

Town of Bridgewater, Vermont
2020 Local Hazard Mitigation Plan

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

11/17/2020

Date of Town Adoption

11/18/2020

Date of Final Approval by FEMA



FEMA

November 19, 2020

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

Dear Ms. Smith:

As outlined in the FEMA-State Agreement for FEMA-DR-4474, your office has been delegated the authority to review and approve local mitigation plans under the Program Administration by States Pilot Program. Our Agency has been notified that your office completed its review of the Town of Bridgewater, Vermont 2020 Local Hazard Mitigation Plan and approved it effective **November 18, 2020** through **November 17, 2025** in accordance with the planning requirements of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended, the National Flood Insurance Act of 1968, as amended, and Title 44 Code of Federal Regulations (CFR) Part 201.

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

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

Thank you for your continued commitment and dedication to risk reduction demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please contact Melissa Surette at (617) 956-7559 or Melissa.Surette@fema.dhs.gov.

Sincerely,

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

WRW:ms

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

CERTIFICATE OF ADOPTION

November 17, 2020

TOWN OF Bridgewater, Vermont Selectboard

A RESOLUTION ADOPTING THE Bridgewater, Vermont 2020 Local Hazard Mitigation Plan

WHEREAS, the Town of Bridgewater has historically experienced severe damage from natural hazards and it continues to be vulnerable to the effects of the hazards profiled in the **Bridgewater, Vermont, 2020 Local Hazard Mitigation Plan**, which result in loss of property and life, economic hardship, and threats to public health and safety; and

WHEREAS, the Town of Bridgewater has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its **Bridgewater, Vermont 2020 Local Hazard Mitigation Plan (Plan)** under the requirements of 44 CFR 201.6; and

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

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

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

RESOLVED by Town of Bridgewater Selectboard:

1. The **Bridgewater, Vermont 2020 Local Hazard Mitigation Plan** is hereby adopted as an official plan of the Town of Bridgewater;
2. The respective officials identified in the mitigation action plan of the **Plan** are hereby directed to pursue implementation of the recommended actions assigned to them;
3. Future revisions and **Plan** maintenance required by 44 CFR 201.6 and FEMA are hereby adopted as part of this resolution for a period of five (5) years from the date of this resolution; and
4. An annual report on the process of the implementation elements of the Plan will be presented to the Selectboard by the Emergency Management Director or Coordinator.

IN WITNESS WHEREOF, the undersigned have affixed their signature and the corporate seal of the Town of Bridgewater this 17 day of November, 2020.


Selectboard Chair


Selectboard Member


Selectboard Member

ATTEST:



Town Clerk

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I. Introduction

Natural and human-caused hazards may affect a community at any time. They are not usually avoidable; however, their impact on human life and property can be reduced through community planning.

Accordingly, this Local Hazard Mitigation Plan (hereafter referred to simply as the Plan) seeks to provide an all-hazards mitigation strategy that will make the community of Bridgewater more disaster resistant.

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

II. Purpose of the Plan

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

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

The 2015 Bridgewater Local Hazard Mitigation Plan was the first stand-alone mitigation plan drafted for the Town. Previously, the Town had a town-specific 2009 Annex in the Regional Pre-Disaster Mitigation Plan. This new plan updates the 2015 plan, adding new information to make the plan stronger and more useful for the Bridgewater town officials and residents who will implement the hazard mitigation strategies in the future.

III. Community Profile

The Town of Bridgewater is situated in the central portion of Windsor County, Vermont. It comprises an area of approximately 28,657 acres or 44.8 square miles. Bridgewater is located within two physiographic areas. The major portion of the Town is characterized by mountainous terrain, narrow valleys, and a few peaks with elevations over 2,500 feet. A small part of the Town, to the east of the ridge formed by Pinnacle, Montague, and Ohio Hills, is characterized by a more subdued terrain, where the valleys are less narrow, and the slopes less steep.

Near the southern edge of the Town flows the Ottauquechee River, from west to east. It rises several miles away in Killington, and flows through Bridgewater, Woodstock, Hartford and Hartland on its way through the famous Quechee Gorge and into the Connecticut River. Almost all of Bridgewater, except for the northeastern section, is drained by this river and the streams that run into it.

U.S. Route 4, Vermont Routes 100 and 100A serve the town from West Bridgewater to Bridgewater Corners. However, from Bridgewater Corners east through Bridgewater Village, Route 4 is very busy, narrow and winding, and in need of some improvement to provide better safety and convenience. As one would expect, Route 4 serves as a major commuting facility for residents leaving town for their jobs and those working in Bridgewater living elsewhere.

Bridgewater's rate of population growth (expressed as the percent of population change) has fluctuated over the past few decades. The population grew slowly (by 3.2%) between 1980 and 1990 and then more quickly (by 9.5%) between 1990 and 2000. However, after the year 2000, Bridgewater's population began to decline or experience negative growth (it declined by -4.5% between the years 2000 and 2010). The negative growth rate is likely due to the lack of available land. In 2010, the population of Bridgewater was 936.

The majority of Town lies within the service area of Green Mountain Power (GMP), which supplies electrical power to the town.

Bridgewater is serviced by the Bridgewater Volunteer Fire Department, which is a member of the Connecticut River Valley Fire Mutual Aid Association and the Upper Valley Mutual Aid Association, where towns provide assistance to one another in the case of a serious fire. The equipment used by the Fire Department includes: one two-wheel drive pumper; one all-wheel drive pumper; one all-wheel drive tanker; one all-wheel drive rescue truck and 1 ATV. Funding is provided through fund raising activities plus annual support from the Town. All future development within the Town should be in accord with the capabilities of this Department to service the development.

An elected constable provides limited police security and traffic control services when needed. All other police functions are performed by the Windsor County Sheriff or Vermont State Police, Troop "D" located in South Royalton.

Ambulance services are provided in cooperation with the Woodstock Ambulance Service and the Bridgewater Fast Squad. The Squad consists of nine volunteers at the time of this writing, and is available to respond to accidents and medical emergencies as needed. The closest hospitals are Mount Ascutney Hospital and Health Center, located in Windsor, Rutland Regional Medical Center in Rutland, and Dartmouth-Hitchcock Medical Center in Lebanon. Medivac services are available by the DHART helicopter, which typically transports patients to Dartmouth-Hitchcock Medical Center.

IV. The Planning Process

A. Plan Developers

Two Rivers-Ottauquechee Regional Commission (TRORC) assisted the Town of Bridgewater with updating its Hazard Mitigation Plan. The following stakeholders served on a plan steering committee and assisted with revisions:

This section of the Plan satisfies 44 CFR 201.6(b)(1) and 201.6(c)(1) (or, A3.a and A3.b of FEMA's Local Mitigation Plan Review Guide, 2011).

Name	Role/Organization	How Participation Was Solicited
Josh Maxham	Emergency Coordinator	In June 2020, the Town Clerk recruited key stakeholders to join the plan steering committee. All those invited joined the committee, with the exception of the Town Health Officer. TRORC staff coordinated with the Town Clerk to publicize all meetings broadly in the community. See below for more meeting-specific details.
Mary Oldenburg	Fast Squad Member	
Owen Astbury	Planning Commission member	
Jeff Sailor	Road Foreman	
Nancy Robinson	Town Clerk	

Additional Participants in the Process:

The draft plan was submitted on August 27, 2020 to Bridgewater’s Selectboard and Planning Commission for review. No edits were requested by either body.

B. Plan Development Process

Bridgewater’s first hazard mitigation plan was a 2009 annex to the multi-jurisdictional Regional Hazard Mitigation Plan, drafted by Two Rivers-Ottawaquechee Regional Commission, and approved by FEMA on September 30, 2008. The annex was later reconstructed as a single jurisdiction, stand-alone Bridgewater Local Hazard Mitigation Plan that was approved by FEMA on August 4, 2015. The plan expired on August 4, 2020.

This section of the Plan satisfies the Element A: Planning Process requirements set out in 44 CFR 201.6.

The changes to this Plan include:

- **General**
 - Data updates: New hazard incidents, emergency declarations, structure and property vulnerability, and the Town’s existing hazard mitigation efforts and resources;
 - Hazards have been reevaluated to reflect changes in the hazard ranking system used by the Vermont Division of Emergency Management in the 2018 Vermont State Hazard Mitigation Plan.
 - Status updates on mitigation strategies/actions identified in the 2015 Plan
 - Updates to the discussion of plan development process
 - New hazard mitigation strategies
- **Hazards Analysis**
 - Hazardous Material Spills, Structure Fire, Wildfire/Brushfire, and Flash Flood/Flood/Fluvial Erosion remain on the list of “top hazards,” which reflects Town

officials' belief that Bridgewater is still vulnerable to these hazards, and the Town's intentions to continue mitigation planning for these hazards;

- Severe Weather was added to the list of "top hazards," reflecting community concerns about high wind events and associated power outages.

- **Maps**

- The map of the Town of Bridgewater (depicting critical facilities, town infrastructure, and the NFIP designated floodway and 100-year floodplain) has been updated.

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

- **Activities**

- 6/24/2020: A kick-off meeting, during which TRORC staff explained the planning process and timeline and guided stakeholders through an evaluation of the 2014 plan's hazard ranking and mitigation strategies/actions. Stakeholders also discussed changes in the Town's assets and capabilities since the adoption of the 2015 Plan, and provided status updates for the mitigation strategies identified in the 2015 plan. The following stakeholders were represented at the meeting: Bridgewater Town Clerk, Bridgewater Emergency Coordinator, Fast Squad, Bridgewater Planning Commission, and Bridgewater Road Foreman.
- 7/16/2020: Stakeholders met with TRORC staff to address outstanding data needs, develop mitigation strategies, and discuss strategy implementation. The following stakeholders were represented at the meeting: Bridgewater Town Clerk, Bridgewater Emergency Coordinator, Bridgewater Road Foreman, Fast Squad, and Bridgewater Planning Commission.
- 7/22/2020: Stakeholders met with TRORC staff to review a working draft of the plan and address outstanding data needs. . The following stakeholders were represented at the meeting: Bridgewater Town Clerk, Bridgewater Emergency Coordinator, Fast Squad, and Bridgewater Planning Commission.

- **Public participation and involvement (44 CFR 201.6(b)(1))**

- Three planning meetings were held (6/24/20, 7/16/20, 7/22/20). All of these meetings were open to the public and accessible via videoconference or phone. Meeting notices directed interested members of the public to contact the Town Clerk for copies of meeting materials. No members of the public attended any of the meetings. For more details about these meetings, see "Activities," above.
- The planning meetings were publicized as follows:
 - Notices were published in the *Vermont Standard* (a local paper) preceding each meeting. Contact information was provided in the notice to allow interested community members to learn more about and participate in the planning process. No comments were received. Publication dates:
 - 6/18/20, 7/9/20, 7/16/20
 - Preceding each meeting, digital meeting announcements were posted to the Town website. Hardcopy fliers were also posted at the Town Office, Bridgewater

Corners Post Office, and the Bridgewater Village Post Office. Contact information was provided in the notices to allow interested community members to learn more about and participate in the planning process. No comments were received.

- **Governmental participation and involvement (44 CFR 201.6(b)(2))**
 - TRORC staff consulted with Josh Maxham (Emergency Coordinator) to request information about structural fires and wildfires/brush fires that happened in the Town in recent years. Josh provided incident data to TRORC on 7/18/20.
 - TRORC staff consulted with Nancy Robinson (Town Clerk) on 7/22/20 regarding the location of recent development activities in the Town.
 - The following government stakeholders attended planning meetings and helped review the draft plan: Josh Maxham (Emergency Coordinator), Mary Oldenburg (Fast Squad Member), Owen Astbury (Planning Commission member), Jeff Sailor (Road Foreman), Nancy Robinson (Town Clerk)
 - The draft plan was provided to the Planning Commission (8/27/20) and Selectboard (8/27/20) for their review. Contact information was provided for receiving comments by email. No comments were received.
 - Sent revised draft to Vermont Emergency Management (9/30/20) for review.
- **Neighboring community participation and involvement (44 CFR 201.6(b)(2))**
 - Public meeting notices in the *Vermont Standard* alerted the public to the hazard mitigation planning process that was taking place. Contact information was provided in the notices to allow those interested in Bridgewater’s efforts to receive more information and learn about upcoming meetings. No comments were received. Publication dates: 6/18/20, 7/9/20, 7/16/20.
 - Sent revised draft to neighboring towns’ Selectboards for comment and provided contact information for receiving comments (9/15/2020).
 - Towns of: Barnard, Pomfret, Woodstock, Reading, Plymouth, Killington, and Stockbridge
 - No comments were received.
- **Review of existing plans, studies, reports, and technical information (44 CFR 201.6(b)(3))**
 - State of Vermont Hazard Mitigation Plan, 2018
 - Bridgewater Hazard Mitigation Plan (Adopted 07/14/2015)
 - This Plan was referenced extensively during the plan development process, especially in regard to the worst threats and mitigation action strategies identified in 2015.
 - Bridgewater Town Plan (Adopted 09/25/2018)
 - The Town Plan provided TRORC’s staff with background information on the community, as well as more detail on their emergency services.
 - Bridgewater Flood Hazard Area Regulations (Adopted 11/28/2006)

This section of the Plan satisfies 44 CFR 201.6(b)(3) (or, A4.a and A4.b of FEMA’s Local Mitigation Plan Review Guide, 2011).

