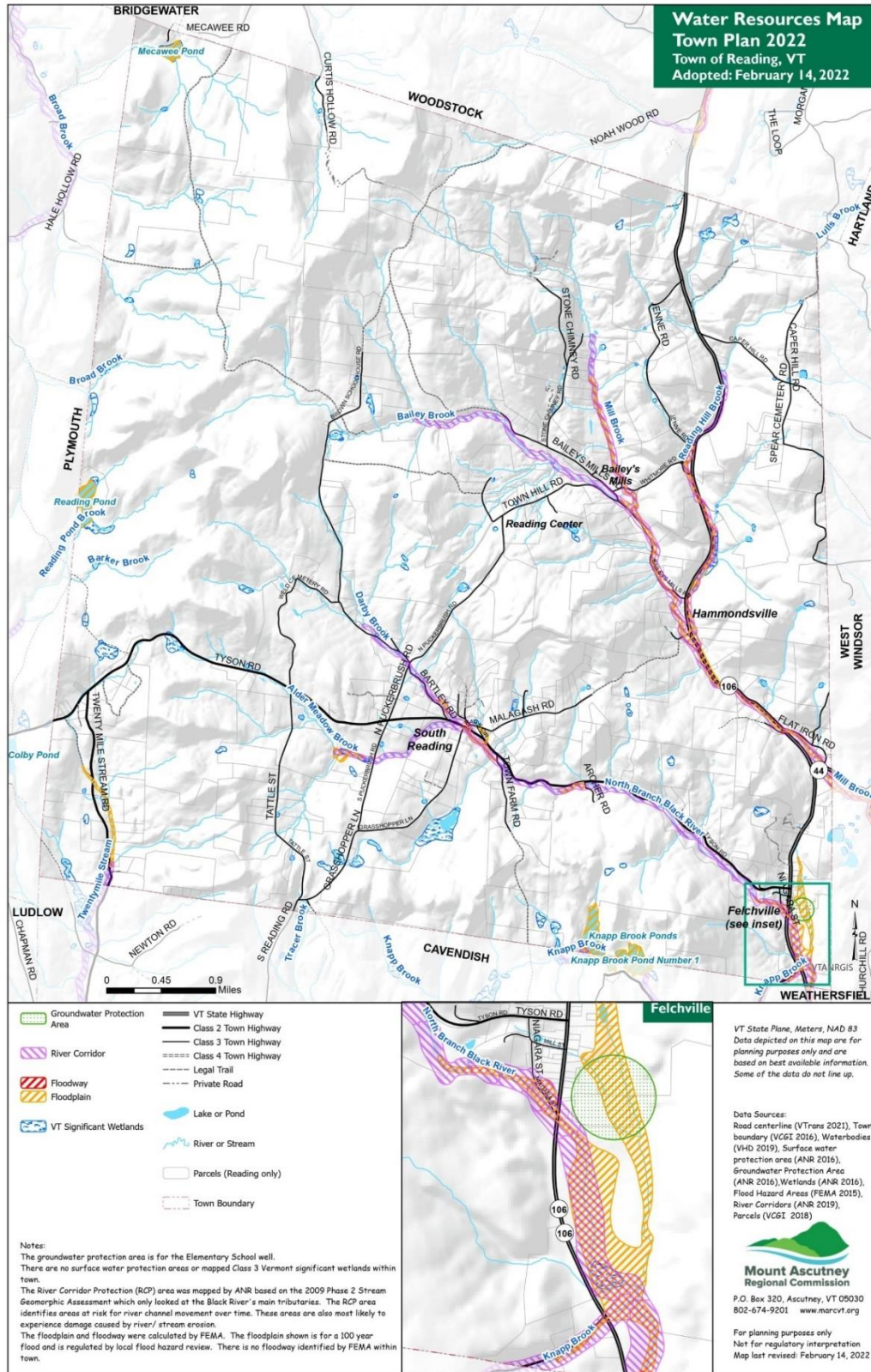
APPENDIX A: MAP 2: FUTURE LAND USE



APPENDIX A: MAP 3: SIGNIFICANT HABITAT



APPENDIX A: MAP 4: WATER RESOURCES



APPENDIX B: AGENDAS, SIGN-IN FORMS, AND PUBLIC NOTICES

MEETING 1 Agenda

Reading Hazard Mitigation Meeting 1

June 27th, 2022, 6 PM -7:30 PM

Location:

Reading Town Hall

799 VT-106, Reading, VT 05062

6:00- Introduction (10 min)