- The Flood Hazard Area Regulations provided information on the Town’s regulation of the Special Flood Hazard Area (SFHA).
- Bridgewater Local Emergency Management Plan (LEMP) (Adopted 04/21/2020)
 - The Bridgewater LEMP was referenced for general knowledge regarding the Town’s emergency operations.
- Ottauquechee River Watershed Stream Geomorphic Assessment, Bridgewater and Woodstock, Vermont (01/29/2013)
 - The Ottauquechee River Watershed Stream Geomorphic Assessment was referenced for information regarding a critical waterbody in the Town of Bridgewater. The Corridor Plan informed the Flash Flood/Flood/Fluvial Erosion section of this Local Hazard Mitigation Plan as well as the mapping/GIS components of this Plan.
- Flood Insurance Study for Windsor County, Vermont (Dated 09/28/2007)
 - The Flood Insurance Study was referenced for general knowledge of the Ottauquechee River and peak discharge information.
 - Relevant peak discharge information for the Ottauquechee River can be found on page 24 of Volume 1.
 - This information was incorporated into the mapping/GIS components of this Plan; specifically in determining the number of structures that are vulnerable to SFHA, and into the Flash Flood/Flood/Fluvial Erosion section of this Plan.
- Additional data sources are listed in the *Hazard Identification* section of this Plan (V.A).

C. Status Update on Mitigation Actions Identified in 2015

The following table outlines the mitigation actions that were proposed in Bridgewater’s 2015 Local Hazard Mitigation Plan (adopted on July 14, 2015).

This section of the Plan satisfies the requirements of 44 CFR 201.6(d)(3).

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

2015 MITIGATION OR PREPAREDNESS ACTION	LOCAL LEADERSHIP	PRIORITIZATION (MITIGATION PLAN STATUS)	POSSIBLE RESOURCES	TIME FRAME	STATUS UPDATE—2020
ALL HAZARDS					
<i>Ensure that Bridgewater’s Local Emergency Operations Plan (LEOP) is kept up-to-date and identifies vulnerable areas and references this Plan. (Preparedness)</i>	Select-board	High	Local resources; TRORC; Vermont Emergency Management	1 Year from Date of Plan Approval	<input checked="" type="checkbox"/> Completed. The newest iteration of the LEOP is the Local Emergency Management Plan (LEMP). The Bridgewater LEMP is renewed annually; it was last updated and approved on 04/21/2020.
<i>Develop a town methodology for consistently documenting infrastructure damage after weather events. (Mitigation)</i>	Town Office	High	Local resources; Vermont Emergency Management/ Vermont Agency of Natural Resources	1 Year from Date of Plan Approval / As needed	<input checked="" type="checkbox"/> Completed. The Town Clerk works with the Highway Department to document infrastructure damage. Damage is reported to TRORC and the Selectboard.
<i>Encourage residents to sign up for VTAlert, a weather-related and emergency notification system that will alert residents to risks and threats that they may face. (Preparedness)</i>	Select-board	Medium	Local resources; Vermont Emergency Management; VT Alert	2-3 Years from Date of Plan Approval	<input checked="" type="checkbox"/> Completed. The community was informed of the VTAlert service via on Fire Department Facebook post. As the need arises, additional announcements about VTAlert will be posted to that Facebook page and to the Town website.

2015 MITIGATION OR PREPAREDNESS ACTION	LOCAL LEADERSHIP	PRIORITIZATION (MITIGATION PLAN STATUS)	POSSIBLE RESOURCES	TIME FRAME	STATUS UPDATE—2020
STRUCTURE FIRE					
<i>Ensure that fire department personnel maintain their Firefighter certifications. (Preparedness)</i>	Bridge-water Volunteer Fire Dept.	High	Local/FD resources; Vermont Fire Academy	Annually	<input checked="" type="checkbox"/> Completed. Certifications are maintained each year. Fire Department volunteers meet every Monday night for training and also attend state-run trainings.
STRUCTURE FIRE/ WILDFIRE/BRUSHFIRE					
<i>Complete a comprehensive survey of potential dry hydrant sites to determine the need for additional sites and potential location, and install dry hydrants. (Mitigation)</i>	Bridge-water Volunteer Fire Dept.	Medium (new)	Local/FD resources	2-3 Years from Date of Plan Approval	<input checked="" type="checkbox"/> Completed. The Town maintains a list of all dry hydrant sites. In the past 5 years, the Town investigated a number of potential sites; 2 dry hydrants were installed and a few other potential sites were deemed infeasible and therefore were not developed.
<i>Develop a plan to build a new fire station. (Mitigation/ Preparedness)</i>	Bridge-water Volunteer Fire Dept.	Low	Local/FD resources	5 Years from Date of Plan Approval	<input checked="" type="checkbox"/> Completed. The Town approved a bond and construction will start in spring of 2021.

2015 MITIGATION OR PREPAREDNESS ACTION	LOCAL LEADERSHIP	PRIORITIZATION (MITIGATION PLAN STATUS)	POSSIBLE RESOURCES	TIME FRAME	STATUS UPDATE—2020
HAZARDOUS MATERIAL SPILL					
<i>Ensure that all emergency response and management personnel continue to receive HAZMAT Awareness training at a minimum. (Preparedness)</i>	Bridge-water Volunteer Fire Dept.	High	Local/FD resources; Vermont State HAZMAT Team	1 Year from Date of Plan Approval	<input checked="" type="checkbox"/> Completed. This is done annually.
<i>Continuously stock gear to help contain small spills when they occur (booms, absorbent materials, etc.). (Preparedness)</i>	Bridge-water Volunteer Fire Dept.	High	Local/FD resources; polluting party	As needed	<input checked="" type="checkbox"/> Completed. The Town maintains a stock of gear. Replacement gear is paid for by billing the insurance company of the responsible parties.
WILDFIRE / BRUSHFIRE					
<i>Develop a public education program to educate residents about wildfire/brushfire risks and how to minimize the occurrence of wildfire/brushfire. (Mitigation)</i>	Bridge-water Volunteer Fire Department	Low (new)	Local/FD resources	5 Years from Date of Plan Approval	Not completed. The Town does post safety messages on the Fire Department Facebook page during high-risk periods (spring and fall). The Fire Department used to conduct educational programs at the elementary school, but the school has since closed.

2015 MITIGATION OR PREPAREDNESS ACTION	LOCAL LEADERSHIP	PRIORITIZATION (MITIGATION PLAN STATUS)	POSSIBLE RESOURCES	TIME FRAME	STATUS UPDATE—2020
FLASH FLOOD / FLOOD / FLUVIAL EROSION					
<i>Maintain and update town bridge and culvert inventories. Regularly inspect and maintain town bridges and culverts; and develop a schedule to replace undersized culverts. (Mitigation)</i>	Select-board / Road Foreman	High (2 nd priority of 5 natural hazard mitigation projects in 2009 Plan)**	Local resources; VTrans	1-2 Years from Date of Plan Approval	Partially completed. The Town's bridge inventory is up to date, and all of the bridges are currently in good condition. The Town is applying for grant funding to update its culvert inventory. Culverts are upgraded when they fail, though upgrades don't always require upsizing. The Town does not have a schedule/plan for replacing undersized culverts.
<i>Work with State staff to plan removal of fallen trees in areas with remote, steep streams. (Mitigation)</i>	Road Foreman	Medium (3 rd priority of 5 natural hazard mitigation projects in 2009 Plan)**	Local resources; Vermont Agency of Natural Resources	2-4 years from Date of Plan Approval	Not completed. The State has determined that trees should not be removed from streambeds. The Town has taken other measures to address streambank erosion and has improved ditches within 100 feet of streams.
<i>As part of Town Plan updates, review the Town's Flood Hazard Area Regulations to ensure that they are compliant and consistent with state and federal guidelines and statutes. (Mitigation)</i>	Planning Commission; Select-board	Low (new)	Local resources; TRORC; Municipal Planning Grants; NFIP	5 Years from Date of Plan Approval	<input checked="" type="checkbox"/> Completed. These regulations have been reviewed and are compliant.

2015 MITIGATION OR PREPAREDNESS ACTION	LOCAL LEADERSHIP	PRIORITIZATION (MITIGATION PLAN STATUS)	POSSIBLE RESOURCES	TIME FRAME	STATUS UPDATE—2020
<i>Support town or conservation organization assistance to landowner(s) of property(ies) in Bridgewater on the NFIP's repetitive and severe repetitive loss list to reduce flood damages, through elevation, floodproofing, acquisition or relocation, or an infrastructure project if one is found to address the source of flooding. (Mitigation)</i>	Select-board (as needed)	Low (new)	Local resources; NFIP	5 Years from Date of Plan Approval	<input checked="" type="checkbox"/> Completed. The Town has worked with property owners on buyouts. The last of these was in 2015, but conversations with landowners continue; one potential buyout is currently being considered.
<i>Support projects to protect or restore strategic areas of floodplain to provide areas for flood storage, which will help alleviate peak flood flows. (Mitigation)</i>	Select-board / Road Foreman	Medium (new)	Local resources	2-3 Years from Date of Plan Approval	<input checked="" type="checkbox"/> Completed. Buyout properties are being maintained as open space. The Town's Flood Hazard Area Regulations prohibit reduction in flood storage within the floodway.
<i>Develop a plan for the reuse of Bridgewater's Tropical Storm Irene buyout properties as river access or green space, and maintain the undeveloped character of the land to allow for future flooding. (Mitigation)</i>	Select-board / Town Officer	Medium (new)	Local resources; HMGP; third party consultants	3-4 Years from Date of Plan Approval	<input checked="" type="checkbox"/> Completed. Buyout properties are maintained as open space.

2015 MITIGATION OR PREPAREDNESS ACTION	LOCAL LEADERSHIP	PRIORITIZATION (MITIGATION PLAN STATUS)	POSSIBLE RESOURCES	TIME FRAME	STATUS UPDATE—2020
<i>Develop a program to upgrade undersized culverts and upgrade/improve ditches on Gold Coast Road to improve the resilience of the entire road to flood damage. (Mitigation)</i>	Select-board / Road Foreman	High (new)	Local resources/Local road budget	1 Year from Date of Plan Approval	Partially completed. The Town undertakes regular maintenance of culverts and ditches. Culverts are only upgraded as needed, and none have failed on Gold Coast Road in the past 5 years. Some of the ditches (those in front of the cemetery) were stone-lined in 2019.
<i>Develop a program to upgrade undersized culverts and upgrade/improve ditches on Cox District Road to improve the resilience of the entire road to flood damage. (Mitigation)</i>	Select-board / Road Foreman	High (new)	Local resources/Local road budget	1 Year from Date of Plan Approval	Partially completed. The Town undertakes regular maintenance of culverts and ditches. In 2018 and 2019, the Town stone-lined about 1/3 of the road's ditches, including some steep ditches. The Town is currently working to upgrade 1 major culvert, and may potentially upgrade another culvert in the near future.
<i>Upgrade culvert on Dailey Hollow Road to improve the flow of floodwaters and increase flood resilience. (Mitigation)</i>	Select-board / Road Foreman	Low (new)	VTrans Structures grant; Local resources	5 Years from Date of Plan Approval	Not completed. Upgrades were made immediately after Irene and no further work is needed.
<i>Upgrade 5'x7' box culvert on Bridgewater Hill Road to a 10' arch (multi-plate) culvert. (Mitigation)</i>	Select-board / Road Foreman	Medium (new)	VTrans Structures grant; Local resources	2-3 Years from Date of Plan Approval	Not completed. The culvert was repaired/reinforced, but could not be upgraded to an arch because doing so would undermine the abutting property owner's house.