- Sign in
- Background
- Timeline
- Process
- In kind hour track

6:10- Data background presentation (10 min)

6:20- Hazard and Vulnerable Area Assessment (40 min)

- A. Hazard Event Assessment Exercise (20 min)
- B. Hazard Impact Assessment Exercise (20 min)
- C. Vulnerable Area Assessment Exercise

Extra – Assess 2016 Action and Strategies

Follow Up –

- Flow chart
- Assessment results
- In kind hour worksheet
- Vulnerable areas

APPENDIX B: AGENDAS, SIGN-IN FORMS, AND PUBLIC NOTICES

MEETING 1 Sign-In Form

VOLUNTEER FORM TO DOCUMENT IN-KIND SERVICES - MATCH INFORMATION						
PROGRAM:	Reading LHMP					
DATE OF MEETING:	June 27, 2022					
MEETING LOCATION:	Reading Town Hall					
TOPIC:	Hazard Mitigation Meeting 1					
MEETING TIME:	6PM-7:30PM					
VOLUNTEER FORM TO DOCUMENT IN-KIND SERVICES - MATCH INFORMATION						
VOLUNTEER ATTENDEES - CLAIMED						
No.	NAME	AFFILIATION	MILEAGE ROUND TRIP	MEETING HOURS	TOTAL MILEAGE	TOTAL TIME
						\$20.00
1	Bob Allen	Reading Zoning Administrator, Selectboard Member		1.5	-	30.00
2	Calista Brennan	Reading Clerk and Treasurer		1.5	-	30.00
3	Gary Vittum	Firechief and Emergency Management Director		1.5	-	30.00
4	Gordan Eastman	Selectboard Chair		1.5	-	30.00
		Sub Total	0.00	6.00	\$0.00	\$120.00
FEDERALLY SUPPORTED PERSONNEL - CAN NOT CLAIM						
No.	NAME	AFFILIATION	MILEAGE ROUND TRIP	MEETING HOURS	TOTAL MILEAGE (08/01/08-)	TOTAL TIME
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
		Sub Total	0.00	6.00	\$0.00	\$0.00
TOTAL MATCH						\$120.00
TOTAL Non-Volunteer Match						\$0.00
TOTAL VOLUNTEER MATCH						\$120.00

APPENDIX B: AGENDAS, SIGN-IN FORMS, AND PUBLIC NOTICES

MEETING 2 Public Notice and Agenda

Town of Reading
Notice of Public Information Meeting

LOCAL HAZARD MITIGATION PLAN UPDATE
Reading Town Hall
Monday, September 12, 2022
6pm to 8pm

Reducing Risk to Natural Hazards and Disasters in Reading: Voice your concerns during the Local Hazard Mitigation Plan update.

The Town of Reading is updating its Local Hazard Mitigation Plan. The purpose of this planning effort is to protect life, property, economy, quality of life, and environment of the Reading Community from hazards and disasters. We are requesting input from the local community regarding experiences and concerns about hazard events and the potential risks and vulnerabilities to hazards, such as flooding, erosion, extreme temperatures, winter storms and drought.

The Town's Hazard Mitigation Committee plans to meet at Reading Town Hall on September 12th from 6:00pm to 8:00pm. The meeting will be conducted by the Mount Ascutney Regional Commission (MARC). The public is encouraged to attend and share their thoughts.

You can also provide your concerns, comments, and questions regarding this planning effort via email to Cindy Ingersoll at cingersoll@marcv.org.

Meeting agendas, planning materials, and templates which you can use to provide your input can be found on the MARC website under the Town of Reading page at <https://marcv.org/town-of-reading/> under **Reading Local Hazard Mitigation Planning Update Process**. Contents will be updated biweekly. Feel free to review the 2022 Town Plan and the prior 2017 Local Hazard Mitigation Plan which can also be found on the webpage.