Changes in Town Priorities and Vulnerabilities Since the 2015 Plan

This 2020 Local Hazard Mitigation Plan reflects the evolution of the Town's priorities since 2015. The "top hazards" identified in this Plan and in the 2015 Plan are largely the same, with one significant change: the stakeholders who participated in the 2020 planning process decided to add Severe Weather to the list of "top hazards." That addition reflects community concerns about high wind events and associated power outages.

This 2020 Plan update also includes changes to mitigation strategies. Several of the 2015 strategies that were not completed were omitted from this Plan, or were significantly edited:

- *Work with State staff to plan removal of fallen trees in areas with remote, steep streams (2015):* This strategy was omitted because the State doesn't permit tree removal from streambeds.
- *Upgrade culvert on Dailey Hollow Road (2015):* This strategy was omitted because the Town replaced the pipe after Irene, and no further upgrades are needed.
- *Upgrade/improve culverts and ditches on Gold Coast Road (2015):* This strategy was omitted because the Town has completed necessary upgrades and no further work is needed for the foreseeable future (apart from regular maintenance).
- *Upgrade 5'x7' box culvert on Bridgewater Hill Road (2015):* This strategy was omitted because upgrading the culvert would destabilize a nearby building.
- *Upgrade/improve culverts and ditches on Cox District Road (2015):* This strategy was significantly revised because the Town has worked on the road since 2015, and the only remaining work is to upsize a culvert near the Town Line.

The 2020 Plan also includes new strategies that reflect the Town's plans to build a new Fire Department facility outside of the floodplain; the need for ongoing right-of-way maintenance to protect power lines; concerns about traffic speeds on US-4 (and associated hazardous material spill risks); and the need for ongoing fire education in the community.

Development in Bridgewater has been relatively stagnant in recent years. The Town's 2020 Grand List has 10 fewer taxable parcels than the 2015 Grand List. Since the Town's last Local Hazard Mitigation Plan was adopted in July 2015, there have been no new structures constructed within the floodplain or along major transportation routes, with only one exception: a mobile home was installed in the 100-year floodplain (outside the floodway) to replace an older building that was removed. The Town remains proactive in enforcing its flood hazard area regulations, which prohibit new development (excepting minor improvements) in the floodway and impose standards on development elsewhere in the 100-year floodplain. Overall, the vulnerability of Bridgewater to flooding, fluvial erosion, and hazardous material spills has not significantly increased as a result of development since 2015.

At the time of this Plan's drafting, there are no future plans for any type of development within the special flood hazard area or hazardous material spill risk zone (i.e., along major roads). The Town therefore does not anticipate any development-driven increase in its vulnerability to those hazards.

Vulnerability may even decrease when the fire station is moved out of the 100-year floodplain within the next 5 years.

It should be noted that climate change impacts may change floodplain boundaries and increase flooding/erosion vulnerability within the Town. The strong focus on flooding and fluvial erosion in this 2020 Plan is consistent with the Town's understanding of its future vulnerability to these hazards. Since 2015, Bridgewater has completed numerous mitigation actions that have reduced its vulnerability to flooding and fluvial erosion. Almost every road in Town has had some kind of culvert improvement work done; some culverts were upsized from 15" to 18," and some had their corrugated metal pipes replaced with poly culvert pipes. Ditches have been improved (and often stone-lined) on numerous roads, including: Chateauguay Road, North Bridgewater Road, Cox District Road, Perkins Road, and Gold Coast Road.

D. Existing Hazard Mitigation Programs, Projects & Activities

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

This section of the Plan satisfies the requirements of 44 CFR 201.6(c)(3).

	Type of Existing Authority / Policy / Program / Action	Resources: Staffing & Funding	Ability to Expand/Improve on
Community Preparedness Activities	Program—Annual update of Bridgewater’s Local Emergency Management Plan (LEMP). Last updated and approved on 04/21/2020.	Staff time from the Town Clerk, volunteer time from the Emergency Management Director/ Coordinator; volunteer team from other town emergency responders; assistance from TRORC.	This document is reviewed and updated each year to ensure that the contact information of emergency response personnel is up-to-date. This information is then sent to Vermont Emergency Management for their records. The current program works well; there is no need to expand or improve at this time.
	Completed Action—Shelter Designation: The Grange Hall is the primary shelter, and Oak Chapel Church is the secondary shelter.	Staff time from the Town Clerk, volunteer time from Selectboard, Emergency Management Director/ Coordinator.	The current designation is sufficient and there is no need to improve or expand on it at this time.
	Program— Attendance/participation at Local Emergency Planning Commission (LEPC) #12 meetings.	Volunteer time from the Fire Department, Selectboard members, Emergency Management Director/Coordinator.	No need to expand or improve on attendance, as attendance is satisfactory.
Insurance Programs	<p>Authority/ Program— Participation in National Flood Insurance Program (NFIP)</p> <p>The Town of Bridgewater participates in and is compliant with the NFIP by enforcing its most currently adopted Flood Hazard Area Regulations (11/28/2006). The Town enforces the Flood Hazard Area Regulations based on the 09/28/2007 FIRMs.</p> <p>[Note: This section of the Plan satisfies the requirements of 44 CFR 201.6(c)(3)(ii).]</p>	<p>The Bridgewater Town Clerk serves as the NFIP Administrator.</p> <p>Assistance from TRORC and Vermont ANR.</p> <p>Funding from local resources (annual budget).</p>	<p>The Town’s initial Flood Hazard Boundary Map (FHBM) was dated 08/16/1974. The Town’s initial Flood Insurance Rate Map (FIRM) was dated 07/02/1980. The Town’s Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) have since been updated, and the current effective date for both is 9/28/2007.</p> <p>The Town will ensure that its regulations are enforced and remain up to date.</p>

	Type of Existing Authority / Policy / Program / Action	Resources: Staffing & Funding	Ability to Expand/Improve on
Land Use Planning	Policy/Program—Bridgewater Municipal Plan (Adopted 09/25/2018). The 2018 Plan update was informed by the Town’s 2015 Local Hazard Mitigation Plan. The Municipal Plan includes sections on “Flood-Prone Areas” and “Flood Hazard and River Corridor Areas” within the “Critical Natural Areas” chapter of the Town Plan.	Volunteer time from Planning Commission, and assistance from TRORC/ other state agencies on specific subject matter. Funding from state Municipal Planning Grants.	The Town Plan is updated at least every 8 years. The Planning Commission may expand or improve on any section it deems necessary, or that is required by changes in state statute.
	Authority—Bridgewater Flood Hazard Area Regulations (Adopted 11/28/2006)	Volunteer time from the Planning Commission, and assistance from TRORC and Vermont ANR. Funding from state Municipal Planning Grants.	During the Town Plan review/update period, the Flood Hazard Area Regulations are also reviewed and updated if needed.
	Policy/Program—Bridgewater Local Hazard Mitigation Plan (Adopted on 07/14/2015)	Volunteer time from Town officials; assistance from TRORC and Vermont Emergency Management; Funding from FEMA, Vermont Emergency Management, TRORC.	The 2020 Bridgewater Local Hazard Mitigation Plan (LHMP) will replace the 2015 Plan. The 2020 LHMP has evolved from the 2015 Plan and has expanded and improved upon it. Future iterations of the Town’s LHMP will be updated by the Town at least every five years.
Hazard Control & Protection of Critical Infrastructure & Facilities	Completed Action— Culvert inventory with TRORC assistance in 2010	Staff time from the Road Foreman, with assistance from TRORC. Funding from VTrans.	The Town is currently using the culvert inventory to further its culvert improvement program, but the inventory could be improved upon by completing another update with georeferenced culvert locations. The Town is seeking grant funding for an inventory update.
	Authority— Town Road and Bridge Standards (Adopted 03/10/2020)	Adopted by the Selectboard, implemented by the Road Foreman, assistance from TRORC. Funding from VTrans and the local budget to implement.	Specifies minimum construction standards for roadway, ditches, culverts, bridges, and guardrails. VTrans updates the Town Road and Bridge Standards on a fairly regular basis. The Town has the authority to require above-and-beyond what is written in the policy.

	Type of Existing Authority / Policy / Program / Action	Resources: Staffing & Funding	Ability to Expand/Improve on
Hazard Control & Protection of Critical Infrastructure & Facilities	Completed Action— Property buyouts following Tropical Storm Irene Before 2015, the following buyouts were completed: 2 on U.S. Route 4; 1 on Cram Trail; 1 on VT100A	Staff time from the Town Clerk, volunteer time from the Selectboard. Assistance from TRORC and Vermont Emergency Management, and funding from FEMA HMGP and HUD CDBG.	One more potential buyout is in the early stages of discussion.
	Policy/Action— Bridgewater Community Wildfire Protection Plan (Dated 04/2011) The Town drafted a plan in April 2011, but did not adopt it.	Volunteer time from the Planning Commission and assistance from TRORC and other agencies/organizations. Funding from the Vermont Rural Fire Protection Task Force.	This document has not yet been adopted and would require minor updates if the Town wishes to adopt it. The Town will consider doing further work on this plan pending available time and resources.
Education / Public Outreach	Ongoing Action— The Town/Fire Department has public preparedness information at the Town Office.	Time from the Volunteer Fire Department and funding from Fire Department budget.	This is an ongoing action and there is no need to expand upon it.
	Ongoing Action— Education/ communication to community regarding structure fire prevention or other important preparedness information. The Bridgewater Volunteer Fire Department puts information on its Facebook page and also places signs outside of the firehouse to communicate important information to residents and passersby (e.g., Fire Prevention Week, etc.). There are currently over 1,400 followers of the Facebook page.	Time from the Volunteer Fire Department and funding from Fire Department budget.	This is an ongoing action, and there is no need to expand or improve on this action.
	Ongoing Action / Education —Town website postings of emergency announcements, events / activities, and other community news.	Staff time from the Town Office (as needed)	This is an ongoing action, and there is no need to expand or improve on this action.

E. Plan Maintenance

This Plan (the Bridgewater Local Hazard Mitigation Plan) will be regularly monitored, updated, and evaluated by discussing its effectiveness and incorporating any necessary revisions. An effective plan advances its goals and leads to successful implementation of the strategies identified by the Town.

This section of the Plan satisfies 44 CFR and 201.6(c)(4)(i), 201.6(c)(4)(ii), and 201.6(c)(4)(iii).

Monitoring and evaluation of the Local Hazard Mitigation Plan will consist of thorough analysis of whether the Plan's vulnerabilities analyses are still valid, the status of mitigation and preparedness strategies, whether strategies are being implemented according to the time frames included in tables in this Plan, and whether previously identified strategies are still appropriate for the Town (considering effectiveness of implemented projects or actions, as well as changes in Town priorities, capabilities, and vulnerabilities). Updating the Plan will entail incorporating new data and analyses of challenges, opportunities, and progress; making the Plan consistent with changes to the Town Plan or Bylaw; revising strategies or developing new strategies as needed; and identifying the next steps required to implement the Plan's strategies. The plan can be amended in between 5-year updates without formal re-adoption during regularly scheduled Selectboard meetings.

Bridgewater's Town Clerk and/or Administrative Assistant will be the principal point of contact and will take primary responsibility for the monitoring, evaluation, and update process described here. He or she will bring the Plan's maintenance activities to the Selectboard's agenda and discussions. The Two Rivers-Ottawaquechee Regional Commission (TRORC) will help with Plan updates if assistance is requested by the Town and if funding is available. If TRORC is unable to assist the Town, then the Town Clerk/Administrative Assistant or Selectboard will update the Plan, or the Selectboard may appoint a committee of interested citizens to draft changes.

The process of evaluating and updating the plan will include continued public participation through public notices posted on the Town website, notice within the Town Office, notice in *Vermont Standard* and the TRORC newsletter and blog, and inviting the public to the scheduled Selectboard (or specially scheduled) meeting. Additional stakeholders shall be invited to the meeting, such as Woodstock Ambulance, VTrans, and the Vermont Agency of Natural Resources. These efforts will be coordinated by the Town Clerk. Comments from local officials and the public will be incorporated into the plan when relevant.