TOWN OF READING
LOCAL HAZARD MITIGATION PLAN UPDATE
Hazard Mitigation Committee Meeting

Reading Town Hall
Monday, September 12, 2022
6pm to 8pm

AGENDA

1. Introduction if Public is Present (10 mins)
2. Review and Confirm Previous Plan Period Mitigation Actions (Table 2) (15 mins)
3. Review and Confirm Status of Community Resources and Capabilities (Table 3) (15 mins)
4. Review and Confirm Prior Meeting Output on Hazard Assessment and Hazards to be Profiled (Tables 4a, 4b) (15 mins)
5. Identify Hazard Occurrences Over Past 5 Years (attached template) (20 mins)
 - a. Discussion of Vulnerable Areas: location, hazard occurrences, extent
6. Record match hours (attached excel template) (10 mins)
7. Relevant Changes in Other Town Planning Efforts and Documents (10 mins)
8. Next Meeting (**SET DATE**) – Topics for Discussion

APPENDIX B: AGENDAS, SIGN-IN FORMS, AND PUBLIC NOTICES

MEETING 2 Sign-In Form

VOLUNTEER FORM TO DOCUMENT IN-KIND SERVICES - MATCH INFORMATION

PROGRAM: Reading LHMP (MARC, HMC, Public)
DATE OF MEETING: September 12, 2022
MEETING LOCATION: Reading Town Hall
TOPIC: Hazard Mitigation Meeting 2
MEETING TIME: 6pm-7:30pm

VOLUNTEER ATTENDEES - CLAIMED						
No.	NAME	AFFILIATION	MILEAGE ROUND TRIP	MEETING HOURS	TOTAL MILEAGE	TOTAL TIME
1	Gordon Eastman	Selectboard Chair, HMC		1.5	-	30.00
2	Bob Hartnett	Town Moderator/JP		1.5	-	30.00
3	Bob Allen	HMC, Zoning Administrator, SB member		1.5	-	30.00
4	Kevin Kaija	Public Member		1.5	-	30.00
5	Marie Caduto	Public Member, Department of Env Conservation		1.5	-	30.00
6	Jim Peplau	Selectboard Member		1.5	-	30.00
7	Calista Brennan	Town Clerk/Treasurer		1.5	-	30.00
8	Stacy Gallowhur	Public Member		1.5	-	30.00
9	Richard Van de Boon	Public Member		1.5	-	30.00
Sub Total			0.00	13.50	\$0.00	\$270.00

FEDERALLY SUPPORTED PERSONNEL - CAN NOT CLAIM						
No.	NAME	AFFILIATION	MILEAGE ROUND TRIP	MEETING HOURS	TOTAL MILEAGE (08/01/08-)	TOTAL TIME
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
Sub Total			0.00	13.50	\$0.00	\$0.00

TOTAL MATCH	\$270.00
TOTAL Non-Volunteer Match	\$0.00
TOTAL VOLUNTEER MATCH	\$270.00

APPENDIX B: AGENDAS, SIGN-IN FORMS, AND PUBLIC NOTICES

MEETING 3 Public Notice

**Town of Reading
Notice of Public Information Meeting**

**LOCAL HAZARD MITIGATION PLAN UPDATE
Reading Town Hall
Monday, September 26, 2022
6pm to 7:30pm**

Reducing Risk to Natural Hazards and Disasters in Reading: Voice your concerns during the Local Hazard Mitigation Plan update.

The Town of Reading is updating its Local Hazard Mitigation Plan. The purpose of this planning effort is to protect life, property, economy, quality of life, and environment of the Reading Community from hazards and disasters. We are requesting input from the local community regarding experiences and concerns about hazard events and the potential risks and vulnerabilities to hazards, such as flooding, erosion, extreme temperatures, winter storms and drought. At this meeting, we will be reviewing the plan monitoring and evaluation process, and discussing action items for hazard mitigation.

The Town's Hazard Mitigation Committee plans to meet at Reading Town Hall on September 26th from 6:00pm to 7:30pm. The meeting will be conducted by the Mount Ascutney Regional Commission (MARC). The public is encouraged to attend and share their thoughts.

You can also provide your concerns, comments, and questions regarding this planning effort via email to Malia Cordero at mcordero@marcvt.org.

Meeting agendas, planning materials, and templates which you can use to provide your input can be found on the MARC website under the Town of Reading page at <https://marcvt.org/town-of-Reading/> under **Reading Local Hazard Mitigation Planning Update Process**. Contents will be updated biweekly. Feel free to review the 2022 Town Plan and the prior 2017 Local Hazard Mitigation Plan which can also be found on the webpage.

APPENDIX B: AGENDAS, SIGN-IN FORMS, AND PUBLIC NOTICES

MEETING 3 Agenda and Sign-In Form

**TOWN OF READING
 Hazard Mitigation Committee Meeting**

**LOCAL HAZARD MITIGATION PLAN UPDATE
 Reading Town Hall
 Monday, September 26, 2022
 6pm to 7:30pm**

AGENDA

1. Introduction if Public is Present
2. Review drafted Hazard profile section
3. Identify Plan goals
4. Identify Mitigation Actions and Strategies for 2022-2027 Plan
5. Review and discuss Plan Monitoring and Evaluation
6. Discuss match hours
7. Next Meeting (**SET DATE**) – Initial draft review with Select Board

VOLUNTEER FORM TO DOCUMENT IN-KIND SERVICES - MATCH INFORMATION

PROGRAM: MARC with Hazard Mitigation Committee and the Public
DATE OF MEETING: September 26, 2022
MEETING LOCATION: Reading Town Hall
TOPIC: Hazard Mitigation Meeting 3
MEETING TIME: 6pm-7:30pm

VOLUNTEER ATTENDEES - CLAIMED

No.	NAME	AFFILIATION	MILEAGE ROUND TRIP	MEETING HOURS	TOTAL MILEAGE	TOTAL TIME
1	Gordon Eastman	Selectboard Chair, HMC		1.5	-	30.00
2	Bob Hartnett	Town Moderator/JP		1.5	-	30.00
3	Bob Allen	HMC, Zoning Administrator, SB member		1.5	-	30.00
4						
5						
6						
7						
8						
9						
10						
Sub Total			0.00	4.50	\$0.00	\$90.00

APPENDIX B: AGENDAS, SIGN-IN FORMS, AND PUBLIC NOTICES

MEETING 4 Public Notice

**Town of Reading
Notice of Public Information Meeting**

**LOCAL HAZARD MITIGATION PLAN UPDATE
Reading Town Hall
Monday, October 24, 2022
6pm to 7:30pm**

Reducing Risk to Natural Hazards and Disasters in Reading: Voice your concerns during the Local Hazard Mitigation Plan update.

The Town of Reading is updating its Local Hazard Mitigation Plan. The purpose of this planning effort is to protect life, property, economy, quality of life, and environment of the Reading Community from hazards and disasters. **The Town of Reading is seeking comment on its 2022-2027 Local Hazard Mitigation Plan draft.** The purpose of this planning effort is to improve Reading's resiliency to natural hazards through hazard assessment, recognition of vulnerable assets, and identification of mitigating actions and strategies to reduce the impact of these hazards on the community.

The Town's Hazard Mitigation Committee plans to meet at Reading Town Hall on October 24th from 6:00pm to 7:30pm. The meeting will be conducted by the Mount Ascutney Regional Commission (MARC). The public is encouraged to attend and share their thoughts.

You can also provide your concerns, comments, and questions regarding this planning effort via email to Malia Cordero at mcordero@marcvt.org.

The draft, meeting agendas, planning materials, and templates which you can use to provide your input can be found on the MARC website under the Town of Reading page at <https://marcvt.org/town-of-Reading/> under **Reading Local Hazard Mitigation Planning Update Process**. Contents will be updated biweekly. Feel free to review the 2022 Town Plan and the prior 2017 Local Hazard Mitigation Plan which can also be found on the webpage.

APPENDIX B: AGENDAS, SIGN-IN FORMS, AND PUBLIC NOTICES

MEETING 4 Agenda and Sign-in Form

<p>TOWN OF READING Hazard Mitigation Committee Meeting</p> <p>LOCAL HAZARD MITIGATION PLAN UPDATE Reading Town Hall Monday, October 24, 2022 6pm to 7:30pm</p> <p>AGENDA</p> <ol style="list-style-type: none"> 1. Introduction if Public is Present 2. Discussion of Draft Plan 3. Record in-kind match hours 4. Next Meeting: November 14th at 6pm – Final Draft Review and Adoption by Selectboard

VOLUNTEER FORM TO DOCUMENT IN-KIND SERVICES - MATCH INFORMATION

PROGRAM: MARC with Hazard Mitigation Committee and the Public
DATE OF MEETING: October 24, 2022
MEETING LOCATION: Reading Town Hall
TOPIC: Hazard Mitigation Meeting 4
MEETING TIME: 6pm-7pm

VOLUNTEER ATTENDEES - CLAIMED						
No.	NAME	AFFILIATION	MILEAGE ROUND TRIP	MEETING HOURS	TOTAL MILEAGE	TOTAL TIME
1	Gordon Eastman	Selectboard Chair, HMC		1	-	20.00
2	Bob Hartnett	Town Moderator/JP		1	-	20.00
3						
4						
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8						
9						
10						
Sub Total			0.00	2.00	\$0.00	\$40.00

APPENDIX B: AGENDAS, SIGN-IN FORMS, AND PUBLIC NOTICES

MEETING 5 Public Notice/Executive Summary

Town of Reading 2022-2027 Local Hazard Mitigation Plan Update

EXECUTIVE SUMMARY

This 2022-2027 Local Hazard Mitigation Plan is an update from the previous 2017-2022 plan. As with the prior plan, this planning effort recognizes the benefits of taking a proactive approach to reduce the impact of natural hazards on the Reading community. A town must have a current FEMA approved five-year plan that meets all the required elements in regulation 44 CFR §201.6 in order to be eligible for federal and state disaster recovery funding.