Monitoring, evaluation, and updates will take place as follows:

- **Annually:** The Plan will be monitored and evaluated annually at an April Selectboard meeting, along with the review of the Town's Local Emergency Management Plan (LEMP). This meeting will constitute an opportunity for the public and other town officials to hear about the town's progress in implementing mitigation strategies and to give input on future activities and any revisions that should be incorporated into the Plan. Updates may be made annually as needed, or reserved for the 5-year update process (see below).
- **Within 3 months of every federal disaster declaration:** The Selectboard and the Town Clerk will be responsible for undertaking the plan maintenance process following a disaster declaration.

- **Every 5 years when the plan expires:** The plan maintenance process will begin at least one year before the Plan expires, and shall be informed by the Town's annual and post-disaster monitoring, evaluation, and update efforts.

Bridgewater will also work to integrate mitigation planning with the Town's long-term land use and development planning documents. The Town will reference and draw from the Local Hazard Mitigation Plan when working on Town Plan amendments or changes to the Town's flood hazard area regulations. The 2013 Vermont Legislature passed a law requiring all towns to incorporate flood resiliency elements into their town plans as of July 2014. To do so, flood hazard and fluvial erosion hazards will be identified, and strategies and recommendations will be provided to mitigate risks to public safety, critical infrastructure, historic structures and public investments. This Local Hazard Mitigation Plan will help the town to comply with the new community flood resiliency requirement for town plans adopted after July 2014. The Town shall also consider reviewing any future TRORC planning documents for ideas on future mitigation projects and hazard areas.

V. Community Vulnerability by Hazard

A. Hazard Identification

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

- What bad things can happen?
- How likely are they to occur?
- How bad could they be?

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

It is important that we learn from the past in order to avoid the same disasters and their outcomes. Disasters that have occurred within the Town of Bridgewater, the larger region, and the State of Vermont can give us good information about what types of disasters we can expect in the future and what kinds of damage they might cause. However, while this historical data can inform our perspective of what might happen in the future, it is by no means a prophecy. While Bridgewater might not have been impacted by a specific hazard in the past, this does not necessarily mean it will never be affected in the future. Indeed, the advance of climate change means that old weather patterns may not hold. For instance, in recent years, Vermonters have seen an increase in the number and severity of storms, especially rainfall events. Armed with historical data and a healthy respect for climate change and the unknown, we have tried our best to identify hazards and prepare for the future.

The following table reflects the hazards that we believe can be expected, or are at least possible, in the central Vermont area. We have considered factors such as frequency of occurrence, warning time, and potential community impact to rank each and determine which hazards pose the greatest threats to life and property in Bridgewater. The "Hazard Score" thus reflects the community's vulnerability to each hazard.¹ A handful of the highest-scoring threats (bolded in the table, below) are then followed-up with discussion and mitigation strategies throughout the rest of this Plan.² It should be noted that hazards assigned the same "Hazard Score" are not in order and their placement in the table should not be assumed to reflect their potential to create hazards for the town.

¹ The ranking methodology used in this Plan is described in Appendix A. It is similar to that which is used by the Vermont Division of Emergency Management in the state hazard mitigation plan, though changes were made to reflect the more limited geographical scope of this analysis, which is focused on a small, rural town rather than the entire State of Vermont.

² It's important to note that those hazards with low scores may still occur in Bridgewater's future; however, the Town has chosen to focus this plan on higher scoring hazards in an effort to maximize the benefits derived from investments in mitigation.

Hazard	Frequency of Occurrence	Warning Time	Potential Impact	Hazard Score
<i>Hazardous Material Spill</i>	<i>Highly Likely</i>	<i>None-minimal</i>	<i>Moderate</i>	11
<i>Severe Weather (Thunderstorm, Lightning, High winds, Hail, and Flooding)</i> <i>*Note: We have defined 'Severe Weather' to include two or more of the above hazards.</i>	<i>Highly Likely</i>	<i>3-6 hours</i>	<i>Moderate</i>	10
<i>Structural Fire</i>	<i>Highly Likely</i>	<i>None-minimal</i>	<i>Minor</i>	10
<i>Flash Flood/Flood/Fluvial Erosion</i>	<i>Likely - Highly Likely</i>	<i>3-6 hours</i>	<i>Moderate</i>	9.5
<i>Wildfire / Brushfire</i>	<i>Highly Likely</i>	<i>None-minimal</i>	<i>Negligible</i>	9
Extreme Cold/Snow/Ice Storm	Highly Likely	6-12 hours	Minor	8
Extreme Heat	Occasionally - Likely	6-12 hours	Moderate	7.5
Dam Failure (There are no high hazards dams in the Town of Bridgewater or upstream.)	Unlikely	3-6 hours	Moderate	7
Hail Storms	Likely	3-6 hours	Negligible	7
Ice Jams	Highly Likely	More than 12 hours	Minor	7
Infectious Disease Outbreak	Unlikely - Occasionally	More than 12 hours	Major	6.5
Landslides/Mudslides/Rockslides	Unlikely	None-minimal	Negligible	6
Tornado	Unlikely	3-6 hours	Minor	6
Earthquake	Unlikely	None-minimal	Negligible	6
Invasive Species/Infestation	Highly Likely	More than 12 hours	Negligible	6
Drought	Unlikely	More than 12 hours	Moderate	5
Hurricanes/Tropical Storms	Unlikely	More than 12 hours	Moderate	5
Water Supply Contamination (The Town of Bridgewater does not have a public water supply).	Not applicable (N/A)	N/A	N/A	N/A

After engaging in public discussion using their best available knowledge, Town stakeholders selected the following “top hazards” from among those hazards to which the community is most vulnerable:

- Hazardous Material Spill
- Severe Weather
- Structural Fire
- Flash Flood / Flood / Fluvial Erosion
- Wildfire / Brushfire

Most of the top hazards selected for in-depth analysis and strategy development in this plan are carried over from the 2015 plan; they remain priority concerns for the Town. The only change to the top hazards list was the addition of Severe Weather. This hazard was excluded from the 2015 plan because Town stakeholders felt that the primary impact of concern, flooding, was already addressed through the flood analysis portion of the plan. The spotlighting of Severe Weather in this plan reflects stakeholders' concerns about high winds (and resulting power outages) that often accompany such storms.

Each of these “top hazards” will be discussed in the following sections. Within each section, previous occurrences of each hazard will be listed, including the County-wide FEMA Disaster Declarations (DR-#), where applicable. Hazards information was gathered from:

- Local sources (e.g., town history book, town government records)
- National Centers for Environmental Information (NCEI) Storm Events Database (1950-2020)
- Spatial Hazard Events and Losses Database for the United States (SHELDUS) 1960-2012
- Special Reports produced by the National Weather Service in Burlington, Vermont
- Vermont Department of Environmental Conservation’s Spills List
- FEMA’s listings of Disaster Declarations by year
- National Fire Incident Reporting System data

Each section also includes a description of the hazard and a summary matrix with the following information (please see each hazard profile for a hazard-specific matrix):

Hazard	Location	Vulnerability	Extent	Observed Impact	Likelihood/Probability
Type of hazard.	General areas in community that may be vulnerable to the hazard.	Community structures affected by hazard.	General details about the strength or magnitude of the most notable event(s).	Dollar value or percentage of damages.	<u>Likely</u> : >10% but <75% probability per year, at least 1 chance in next 10 years <u>Highly Likely</u> : >75% probable in a year

B. Hazard Profiles for “Top Hazards”

1. Hazardous Material Spill

Based on available VT Tier II data, there are 6 sites in town that have sufficient types and/or quantities of hazardous materials to require reporting. Most development in Bridgewater is located along U.S. Route 4, VT Route 100A, and Bridgewater Center Road, which run along the Ottauquechee River, the North Branch of the Ottauquechee River, and the Broad Brook. No interstate

This section of the Plan satisfies the requirements of 44 CFR 201.6(c)(2)(i), 201.6(c)(2)(ii), and 201.6(c)(2)(iii) for **Hazardous Materials Spill**.

highways or railways run through or near the Town. There are 16 critical facilities in the Town of Bridgewater, including two hazardous material storage facilities. There are 238 residential, 32 commercial, and 26 other structures within 1,000 feet of a potential HAZMAT spill on major roads (US-4, VT-100A, and VT-100). These include the following critical facilities: Town Office, the Fire Department, the Grange Hall (primary emergency shelter) and the Town Garage. In the event that 5% of these structures were involved in a HAZMAT incident, the estimated damage would be \$1,976,579.

It should also be noted that the State of Vermont currently has one fully-trained HAZMAT response team, with vehicles located in Essex Junction, Pittsford, and Windsor. The HAZMAT crew chief is available within minutes of a call for the team but on-scene response would be a matter of hours. In the event of a serious accident in Town, there would be little time for evacuation and response would be difficult.

The following data was retrieved from the Vermont Department of Environmental Conservation’s Spills List and by searching the archives of local newspapers. The table below is used to illustrate the ease with which trucks and the day-to-day activities in the Town have the potential to create a hazardous material spill and dangerous conditions for emergency responders and town residents.

History of Occurrences:

Date	Event	Location	Extent
05/14/2020	Number 2 Fuel Oil Spill	Private residence, Upper Road, Bridgewater Corners	25 gallons released by a corroded pipe. No available data on the size of the land area that was impacted.
3/23/2020	Diesel & Motor Oil	US-4 and VT-100A intersection	A vehicle accident caused the spill. No available data on the quantity released or size of the land area that was impacted.
2/20/2020	Number 2 Fuel Oil Spill	Private residence, Houghton Road	An ice fall damaged an above-ground storage tank, spilling 10 gallons. No available data on the size of the land area that was impacted.
12/05/2018	Number 2 Fuel Oil Spill	Bridgewater Congregational Church, 7213 US-4	Fuel line break when a boiler exploded. No available data on the quantity released or the size of the land area that was impacted.
05/29/2018	Hydraulic Oil Spill	VT- 100 SB from RT 4	Hose rupture spilled 5 gallons on the roadside. No available data on the size of the land area that was impacted.
02/07/2018	Number 2 Fuel Oil Spill	Private residence, Curtis Hollow Road	Above-ground storage tank failure. No available data on the quantity released or the size of the land area that was impacted.
11/30/2017	Diesel Spill	4 miles up Bridgewater Center Road	Vehicle fluids lost on the roadside following an accident. No available data on the quantity released or the size of the land area that was impacted.
12/12/2014	Diesel Spill	Bridgewater Corner Store, 5680 US-4	A flat bed truck had a fuel line release, spilling 3 gallons on the pavement. No available data on the size of the land area that was impacted.
04/30/2014	Number 2 Fuel Oil Spill	Private Residence, Old Bridgewater Hill Road	An above-ground storage tank holding fuel oil leaked approximately 400 gallons of oil at a private residence. HEA hand-dug contaminated soil in basement. No available data on the size of the land area that was impacted.
01/20/2014	Gasoline Spill	Bridgewater Corner Store, 5680 US-4	Customer overfilled while pumping gasoline at the corner store, which was contained on the asphalt by the FD. 15 gallons were

Date	Event	Location	Extent
			released. No available data on the size of the land area that was impacted.
08/02/2013	Mineral Oil Dielectric Fluid Spill	Cedarbrook Condos, 113 VT RT 100	A leaking pad mounted transformer released 10 gallons. No available data on the size of the land area that was impacted.
09/17/2012	Antifreeze & Diesel Spill	Intersection of US-4 and VT-100A	A traffic accident involving a delivery truck caused the spill. No available data on the quantity released or the size of the land area that was impacted.
03/13/2012	Number 2 Fuel Oil Spill	Back Behind Restaurant, 36 US-4	An above-ground storage tank holding fuel oil leaked its contents, leaching an unknown amount of oil into the soil. According to Irving Oil (the responsible party), the spill may have resulted from Tropical Storm Irene impacts. 10 tons of soil was removed from the site, RWs recovered FP on the water table, and SVE removed vapors from under the business. No available data on the size of the land area that was impacted.
10/11/2011	Number 2 Fuel Oil Spill	Grange Hall, River Road	An off-kilter tank released oil. No available data on the quantity released or the size of the land area that was impacted.
09/23/2011	Hydraulic Oil Spill	US-4	A ruptured hose spilled 2 gallons on the roadside. No available data on the size of the land area that was impacted.
09/23/2011	Number 2 Fuel Oil Spill	Private residence, Route 4	An above-ground storage tank failed in the basement of a private home following Tropical Storm Irene, spilling #2 fuel oil. The storm also deposited 6" of silt. Property was ultimately demolished. No available data on the quantity released or the size of the land area that was impacted.
09/15/2011	Number 2 Fuel Oil Spill	Bridge 44, US- 4	An underground storage tank that had been washed downstream during Tropical Storm Irene was found under Bridge #44 with 18" of water/oil in its tank. It was secured, pumped, and the waste was removed. No available data on the quantity released or the size of the land area that was impacted.
07/02/2009	Diesel Spill	US-4	A tractor trailer accident spilled 60 gallons. No available data on the size of the land area that was impacted.
09/03/2008	Hydraulic Oil Spill	Bridgewater Hill Road	A hydraulic leak released 3 gallons. No available data on the size of the land area that was impacted.
02/22/2008	Number 2 Fuel Oil Spill	Private property on Wayside Road	An above-ground storage tank leaked. No available data on the quantity released or the size of the land area that was impacted.
05/03/2006	Diesel Spill	Bridgewater Center Road	A vehicle accident released diesel to the North Branch of the Ottauquechee River. No available data on the quantity released or the size of the land area that was impacted.
08/01/2003	Kerosene Spill	Texaco, intersection of US-4 and VT-100	An above-ground storage tank leaked kerosene. No available data on the quantity released or the size of the land area that was impacted.
06/02/2001	Kerosene Spill	Private residence, location unspecified	An above-ground storage tank containing kerosene tipped over, spilling 30 gallons. Contaminated soil was dug up and drummed for disposal (8 drums total). No available data on the size of the land area that was impacted.
04/03/2001	Kerosene Spill	Private residence, Daily Hollow Road	Ice broke a fuel line at a private residence, leaking 200 gallons of kerosene, contaminating soils, and requiring soil excavation. No available data on the size of the land area that was impacted.

Date	Event	Location	Extent
10/04/1999	Number 2 Fuel Oil Spill	Cedar Brook Motor Inn, US-4 and 100 South	A line leak released number 2 fuel oil. No available data on the quantity released or the size of the land area that was impacted.
03/19/1999	Hydraulic Oil Spill	Barnard-Chateauguay Rd	A logging operation released hydraulic oil. No available data on the quantity released or the size of the land area that was impacted.
10/09/1998	Motor Oil Spill	Intersection of Pearson Rd and US-4	A truck accident released 7 gallons of motor oil. No available data on the size of the land area that was impacted.
10/31/1997	Kerosene Spill	Private residence, location unspecified	Equipment failure during refueling led to the release of 5 gallons of kerosene. No available data on the size of the land area that was impacted.
09/29/1997	Gasoline & Oil Spill	US-4	A demolition derby in the floodplain resulted in release of gasoline and oil. No available data on the quantity released or the size of the land area that was impacted.
02/03/1997	Number 2 Fuel Oil Spill	VT-100A	A truck rollover on VT-100A spilled 1.5 gallons of number 2 fuel oil. No available data on the size of the land area that was impacted.
10/02/1991	Number 2 Fuel Oil Spill	Bridgewater Elementary School	A small kink in an underground storage tank line led to a 900-gallon spill of number 2 fuel oil. No available data on the size of the land area that was impacted.
08/30/1987	Diesel Spill	US-4	A truck accident caused a diesel spill. No available data on the quantity released or the size of the land area that was impacted.
01/21/1986	Gasoline Spill	General Store	1,200 gallons of gasoline were leaked at the General Store. No available data on the size of the land area that was impacted.
06/07/1981	Waste Oil Spill	Unspecified	55 gallons of waste oil spilled on a road. No available data on the location or size of the land area that was impacted.
02/25/1981	Diesel Spill	US-4	A truck accident led to a 60 gallon diesel spill. Upon investigation, it was determined that no clean-up was possible to remediate the site. No available data on the size of the land area that was impacted.
02/04/1981	Gasoline Spill	Exxon Station	A leaking underground storage tank led to a 1,000 gallon gasoline spill. No available data on the size of the land area that was impacted.
11/08/1973	Gasoline spill	US-4	A truck accident spilled 1,000 gallons of gasoline. No available data on the size of the land area that was impacted.

Although few large spills have occurred in the Town of Bridgewater, the potential for a major spill exists. US Route 4 and VT Route 100A, particularly at their point of intersection, pose constant threats to the Town of Bridgewater. These routes serve as the main thoroughfares for trucks and other motor vehicles transporting a wide-range of goods, including a wide range of hazardous materials, within the confines of Bridgewater. A truck accident and a resulting hazardous material spill could be exceedingly disastrous for the Town and its residents, as these two routes intersect in the development-dense Bridgewater Corners area. The length of Route 4 in the Town runs parallel to the Ottauquechee River, while VT Route 100 follows Reservoir Brook, and VT Route 100A runs parallel to Broad Brook and Pinney Hollow Brook south of Route 4. As a result, surface water contamination issues could be created if a hazardous material spill were to occur along either of these major routes.

A hazardous material spill in the Town, in addition to endangering lives, property, and surface waters, may also impact business and residential water supplies. The Town of Bridgewater does not have a municipally owned public water supply; instead, residents rely on private, individual wells to serve their needs. As evidenced in the table above, there is potential for contamination to soils and waterways in the town, which could pose a very real threat to the Town’s aquifer.

In order to prepare for hazardous material spills in Bridgewater, most members of the Bridgewater Volunteer Fire Department are trained to the HAZMAT Awareness level, and nine members are trained to the Operations level.

Hazard	Location	Vulnerability	Extent	Impact	Likelihood/Probability
Hazardous Materials Spill	US Route 4; VT Route 100A, VT Route 100, and local roads.	Road infrastructure, nearby private and publicly-owned structures (Town Office, the Fire Department, Town Garage), the Ottauquechee River, and Broad Brook.	Initially, local impacts only; but depending on material spilled, extent of damage may spread (e.g., into groundwater).	There are 296 structures within 1,000 feet of a potential HAZMAT spill on major roads (US Route 4, VT-100, VT-100A). In the event that 5% of these structures were involved in a HAZMAT incident, the estimated damage would be \$1,976,579.	Highly Likely

2. Severe Weather

In Bridgewater, severe weather is quite common, typically in the late spring and summer months when the region experiences high temperatures. Severe thunderstorms tend to bring other hazards such as high winds, hail, lightning, and flooding, and these hazards are often experienced in combinations that create many unique weather and emergency management situations.

This section of the Plan satisfies the requirements of 44 CFR 201.6(c)(2)(i), 201.6(c)(2)(ii), and 201.6(c)(2)(iii) for **Severe Weather**.

Many hailstorms have occurred in Vermont, usually during the summer months. While local in nature, these storms are especially significant to area farmers, who can lose entire fields of crops in a single hailstorm. Large hail is also capable of property damage. 782 hail events were recorded between 1950 and 2019 in the state, making hail an annual occurrence in some part of the state. Most of these events had hail measuring between 0.75 and 1 inch, but 171 events had hail over 1 inch in size. The largest hail during the period was 3.3-inch hail that fell in Chittenden County in 2009 (NCEI). Sizeable hail has accompanied storms moving through Bridgewater and the broader region.

Thunderstorms can also generate high winds, such as that which hit the region on July 6, 1999, downing hundreds of large trees in a few minutes. Over the years, Bridgewater has been hit with high winds that

have downed and uprooted numerous trees, and knocked out electricity to residents in the Town. Town-specific wind damage data could not be found for every event, but the “Remarks” section of the NCEI Database helps to illuminate the impact strong winds can have on the Town.

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

History of Occurrences:

Severe Weather Date	Event					Location	Extent
	Thunderstorm / severe storm	Flooding	Hail	High Winds	Lightning		
8/17/2019	✓			✓		County-wide	Estimated wind gust of 50 mph in Stockbridge, 60 mph in Plymouth. No available data on local wind speed or the size of the land area that was impacted.
4/15/2019 (DR-4445)	✓	✓				County-wide	0.5” to 1.5” of rain fell across the region in an intense burst, compounding ongoing snowmelt and leading to flash flooding. In the northern part of the county there were road closures and washouts, and in the south some businesses sustained flood damage. A total of \$600,000 in property damage reported for the county. No available data on the size of the land area that was impacted.
7/1/2017	✓	✓		✓		Northern portion of Windsor County	Flash flooding damaged roads across northern Windsor County. No available data on local wind speed or the size of the land area that was impacted.
9/11/2016*	✓			✓		Bridgewater, County-wide	Estimated wind gust of 50 mph in Bridgewater Corners. Trees downed on power lines. No available data on the size of the land area that was impacted.
7/23/2016	✓			✓		County-wide	Estimated wind gust of 60 mph in South Royalton; no local data available. No available data on the size of the land area that was impacted.
07/03/2014*	✓			✓		Bridgewater	Approximately 1.5” of rain and gusts of up to 65 mph hit the region. No major road damage was reported. No available data on the size of the land area that was impacted.

Severe Weather Date	Event					Location	Extent
	Thunderstorm / severe storm	Flooding	Hail	High Winds	Lightning		
9/11/2013*	✓			✓		Bridgewater, County-wide	Estimated wind gust of 55 mph in Bridgewater Corners. Downed trees and utility lines, pea-sized hail. No available data on the size of the land area that was impacted.
08/28/2013	✓	✓				County-wide	Thunderstorms with very heavy rainfall developed over east central Vermont, resulting in isolated flash flooding, causing \$50k of damage county-wide. No available data on the size of the land area that was impacted.
7/18/2013	✓	✓				Northern portion of County	Flash flooding reported in the northern part of the county as a result of heavy rain on saturated soil. No available data on the size of the land area that was impacted.
6/25/2013 – 7/11/2013 (DR-4140)	✓	✓				County-wide	Intense rainstorms on ground that had already been saturated (by record rainfall in May and June) led to flash flooding around the county. No available data on the size of the land area that was impacted.
9/8/2012	✓			✓		County-wide	Estimated wind gust of 50 mph in Royalton. No available data on local wind speed, or size of the land area that was impacted.
5/28/2012-5/29/2012	✓		✓	✓		County-wide	1.75" hail reported in nearby East Barnard. No available data on local wind speed, or size of the land area that was impacted.
8/28/2011 (DR-4022, TS Irene)*	✓	✓		✓		Bridgewater, County-wide, State-wide	Tropical Storm Irene brought high winds, intense rain, and flooding. Bridgewater received 5 to 7" of rain. Frequent wind gusts of 40 to 55 mph. Widespread power outages. U.S Route 4 and VT Route 100A were severely damaged, the Mill Mall was flooded, and 4 properties have been bought out by the Town with federal relief money. \$2,043,422.30 in damage total for Bridgewater according to FEMA's Public Assistance database (captures at least 70% of total damage). No available data on the size of the land area that was impacted.
7/6/2011	✓			✓		County-wide	Estimated wind gust of 50 mph in nearby Plymouth and east Barnard. No available data on local wind speed or the size of the land area that was impacted.

Severe Weather Date	Event					Location	Extent
	Thunderstorm / severe storm	Flooding	Hail	High Winds	Lightning		
6/8/2011	✓			✓		County-wide	Estimated wind gust of 50 mph in nearby Woodstock. No available data on local wind speed or the size of the land area that was impacted.
07/21/2008-08/12/2008 (DR-1790)	✓	✓				County-wide	Severe storms and flooding hit Windsor County and other parts of Vermont, leaving damage in their wake. Storms on 8/6 caused over \$100k in damage alone in Windsor County. No available data on the size of the land area that was impacted.
8/25/2007	✓			✓		County-wide	Estimated wind gust of 50 mph in nearby Woodstock. No available data on local wind speed or the size of the land area that was impacted.
8/16/2007*	✓			✓		Bridgewater Corners, County-wide	Estimated wind gust of 50 mph in Bridgewater Corners. Downed trees in Bridgewater. No available data on the size of the land area that was impacted.
7/11/2007 [07/09/2007-07/11/2007 (DR-1715)]	✓	✓				Northern Windsor County	Flash flooding throughout the region, including nearby Stockbridge. No available data on the size of the land area that was impacted.
04/15/2007-04/21/2007 (DR-1698)	✓	✓				County-wide	Severe storms and flooding hit Windsor and other counties throughout Vermont. No available data on the size of the land area that was impacted.
05/14/2006	✓	✓				County-wide	Strong storms brought over 3.5" of rainfall to the immediate area, causing flooding and minor washouts on several roads. The Ottauquechee River experienced bankfull conditions and minor field flooding occurred. \$25,000 in damages reported throughout the county. No available data on the size of the land area that was impacted.
10/07/2005-10/09/2005	✓	✓				County-wide	Heavy rains reached over 6" in portions of Windsor County, causing flooding, mudslides, and clogged culverts in places. No available data on the size of the land area that was impacted.
6/9/2004	✓			✓		Central / Northern part of county	Estimated wind gust of 50 mph in nearby Stockbridge. Widespread power outages reported. No available data on local wind speed or the size of the land area that was impacted.