Hazard mitigation planning is a local public process to identify those hazards that not only have historically impacted the town, but can be expected to affect the Reading community in the future; and to develop and monitor the implementation of specific strategies and actions that will reduce the potential for physical and financial loss from these hazards should a disaster occur.

The initial draft can be viewed online at the following link:

<https://marcv.org/reading-local-hazard-mitigation-planning-update-process/>

The Hazard Profile and Assessment in Section 5 provides a basis for the selected strategies and actions listed in Table 6: 2022-2027 Mitigation/Preparedness Strategies and Actions on page 69. These action items, identified by the Town's Hazard Mitigation Committee members, are a culmination of an initial assessment and prioritization of hazard trends and their impact on town property, infrastructure, economy, life and the local environment.

Most notable projected hazard trends obtained through review and discussion of current data resources is an increased probability of occurrence for flooding and erosion, extreme temperatures, drought, high wind events, and ice. As a result, a greater potential for wildfire and structure fire is also possible. Newly noted hazards that are briefly discussed in this plan update are Infectious Disease and Plant Infestations.

As in the prior plan, **Flooding** and related **Erosion** continue to be priority events, given the Town's geographical characteristics and historical and projected probability of occurrence and impact. This update identifies **Ice**, **Extreme Cold** and **Heavy Snow** as separate hazards, previously combined in the prior plan. These are now assessed separately due to changes in climate that have increased the impact of ice and extreme cold while the impact from heavy snow remains constant and is not expected to change.

Ice from winter storm events has become a higher priority with more frequent occurrences due to a trend towards more extreme variations in temperature during the winter season. **High Wind** is now identified separately as a significant hazard from thunderstorms, winter storms, and other severe weather events that are not always accompanied by precipitation. Combined, high winds from these weather events have a high probability of occurrence with higher wind gusts. **Drought** is also newly

APPENDIX B: AGENDAS, SIGN-IN FORMS, AND PUBLIC NOTICES

MEETING 5 Public Notice/Executive Summary (Cont'd)

recognized as a notable and increasing risk to the community with more frequent extended periods of **Extreme Heat** and variability in precipitation events.

The Town's geographic and demographic vulnerability to **Wildland** and **Structure Fire** has kept these hazards as priorities that could potentially worsen with higher frequencies of extreme weather events such as drought, high wind and thunderstorm events. **Infectious Disease Outbreak** and **Plant Infestations** are newly identified hazards given the recent COVID-19 pandemic and the potential impact on town infrastructure from recent tree infestations.

Table 6 identifies and prioritizes a number of preparedness and mitigation actions including infrastructure upgrades, preparedness actions to improve emergency response, outreach efforts to raise community awareness, and potential policy and capability enhancements. Ideas were drawn from Town plans, River Corridor Plans, Road Erosion Inventories, and state and neighboring town hazard mitigation plans, as well as suggestions from FEMA guidance documents.

You will find the proposed mitigation ideas in Table 6 to be more specific actions compared to prior plans and consistent with other Town plan policies and recommendations. There are also recommendations for larger projects to be broken down into phases for more feasible implementation of important and longer-term mitigation projects.

Particularly important and new this update, is the formal monitoring of plan progress over the five-year planning period. Although the Town is not obligated to implement all the recommended projects in Table 6, it is expected to formally monitor the progress it has made on an annual basis for public review and input. The town is also committed to improved documentation of future hazard events and their impact on the community for input in future planning.