Severe Weather Date	Event					Location	Extent
	Thunderstorm / severe storm	Flooding	Hail	High Winds	Lightning		
07/21/2003-08/18/2003 (DR-1488)	✓	✓				County-wide	Severe storms and flooding hit Windsor County and other portions of the state, causing damage. No available data on the size of the land area that was impacted.
7/10/2001	✓		✓			Central / Northern part of county	Hail measuring 0.88" reported in nearby Tyson and Woodstock. No available data on the size of the land area that was impacted.
5/28/2001	✓		✓			County-wide	Small hail reported across the county. No available data on local hail size or the size of the land area that was impacted.
07/31/2000	✓	✓				County-wide	A strong storm brought heavy rainfall to the region, causing many smaller rivers to reach or exceed bankfull conditions. \$10,000 in damage reported in Windsor County. No available data on the size of the land area that was impacted.
7/16/2000 [07/14/2000-07/18/2000 (DR-1336)]	✓	✓				County-wide	Strong showers and thunderstorms across the state resulted in especially heavy rainfall. \$500,000 in property damages reported county-wide. No available data on the size of the land area that was impacted.
9/16/1999 [09/16/1999-09/21/1999 (DR-1307)]	✓			✓		County-wide	Tropical Storm Floyd brought heaving rains, high winds, and flooding to many counties in Vermont, including Windsor. \$25,000 in property damages reported in Windsor County. Many downed trees and power lines, about 2,750 people without power county-wide. Approximately 6 inches of rain throughout the county. No available data on local wind speed or the size of the land area that was impacted.
7/6/1999*	✓			✓		Bridgewater, County-wide	No available data on wind speed or the size of the land area that was impacted. \$1,000 in property damages reported in Bridgewater. Numerous downed trees and power lines.
5/29/1998	✓			✓		County-wide	No available data on local wind speed or the size of the land area that was impacted. Scattered downed trees and power outages reported. 52 mph winds reported in Woodstock, 60 mph winds reported in Tyson.

Severe Weather Date	Event					Location	Extent
	Thunderstorm / severe storm	Flooding	Hail	High Winds	Lightning		
7/14/1997	✓			✓		County-wide	No available data on wind speed or the size of the land area that was impacted.
06/27/1997*	✓	✓				Bridgewater, Windsor County	Heavy rains brought 3 to 6 inches of rainfall to northern portions of Windsor County, causing extensive flood damage. \$1 million in damages were reported throughout the county. The Ottauquechee River in Bridgewater peaked at 7.7", with a peak flow of 1,960 cfs. No available data on the size of the land area that was impacted.
7/13/1996	✓	✓				County-wide	Eastern Vermont received heavy rain from the remnants of Tropical Storm Bertha. Roads were washed out in some parts of the County. \$10,000 in property damage reported for Windsor County. No available data on the size of the land area that was impacted.
6/12/1996 – 6/13/1996	✓	✓	✓	✓		County-wide	No available data on wind speed or the size of the land area that was impacted. 0.75" inch hail reported in nearby Reading. Scattered flash flooding and power outages.
1/19/1996 - 1/20/1996 (DR-1101)	✓	✓		✓		County-wide	Above normal temperatures and high winds compounded flooding effects from rainfall and snowmelt. No available data on wind speed or the size of the land area that was impacted. Road washouts and power outages reported across the state. \$900,000 in property damages reported for Windsor County.
7/15/1995	✓			✓		Central & Southern Windsor County	No available data on wind speed or the size of the land area that was impacted.
7/30/1994	✓			✓		County-wide	No available data on wind speed or the size of the land area that was impacted.
8/2/1993	✓			✓		County-wide	No available data on wind speed or the size of the land area that was impacted.
3/11/1992 (DR-938)	✓	✓				County-wide	Heavy rain and ice jams led to flooding. No available data on the size of the land area that was impacted.
9/2/1990	✓			✓		County-wide	No available data on wind speed or the size of the land area that was impacted.

Severe Weather Date	Event					Location	Extent
	Thunderstorm / severe storm	Flooding	Hail	High Winds	Lightning		
8/13/1990	✓			✓		County-wide	No available data on wind speed or the size of the land area that was impacted.
7/7/1989	✓			✓		County-wide	No available data on wind speed or the size of the land area that was impacted.
8/28/1988	✓			✓		County-wide	No available data on wind speed or the size of the land area that was impacted.
7/18/1987	✓			✓		County-wide	No available data on wind speed or the size of the land area that was impacted.
6/8/1987	✓			✓		County-wide	No available data on wind speed or the size of the land area that was impacted.
6/24/1986	✓			✓		County-wide	No available data on wind speed or the size of the land area that was impacted.
6/16/1986	✓			✓		County-wide	No available data on wind speed or the size of the land area that was impacted.
7/21/1983	✓			✓		County-wide	No available data on wind speed or the size of the land area that was impacted.
5/3/1983	✓			✓		County-wide	No available data on wind speed or the size of the land area that was impacted.
6/5/1979	✓			✓		County-wide	No available data on wind speed or the size of the land area that was impacted.
8/5/1976 (DR-518)	✓	✓		✓		County-wide	No available data on wind speed or the size of the land area that was impacted.
8/3/1975	✓		✓	✓		County-wide	Hail measuring 1.75" reported. No available data on wind speed or the size of the land area that was impacted.

Severe Weather Date	Event					Location	Extent
	Thunderstorm / severe storm	Flooding	Hail	High Winds	Lightning		
7/6/1973 (DR-397)	✓	✓				County-wide	Extensive rains fell on already soaked watersheds, including the Ottauquechee. Neighboring Woodstock was recorded to have had 6.30" of rainfall over the course of the storm, forcing evacuations. Rivers and streams throughout the area reached or breached bankfull conditions, causing widespread damage. In Bridgewater, river flooding led to the eventual closure of the Bridgewater Woolen Company at the Mill. No available data on the size of the land area that was impacted.
6/8/1971	✓			✓		County-wide	No available data on wind speed or the size of the land area that was impacted.
8/13/1970	✓			✓		County-wide	No available data on wind speed or the size of the land area that was impacted.
9/2/1969	✓			✓		County-wide	No available data on wind speed or the size of the land area that was impacted.
8/30/1969 (DR-277)	✓	✓				County-wide	No available data on the size of the land area that was impacted.
7/19/1968	✓			✓		County-wide	No available data on wind speed or the size of the land area that was impacted.
7/14/1957	✓			✓		County-wide	No available data on wind speed or the size of the land area that was impacted.

The Town of Bridgewater is prone to strong winds, particularly microburst events that sweep through the region. Power outages are the most common occurrence in the wake of such wind events, usually occurring as a result of tree limbs falling on local power lines. The other major hazard caused by severe weather events is flooding. The most recent major flooding event to impact the region was caused by Tropical Storm Irene, which occurred on August 28, 2011. The Town received 5-7 inches of rain, and the resulting 500-year flood inflicted severe damage to infrastructure, including electrical power lines. Bridgewater’s damages totaled over \$2 million. Flooding and fluvial erosion are discussed in greater detail later in this chapter. The Town works continually to maintain and upgrade (as needed) its culverts, bridges, and ditches in order to help lessen the adverse impacts of flooding events that are often attributable to severe storms.

Hazard	Location	Vulnerability	Extent	Observed Impact	Likelihood/Probability
Severe Weather	Town-wide for wind, hail, high winds, lightning and thunderstorm impacts. The following areas are regularly or sometimes impacted by flooding: some properties along US-4 / Ottauquechee River; some properties along VT-100A / Broad Brook; some properties along the North Branch of the Ottauquechee River (particularly in Bridgewater Center); Bridgewater Hill Road; North Bridgewater Road; Chateauguay Rd; Blanchard Road; and a large culvert in Dailey Hollow	Town and private buildings, and utilities; culverts, bridges, road infrastructure.	Tropical Storm Irene—4-7" across county (5 to 7" in Bridgewater).	Varied depending on the severity of the storm, impacts of other recent events, etc. For Tropical Storm Irene, \$2,043,422.30 total damages for Bridgewater according to FEMA's Public Assistance database (captures at least 70% of total damage).	Highly likely

****Note:** Flooding is often the most expensive hazard caused by severe weather. Therefore, the Extent and Impact categories for Severe Weather will reflect the data reported in the Flash Flood/Flood/Fluvial Erosion, as it represents the higher limits of damage caused by severe weather.

3. Structural Fire

Vermont has historically had a disproportionately high per capita fire fatality rate, but prevention efforts have helped to lower this rate over the past 20 years. Senior citizens and children tend to be most at risk; over half of all fire deaths in the state during the past 5 years were people over the age of 65. In 2019, there were 909 reported structure fires in the state, resulting in 4 fatalities and an estimated \$21.5 million dollars in damage.

This section of the Plan satisfies the requirements of 44 CFR 201.6(c)(2)(i), 201.6(c)(2)(ii), and 201.6(c)(2)(iii) for **Structure Fire**.

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

The Town of Bridgewater is broadly characterized by two forms of terrain: one that is more mountainous with a few higher peaks and narrow valleys and one with more subdued valleys that are broader and surrounded by shorter peaks. Bridgewater physically serves as a midway point between two bustling, year-round tourist areas, Woodstock to the east and Killington to the West; much of its growth has arisen along the routes connecting these areas. The bulk of existing development in the Town largely runs parallel to the Ottauquechee River, its North Branch, and Broad Brook along U.S. Route 4, VT Route 100A, and Bridgewater Center Road. As with many Windsor County towns, the area is typified by a number of old wooden town buildings, residences, and a few commercial spaces.

Bridgewater has no registered mobile home parks; however, the 2010 American Community Survey reported that mobile homes accounted for 4.3% of all housing units in the town (roughly 25 units). A structural fire in any of the houses or businesses in the denser Bridgewater Village portion of the Town has the potential to spread to other structures located nearby (given the right conditions). A review of the fires listed in the “History of Occurrences” chart below demonstrates the potential for all structures, including mobile homes, located in the rural Town of Bridgewater to be completely or severely destroyed by fire.

The following occurrences were obtained from local sources or from the National Fire Incident Reporting System. It is reasonable to assume that additional structural fires have taken place but were not reported.

History of Occurrences:

Date	Event	Location	Extent
6/28/2020	Stove Top Fire	VT Route 100	Tea pot left on stove. No property damage, injuries, or fatalities.
5/10/2020	Chimney Fire	VT Route 100A	Fire contained to the chimney. No property damage, injuries, or fatalities.
12/19/2019	Structure fire	Chateauguay Road	Double wide fire; the fire was contained to the kitchen area, with heavy smoke and heat damage throughout the building. \$100,000 loss, no injuries or fatalities.
04/23/2018	Chimney Fire	Parsonage Road	Fire contained to the chimney. No property damage, injuries, or fatalities.
03/12/2017	Structure Fire	US Route 4	Hot ashes left on porch caught the porch floor and wall on fire. \$100 in damages, no injuries or fatalities.
12/04/2016	Structure Fire	Town Line Road	A dryer fire spread to a mud room. \$40,000 loss, no injuries or fatalities.
10/18/2016	Structure Fire	Long Trail Brewery	Building insulation ignited by a light. \$5,000 in property damages. No injuries or fatalities.
02/20/2015	Oven Fire	VT Route 100A	Fire contained in the oven, no property damages. No injuries or fatalities.
01/05/2015	Chimney Fire	US Route 4	Fire contained to the chimney. No available data on property losses. No injuries or fatalities.
01/02/2015	Structure fire	US Route 4	Structure fire confined to the living room, smoke and heat damage throughout home. \$90,000 loss. Minor burn injuries reported.
08/16/2014	Structure fire	VT Route 100A	The blaze originated from an indoor fireplace, and spread to the floor system. Approximately \$5,000 in damages, no injuries or fatalities.
02/08/2014	Structure fire	VT Route 100A	An old farmhouse, built in 1845, was almost entirely destroyed, with losses estimated at \$95,000. A total of 50 firefighters representing the towns of

Date	Event	Location	Extent
			Woodstock, S. Woodstock, Rutland Town, Plymouth, Barnard, Teago, Hartford, Hartland, and Reading responded to the structure fire. The cause of the fire was undetermined. No injuries or fatalities.
01/23/2014	Chimney / Structure Fire	VT Route 100A	A chimney fire destroyed part of a house, rooming and lodging building fire burned outside wall and broke through into one room. The homeowner was present when the fire started, and with the aid of several fire departments, the fire was put out in about 1 hour. Losses estimated at \$30,000. No injuries or fatalities.
01/11/2014	Chimney Fire	North Bridgewater Road	A chimney fire resulted in \$4,400 in losses. No injuries or fatalities.
09/03/2013	Chimney Fire	Bridgewater Mill Mall	Bridgewater and Woodstock FD's were called out to the Bridgewater Mill Mall over a chimney fire, where the old boiler chimney was on fire. The fire was not attached to the mill itself, and was determined to be arson.
01/06/2013	Shed Fire	Back Behind Restaurant	A shed that was located mere inches from the Back Behind restaurant on Rte. 4 in W. Bridgewater was involved in a fire, which was subsequently put out by the local fire department. The structure was a complete loss, with some damage sustained on the exterior of the restaurant. \$50,000 in damages.
01/03/2013	Chimney Fire	North Bridgewater Road	Chimney fire on N. Bridgewater Road, where a small fire was found in the basement on the floor joist that was built around the chimney. This fire was quickly extinguished with a water can.
03/24/2012	Porch Fire	Bridgewater Mill Mall	Christmas tree in mulch bed burnt and cause minor damage to the porch. \$500 loss.
09/21/2012	Structure Fire	VT Route 100A	Comcast drilled through the house main power line catching the floor joist on fire. \$2,000 loss.
12/10/2011	Structure Fire	Cox District Road	Car caught fire in mechanic shop that was attached to a horse riding arena. Fire was contained to the mechanic shop. \$60,000 building loss and \$30,000 contents loss.
01/29/2010	Chimney Fire	Bridgewater Center Road	\$4,100 loss.
10/17/2010	Barn Fire	Phelps Road	Cause of fire undetermined. \$20,000 building loss and \$32,000 contents loss.
09/15/2005	Structure Fire	Gold Coast Road	Fire started from spontaneous combustion of charcoal fire dropped down from deck and burnt into the ground level. \$100,000 building loss and \$80,000 contents loss.
02/12/2002	Structure Fire	Bridgewater Center Road	Fire started in dryer. \$250,000 loss.

Recognized fire protection problems for the community include poor access to fires, limited water supply for firefighting outside the Village area, and distances of homes from the Fire Station, all of which leave Bridgewater vulnerable to the impacts of structure fires. Some recreational and retirement homes with single access roads and no fire-fighting water supply are in jeopardy.

To help provide better fire protection cover in the Town, the Bridgewater Volunteer Fire Department has installed a number of dry hydrants. Many dry hydrants in the Town were damaged as a result of the flooding caused by Tropical Storm Irene in 2011 and were subsequently repaired. Work in recent years has included: a pressurized hydrant on Gold Coast Road (2011); one at the Long Trail Brewery (2012); one behind the Bridgewater Grange Hall on River Road (2012); one on the Town's baseball field (2012); and one along U.S. Route 4 in West Bridgewater (2013). In 2012, a hydrant was relocated from the Oak

Chapel Church on Bridgewater Center Road to a site on the opposite side of the North Branch River and slightly downriver from the previous site. Since 2015, one dry hydrant was installed on North Bridgewater Road (below Atwood Lane), and the hydrant by Long Trail Brewery was replaced and relocated. Dry hydrants are maintained/cleaned out annually.

Hazard	Location	Vulnerability	Extent	Observed Impact	Likelihood/Probability
Structure Fire	Town-wide	All housing, municipal buildings, Bridgewater Mill Mall	Depends on the location and extent of the fire.	Varies depending on the location and extent of the fire. A structure fire on Chateauguay Road on 12/19/2019, caused approximately \$100,000 in property damage.	Highly likely

4. Flash Flood/Flood/Fluvial Erosion

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

This section of the Plan satisfies the requirements of 44 CFR 201.6(c)(2)(i), 201.6(c)(2)(ii), and 201.6(c)(2)(iii) for **Flash Flood/Flood/Fluvial Erosion**.

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

A more recent flooding event that devastated the region and the state was the result of Tropical Storm Irene, which occurred on August 28, 2011. Record flooding was reported across the state and was responsible for several deaths, as well as hundreds of millions of dollars of home, road, and infrastructure damage. Due to the strong winds, 50,000 Vermont residents were initially without power, and many did not have electricity restored to their homes and businesses for over a week. The Town of Bridgewater lost power during this event; however, it was not due to wind, but the fact that the flood waters washed away many power poles. Many of these needed to be reset. The flooding caused by Tropical Storm Irene is considered to be the second greatest natural disaster in 20th and 21st century Vermont, second only to the Flood of 1927.

The Town of Bridgewater suffered major damage to property and infrastructure during Tropical Storm Irene, although no lives were lost. It is estimated that Tropical Storm Irene dropped 5-7 inches of rain over Bridgewater in a very short span of time, some of the highest precipitation totals in Windsor

County (which averaged 4-7 inches over its land area). It is thought that the flooding that occurred as a result of the storm was close to being (or was) a full-fledged 500-year flood in some areas.

Many of Bridgewater’s roads were damaged by the storm, including parts of: Vermont Routes 4 and 100A; Braley Road; Blanchard Road; Bridgewater Center Road; Bridgewater Hill Road; Bridgewater Hollow Road; Cram Trail; Chateauguay Road; Cox District Road; Dailey Hollow Road; Grandma’Ams Hill Road; Goldcoast Road; Gunderson Road; Hale Hollow Road; Little Sherburne Road; Maple Valley Road; North Bridgewater Road; Perkins Road; Richmond Hill Road; River Road; Robinson Road; Rogers Road; Stevens Road; Town Line Road; and Wayside Road. In West Bridgewater, the area around the Irving Gas Station (near the town line with Killington) was consumed by floodwaters, laying waste to huge swathes of roadway and ruining the structural integrity of many surrounding buildings. Vast amounts of silt were deposited along river and streambeds throughout the town, and large amounts of riparian land were eroded. Portions of the Ottauquechee River in the Bridgewater Corners area and its banks required channelization and restoration work to reset the river’s path. The county-wide damage for Windsor County totaled \$32.5 million. Following the flood damage, the State of Vermont and FEMA have been coordinating on the home buy-out process across the state. To date, the Town of Bridgewater has had a total of four buy-out properties in the wake of Tropical Storm Irene along the following roads: Route 4, Route 100A, and Cram Trail.

Unfortunately, flooding is very common across the region, with many events impacting the Town of Bridgewater specifically. The following list indicates the history of occurrence with regard to this hazard in Windsor County (given the small population of Bridgewater, town-specific data is limited); an asterisk “*” denotes the instances in which town-specific data is available, and federal disaster numbers are listed where appropriate.

History of Occurrences:

Date	Event	Location	Extent
4/15/2019 (DR-4445)	Flash Flood	County-wide	0.5” to 1.5” of rain fell across the region in an intense burst, compounding ongoing snowmelt. In the northern part of the county there were road closures and washouts, and in the south some businesses sustained flood damage. A total of \$600,000 in property damage reported for the county. No available data on the size of the land area that was impacted by flooding or fluvial erosion.
7/1/2017	Flash Flooding	Northern portion of Windsor County	Flash flooding damaged roads across northern Windsor County. No available data on the size of the land area that was impacted by flooding or fluvial erosion.
07/03/2014*	Flash Flooding	Bridgewater	Approximately 1.5” of rain and gusts of up to 65 mph hit the region. No major road damage was reported. No available data on the size of the land area that was impacted by flooding or fluvial erosion.
08/28/2013	Flash Flooding	Windsor County	Thunderstorms with very heavy rainfall developed over east central Vermont, resulting in isolated flash flooding, causing \$50k of damage county-wide. No available data on the size of the land area that was impacted by flooding or fluvial erosion.
7/18/2013	Flash Flooding	Northern portion of County	Flash flooding reported in the northern part of the county as a result of heavy rain on saturated soil. No available data on the size of the land area that was impacted by flooding or fluvial erosion.

Date	Event	Location	Extent
Period from 06/25/2013—07/11/2013 (DR-4140)	Severe Storms and Flooding	Windsor County	Severe storms caused flooding throughout the region, causing damage to some infrastructure and facilities. No available data on the size of the land area that was impacted by flooding or fluvial erosion.
08/28/2011 (DR-4022, TS Irene)*	Tropical Storm Irene	Bridgewater, County-wide	Widespread rainfall amounts of 3-5 inches occurred across Vermont with 5 to 7+ inches across much of southern, central Vermont. Devastating flash flooding occurred across much of central and southern Vermont mountain valleys with substantial and some record-breaking flood stages on larger rivers. This flood event ranked second only to the November 1927 flood in the scope of meteorological and hydrological conditions/impacts as well as loss of life (84 in 1927), but first in monetary damage (approx. \$500. million statewide v. \$350 million (1927 in 2010 dollars). There were nearly 2,400 roads, 800 homes/businesses, 300 bridges and a half dozen railroad tracks destroyed or damaged from the flooding caused by Irene. According to spotter's reports, Bridgewater received 5-7" of rain. U.S Route 4 and VT Route 100A were severely damaged, the Mill Mall was flooded, and 4 properties have been bought out by the Town with federal relief money. \$2,043,422.30 in damage total for Bridgewater according to FEMA's Public Assistance database (captures at least 70% of total damage). No available data on the size of the land area that was impacted by flooding or fluvial erosion.
04/27/2011	Flood	Windsor County	High temperatures, snowmelt and rainfall combined to produce significant flooding in places throughout the region. No available data on the size of the land area that was impacted by flooding or fluvial erosion.
07/21/2008-08/12/2008 (DR-1790)	Severe Storms & Flooding	Windsor County	Severe storms and flooding hit Windsor County and other parts of Vermont, leaving damage in their wake. Storms on 8/6 caused over \$100k in damage alone in Windsor County. No available data on the size of the land area that was impacted by flooding or fluvial erosion.
07/09/2007-07/11/2007 (DR-1715)	Severe Storms & Flooding	Windsor County	Severe storms and flooding struck a number of counties in Vermont, including Windsor. No available data on the size of the land area that was impacted by flooding or fluvial erosion.
04/15/2007-04/21/2007 (DR-1698)	Severe Storms & Flooding	Windsor County	Severe storms and flooding hit Windsor and other counties throughout Vermont. No available data on the size of the land area that was impacted by flooding or fluvial erosion.
05/14/2006	Flood	Windsor County	Strong storms brought over 3.5" of rainfall to the immediate area, causing flooding and minor washouts on several roads. The Ottauquechee River experienced bankfull conditions and minor field flooding occurred. \$25,000 in damages reported throughout the county. No available data on the size of the land area that was impacted by flooding or fluvial erosion.
1/18/2006	Flood	County-wide	The region received 1.5" to 2.5" of rain on top of snowmelt, leading to field and road flooding. \$3,000 in damage reported throughout Windsor County. No available data on the size of the land area that was impacted by flooding or fluvial erosion.
10/07/2005-10/09/2005	Heavy Rain	Windsor County	Heavy rains reached over 6" in portions of Windsor County, causing flooding, mudslides, and clogged culverts in places. No available data on the size of the land area that was impacted by flooding or fluvial erosion.
07/21/2003-08/18/2003 (DR-1488)	Severe Storms & Flooding	Windsor County	Severe storms and flooding hit Windsor County and other portions of the state, causing damage. No available data on the size of the land area that was impacted by flooding or fluvial erosion.
04/13/2002-04/14/2002	Flood	Windsor County	A combination of snowmelt and rainfall of 1-3" across the area caused flooding in areas. \$50k in damage reported throughout the county. No available data on the size of the land area that was impacted by flooding or fluvial erosion.