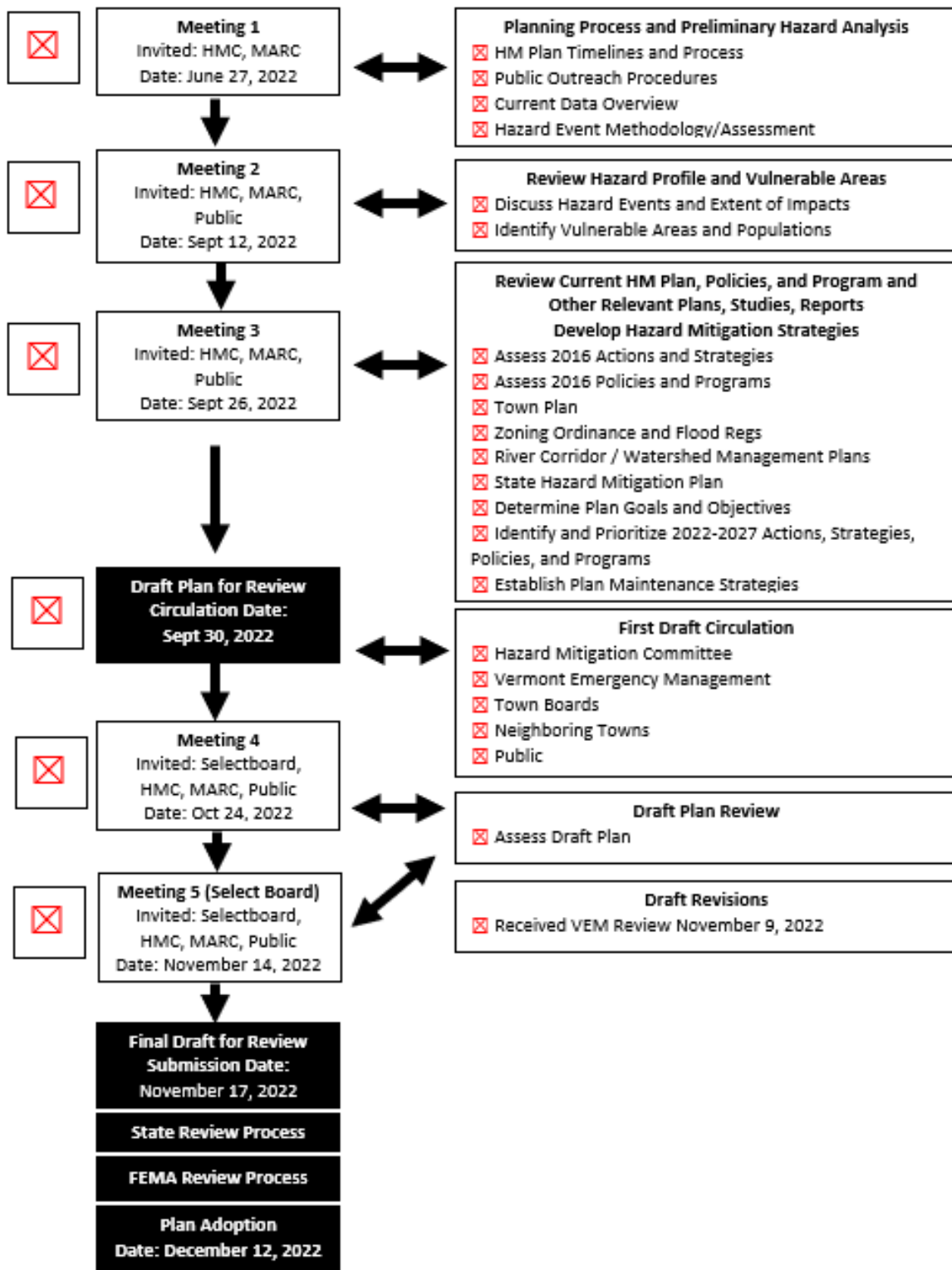
This is a dynamic plan which can be modified over the plan period to accommodate changes in priorities and ideas with the occurrence of future disaster events and availability of funding. The effectiveness of this plan will be determined based on local awareness, knowledge, and support and on the recognition and incorporation of hazard mitigation into all other municipal planning efforts.

APPENDIX B: AGENDAS, SIGN-IN FORMS, AND PUBLIC NOTICES

MEETING 5 Sign-in Form

VOLUNTEER FORM TO DOCUMENT IN-KIND SERVICES - MATCH INFORMATION						
PROGRAM:	Select Board Meeting					
DATE OF MEETING:	November 14, 2022					
MEETING LOCATION:	Reading Town Hall					
TOPIC:	LHMP Draft Review					
MEETING TIME:	6pm-7:30pm					
VOLUNTEER ATTENDEES - CLAIMED						
No.	NAME	AFFILIATION	MILEAGE ROUND TRIP	MEETING HOURS	TOTAL MILEAGE	TOTAL TIME
1	Gordon Eastman	Select Board Chair, HMC Member		1.5	-	30.00
2	Robert Allen	Select Board Member, HMC Member		1.5	-	30.00
3	Jim Peplau	Select Board Member		1.5		30.00
4	Calista Brennan	Town Clerk/Treasurer		1.5		30.00
5	Glen Towne	Road Foreman		1.5		30.00
6	Stacy Gallowhur	Resident		1.5		30.00
7	Richard Van de Boom	Resident		1.5		30.00
8	Bob Hartnett	Town Moderator/JP		1.5		30.00
9	Lisa Silvester	Resident		1.5		30.00
10	Mark Corbin	Resident		1.5		30.00
11	Martha Harrison	MARC Planner		1.5		30.00
12	Steve Strait	Planning Commission Chair		1.5		30.00
13	Jon Ashley	Dubois & King (Engineering firm)		1.5		30.00
14	Marie Caduto	Resident, Dept. of Environmental Conservation		1.5		30.00
15	Catherine Norcott	Resident		1.5		30.00
16	Brian Cali	Energy Committee		1.5		30.00
17	Bill Bakker	Library Trustee		1.5		30.00
18	Jean Goldsborough	Planning Commission		1.5		30.00
19	Ann Rubright	Green Spaces Committee		1.5		30.00
20	Mary Crowley	Resident		1.5		30.00
21	Cathy Callen-Rondeau	Resident, MARC Board Commissioner		1.5		30.00
Sub Total			0.00	31.50	\$0.00	\$630.00
FEDERALLY SUPPORTED PERSONNEL - CAN NOT CLAIM						
No.	NAME	AFFILIATION	MILEAGE ROUND TRIP	MEETING HOURS	TOTAL MILEAGE (08/01/08-)	TOTAL TIME
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
Sub Total			0.00	31.50	\$0.00	\$0.00
TOTAL MATCH						\$630.00
TOTAL Non-Volunteer Match						\$0.00
TOTAL VOLUNTEER MATCH						\$630.00

APPENDIX C: PROCESS FLOW CHART



APPENDIX D: TOWN PLAN REVIEW

The 2022 Reading Town Plan identifies the following recommendations which support hazard mitigation.

Goals and Action Items

- “The Planning Commission and Select Board shall research and adopt as appropriate zoning bylaws that protect aquatic and riparian habitats from development and contribute to improved flood resiliency, including but not limited to more effective stream protection buffers.” (Page 30)

- “6. Review development within all flood hazard and river corridor in order to mitigate risks to public safety, critical infrastructure, historic structures and municipal investments. The Planning Commission and Select Board should adopt Reading’s All-Hazard Mitigation Plan by reference to supplement and inform the flood resilience section of this Town Plan. The Planning Commission and Select Board shall consider additional strategies to mitigate flood and erosion risks, such as adopting standards that go beyond NFIP minimums and additional mechanisms to reduce erosion risks within river corridors” (Page 31-32)
- “3. Maintain and improve the quality of surface waters through better road maintenance practices.⁹⁴ The Road Foreman will continue to implement mitigation projects at priority sites identified in the erosion inventory. The Road Foreman will continue to improve road maintenance practices to protect surface waters from road runoff and sedimentation. The Road Foreman, Reading’s MARC transportation representative and the Select Board will continue to seek out state and federal programs that address the water quality issues of road runoff from paved and unpaved roads into nearby waterways.” (Page 41-42)

Priority Watershed Improvements

- Stabilize embankment along 20 Mile Stream Road.
- Replacing the steel arch under Agony Hill Road with a larger structure to better accommodate the large volumes of sediment working through the reach.
- Replace Baileys Mills Road arch with a larger structure and design for over bank flooding.
- Plan for ongoing sedimentation in the lower, wider valleys along Bailey Brook and Mill Brook (i.e., downstream of the confluence of Mill Brook and Bailey Brook).
- Study flood mitigation alternatives to the “alluvial fan” area on Bailey Brook at the intersection of Baileys Mills Road and Town Farm Road that was severely damaged during Tropical Storm Irene flooding.

Policies

- “Rare and irreplaceable natural areas within the Town shall be protected from development activities and uses that threaten their biological integrity and ecological value. Development in and around these areas may be limited in scope and intensity; soil erosion and pollution of water resources must be controlled in these areas.” (Page 32)
- “9. The Town shall give careful consideration to the fragile and scenic nature of steep slopes (over 25%) and ridgelines when determining what kinds of development are appropriate in these sensitive areas.” (Page 33)
- “11. Development shall meet the standards for surface water buffers (Section 3.10) and flood hazard review (Section 5.5) in accordance with the zoning bylaws.” (Page 33)
- “Renewable energy generation facilities must not have undue adverse impacts on “possible constraints”. In addition, applicants shall demonstrate that the project will not have undue adverse impacts on significant wildlife habitat, wildlife travel corridors, stormwater, water quality, flood resiliency, important recreational facilities or uses, scenic resources identified in this plan, or

inventoried historic or cultural resources. Project proposals must consider placement of such facilities in locations where impacts are minimal or employ reasonable measures to mitigate undue adverse impacts of the applicable resources.” (Page 69)

- “Support climate change mitigation and adaptation efforts as well as flood resiliency planning.” (Page 95)
- “Minimize environmental and human health risks posed by hazardous sites.” (Page 95)

APPENDIX E: PLAN MONITORING FORMS

**Town of Reading 2022-2027 Local Hazard Mitigation Plan
Annual Monitoring Form
Progress on Mitigation Strategies and Actions
(Word Doc Available)**

Period Covered: _____

Date: _____

High Priority
Moderate Priority
Low Priority

*Edit Cell Color to Reflect changes in Priority of Mitigation Actions/Strategies

MITIGATION ACTION OR STRATEGY (**Indicates Action is from Prior Plan)	PROGRESS MADE*	FUNDING SOUGHT	NEXT STEPS	RESPONSIBLE PARTY	TIME FRAME
**Work with MARC to provide a concise and comprehensive list of available funding sources to include a description/examples of eligible project types and application schedules to better coordinate efforts in implementing mitigation projects.					
**Maintain and enhance seasonal fire safety awareness program for residents, landowners, and rental properties. Explore Firewise and other State fire safety outreach ideas for applicable programs, such as campfire and brush burn safety, and household fire hazards.					
Allocate enough funding each budget cycle early in the fall season in anticipation of ice events over the season and possible supply issues.					

<p>**Review identified site specific mitigation measures recommended as flood and erosion hazard mitigation projects in river corridor plans for the Black River and Mill Brook River and Town Plan review (Appendix D – Priority Watershed Improvements) to develop a phased approach to implement actions that improve and protect natural system function, ecological integrity, and water quality; and that are feasible based on available funding.</p>					
<p>Evaluate the feasibility to develop a phased plan for upgrading bridge on 20 Mile Stream Rd, as recommended in the Black River Corridor Plan, to increase bankful width to accommodate high stream flows.</p>					
<p>Make continued progress on Municipal Roads General Permit (MRGP) standards for implementing best management practices on hydrologically-connected road segments with a focus on segments at the highest risk for erosion during severe rain events as assessed in the Road Erosion Inventory as very high and high priority (Tattle, Stone Chimney, Newton, Mann, Jenne, Grasshopper, Brown Schoolhouse).</p>					
<p>Conduct annual review of Hazard Mitigation Plan progress as noted in Section 6.3 prior to capital budgeting process and recommend incorporating projects selected from this plan, if feasible and funding is available.</p>					

Work with MARC to maintain hazard mitigation awareness of mitigation/preparedness actions in other town planning efforts.					
Evaluate and assess available options for removal of debris from streams to prevent blocking bridges and culverts during future storm events.					
**Work with MARC to develop a training program on Vermont Flood Ready tools, to provide residents with flood mitigation guide materials and NFIP informational materials.					
Work with MARC and Town residents to consider FEMA buy-out feasibility for vulnerable residential properties on Grasshopper Ln and Tyson Road to mitigate flood risk.					
Develop a more proactive approach and seek possible funding for improving tree maintenance to better assess and mitigate the potential impact of heavy snow, ice, and wind to protect vulnerable utility infrastructure.					
Identify opportunities to enhance public outreach and awareness of hazards with recent climate trends identified in this plan, including extreme heat and drought, particularly for vulnerable populations.					
Inform residents of local shelter sites (Town Hall, Fire Station) and informational resources prior to anticipated severe weather and extreme temperature events , with a focus on vulnerable					

populations.					
Consider annual updates for bridge and culvert inventories and maintain a priority list for upgrades and repairs to reduce risk of damage and infrastructure failure from flooding and erosion.					
**Work with the state agencies to update management plans for state lands located in town to reduce fuel for wildland fires.					
Initiate the process to formally close the lower section of Niagara Road , which is currently designated as a Class 3 road and located in a flood hazard zone; it was entirely washed out during Tropical storm Irene.					

(END OF PLAN DOCUMENT)