Date	Event	Location	Extent
12/17/2000-12/18/2000	Flash Flood	Windsor County	Small streams overflowed their banks, causing some road and low-land flooding. \$5,000 in damage reported throughout Windsor County. No available data on the size of the land area that was impacted by flooding or fluvial erosion.
07/31/2000	Flash Flood	Windsor County	A strong storm brought heavy rainfall to the region, causing many smaller rivers to reach or exceed bankfull conditions. \$10k in damage reported in Windsor County. No available data on the size of the land area that was impacted by flooding or fluvial erosion.
07/14/2000-07/18/2000 (DR-1336)	Flash Flood	Windsor County	Strong showers and thunderstorms across the state resulted in especially heavy rainfall. \$500,000 in reported damage throughout the county. No available data on the size of the land area that was impacted by flooding or fluvial erosion.
04/04/2000	Flash Flood	Windsor County	Mild temperatures and steady rains resulted in melting mountain snows, which led to many rivers and streams rising up bankfull or above and some flooding in areas. \$10,000 in damage reported in Windsor County. No available data on the size of the land area that was impacted by flooding or fluvial erosion.
03/28/2000	Flash Flood	Windsor County	Steady rain and melting snow resulted in rising water levels on country rivers and streams. \$5,000 in damage reported in the county. No available data on the size of the land area that was impacted by flooding or fluvial erosion.
09/16/1999-09/21/1999 (DR-1307)	Tropical Storm	Windsor County	Tropical Storm Floyd brought heaving rains, high winds, and flooding to many counties in Vermont, including Windsor. No available data on the size of the land area that was impacted by flooding or fluvial erosion.
06/27/1997*	Flash Flood	Bridgewater, Windsor County	Heavy rains brought 3 to 6 inches of rainfall to northern portions of Windsor County, causing extensive flood damage. \$1 million in damages were reported throughout the county. The Ottauquechee River in Bridgewater peaked at 7.7", with a peak flow of 1,960 cfs. No available data on the size of the land area that was impacted by flooding or fluvial erosion.
7/13/1996	Flood	County-wide	Eastern Vermont received heavy rain from the remnants of Tropical Storm Bertha. Roads were washed out in some parts of the County. \$10,000 in property damage reported for Windsor County. No available data on the size of the land area that was impacted by flooding or fluvial erosion.
6/12/1996 – 6/13/1996	Flash Flooding	County-wide	No available data on the size of the land area that was impacted by flooding or fluvial erosion. Scattered flash flooding and power outages.
5/11/1996	Flood	County-wide	Between 1.5 and 3.5 inches of rain fell on the region, resulting in minor field flooding. No available data on the size of the land area that was impacted by flooding or fluvial erosion. \$5,000 in property damage reported for Windsor County.
01/19/1996-01/20/1996 (DR-1101)	Flood	Windsor County	Above normal temperatures and high winds compounded flooding effects from rainfall and snowmelt. Numerous roads were washed out due to the flooding statewide, and power outages were reported throughout the state. \$900,000 in property damages reported for Windsor County. No available data on the size of the land area that was impacted by flooding or fluvial erosion.
3/11/1992 (DR-938)	Flood	County-wide	Flooding due to heavy rain and ice jams. No available data on the size of the land area that was impacted by flooding or fluvial erosion.
8/5/1976 (DR-518)	Flood	County-wide	Flooding in the wake of severe storms. No available data on the size of the land area that was impacted by flooding or fluvial erosion.
07/06/1973 (DR-397)*	Severe Storms, Flooding, Landslides	Bridgewater, Windsor County	Extensive rains fell on already soaked watersheds, including the Ottauquechee. Neighboring Woodstock was recorded to have had 6.30" of rainfall over the course of the storm, forcing evacuations. Rivers and streams throughout the area reached or breached bankfull conditions, causing widespread damage. In Bridgewater, river flooding led to the eventual closure of the Bridgewater Woolen Company at the Mill. No available data on the size of the land area that was impacted by flooding or fluvial erosion.

Date	Event	Location	Extent
8/30/1969 (DR-277)	Flood	County-wide	Flooding in the wake of severe storms. No available data on the size of the land area that was impacted.
11/03/1927- 11/04/1927*	Flood	Windsor County	The greatest recorded flood disaster in Vermont history devastated the state, losing countless homes, 1,285 bridges, hundreds of miles of roadways and railway tracks, and taking a total of 84 lives, including then-Lt. Gov. S. Hollister Jackson. Rain totals over the 3rd and 4th reached 7-8" in Bridgewater, causing major flooding along the Ottauquechee. No available data on the size of the land area that was impacted by flooding or fluvial erosion.

The Town of Bridgewater has standalone flood hazard area regulations that were adopted in 2006. Development within the floodway is prohibited, with the exception of minor improvements to existing structures or infrastructural or public health and safety improvements (which still require a conditional use permit). Development is permitted in special flood hazard areas (i.e., 100-year floodplain) outside the floodway, but must meet certain standards with regard to design, construction, elevation, etc.

There are 67 residential structures (including 12 mobile homes), 16 commercial structures, and 12 other structures in the 500-year floodplain.³ These include the following critical facilities: 2 hazardous material storage facilities, the Town Fire Department, the Grange Hall (primary emergency shelter), and Oak Chapel Church (secondary emergency shelter). If all of the structures in the floodplain were damaged/destroyed in a severe flood event, the damage would equal \$12,692,700.

There are 102 residential structures, 12 commercial structures, and 12 other structures located in the river corridor where there is heightened risk from fluvial erosion. These include the following critical facilities: the Town Garage, Town Fire Department, the Grange Hall (primary emergency shelter), and Oak Chapel Church (secondary emergency shelter). River corridor areas that lie outside of the federally-mapped 100-year floodplain are not subject to the Town's flood hazard area regulations.

It is important to consider the exposure of vulnerable populations, especially children, the elderly, and low-income households, to flood risk. Across Vermont, most child and elder care facilities are not registered with the State. Most child day care in Bridgewater is likely private in-home care, as there are no licensed childcare providers or registered childcare homes in the Town. It is also likely that residents, particularly commuters, utilize childcare facilities in neighboring towns and job centers. There are also no registered elder care facilities in the Town of Bridgewater that may be at risk of flood damage. Finally, low income housing is not registered with the State, but the state does maintain a list of mobile home parks; there are currently no parks located in Bridgewater. There are, however, individual mobile homes that are vulnerable to flood risks in Town. A mobile home, used as a storage shed, was dislodged during Tropical Storm Irene.

It should be noted that the state's river corridor maps and FEMA's floodplain maps may not identify all properties that are at risk of flooding or erosive damage. FEMA has not mapped floodplains for all areas

³ The 500-year floodplain was chosen as a basis for this analysis to demonstrate the number of Bridgewater properties that are or may be vulnerable to flooding. In addition, the flooding that occurred as a result of Tropical Storm Irene is considered to be greater than a 100-year flood. Therefore, in order to be more forward-looking, the potential damage to structures in the 500-year floodplain is documented in this plan.

of the Town. The state's river corridor maps include more areas but, like FEMA's maps, they do not include all the land lying within the 500-year floodplain. Moreover, recent studies have shown that the majority of flooding in Vermont is occurring along upland streams, as well as along road drainage systems that fail to convey the amount of water they are receiving. Because they are not identified on FEMA's maps, these areas are often not recognized as being flood prone and property owners in these areas are not typically required to have flood insurance (DHCA, 1998). While small, mountainous streams may not be mapped by FEMA in NFIP FIRMs (Flood Insurance Rate Maps), flooding along these streams is possible, and should be expected and planned for. Flash flooding in these reaches can be very erosive, causing damage to road infrastructure and to topographic features including stream beds and the sides of hills and mountains. The presence of undersized or blocked culverts can lead to further erosion and stream bank/mountainside undercutting. Furthermore, precipitation trend analysis suggests that climate change is increasing the intensity and frequency of local storms, making it all the more important to plan for potential flood and fluvial erosion impacts in areas not accounted for by FEMA's floodplain maps.

Bridgewater maintains its culverts, bridges, and ditches on a regular basis, and upgrades them as needed. Since 2015, nearly every road in Town has benefitted from at least some culvert improvement work. Many culverts have been upsized from 15 to 18 inches, and others have been improved by replacing corrugated metal pipe with poly culvert pipe. About 25% of the Town's culverts still have metal pipe that will eventually need to be replaced; these are scattered throughout Town and are not located in areas with high flood risk. The last comprehensive culvert inventory was completed in 2010, and the Town is currently seeking funding to undertake an update.

In addition to upgrading infrastructure to improve the flow of floodwaters, it is important to restore floodplain, improve areas and/or increase the number of areas for retention of floodwaters to reduce the risk to structures and road infrastructure wherever possible. Like upgrading infrastructure, protecting and restoring floodplain will help protect flood-prone structures and roads.

Currently, there is little development taking place in Bridgewater. A new fire station will be built in the next 5 years, and will be located outside of the floodplain. There is presently no planned development within the floodplain. There is 1 repetitive loss property in the Town of Bridgewater at the time of this plan's writing; it is a residential building. The Town has no severe repetitive loss properties.

Hazard	Location	Vulnerability	Extent	Observed Impact	Likelihood/Probability
Flash Flood/ Flood/ Fluvial Erosion	The following areas are regularly or sometimes impacted by flooding: some properties along US-4 / Ottauquechee River; some properties along VT-100A / Broad Brook; some properties along the North Branch of the Ottauquechee River (particularly in Bridgewater Center); Bridgewater Hill Road; North Bridgewater Road; Chateauguay Rd; Blanchard Road; and a large culvert in Dailey Hollow	Culverts, bridges, road infrastructure, public and private infrastructure. There are 95 structures in the 500-year floodplain. If all of these properties were damaged/destroyed in a severe flooding event, the damage would equal \$12,692,700.	Tropical Storm Irene—4-7” across county (5”+ in Bridgewater).	Tropical Storm Irene— \$2,043,422.30 in damage total for Bridgewater according to FEMA’s Public Assistance database (captures at least 70% of total damage).	Likely - Highly Likely

5. Wildfire/Brushfire

Wildfire may be sparked by natural or human activities. Lightning is one of two main natural causes of wildfire. However, across the United States, approximately 90 percent of wildfires are started by humans. According to FEMA, there are three types of wildfire that can consume natural landscapes and man-made structures and features: surface fire, ground fire and crown fire. Surface fires are slow moving across the forest floor, and, as a result, kill and damage trees. Ground fires are usually caused by lightning strikes, and burn on or below the forest floor. Crown fires, so called for their location in the crown of trees, effortlessly spread through tree tops, often aided by wind.

This section of the Plan satisfies the requirements of 44 CFR 201.6(c)(2)(i), 201.6(c)(2)(ii), and 201.6(c)(2)(iii) for **Wildfire/Brushfire**

The Vermont landscape is especially vulnerable to wildfire during the period of time in early spring when all the snow has melted, vegetation has not begun to develop leaves, and the land and vegetation are very dry and/or dead. The vast majority of the Town of Bridgewater is forest land, including a large swathe of forested area that is included in the Chateauguay – No Town Conservation Project. This project covers multiple tracks of land across several towns (Bridgewater, Barnard, Stockbridge, and Killington) to create a no-growth area comprised of largely conserved lands. This Chateauguay area also serves as part of the Appalachian National Scenic Trail. Owing to the fact that such an overwhelming portion of the Town is forestland, Bridgewater is highly vulnerable to the impacts of wild and brush fires if they were to occur within Town bounds.

The following occurrences were obtained from local sources or from the National Fire Incident Reporting System (NFIRS).

History of Occurrences:

Date	Event	Location	Extent
10/15/2017	Brush Fire	Bralely Road	Power lines came down, burning approximately 1 acre of brush. No injuries or fatalities
08/29/2016	Brush Fire	Pearson Road	Small out of control brush fire. No injuries or fatalities. No available data on the size of the land area that was impacted.
2013	Grassfire	Alongside U.S. Route 4	Consisted of 3 circles that were about a foot or less in diameter. Extinguished by a passerby.
2003	Wildfires	Town of Bridgewater	At least 5 wildfires broke out in 2003, which is an unusually high number of wildfires for the Town in one year. No available data on the size of the land area that was impacted.
04/30/2001	Brush Fire	Unknown	A brush fire was started without a permit, leading to 2 acres being burned.
1983	Brush Fire	Free Stone Ledges	Fire burned for a few days and consumed approximately 20 acres.
Late 1970's/Early 1980's	Brush Fire	Chateauguay	100 acres of forest burned.
1970s and 1980s	Brush Fires	Multiple locations in Bridgewater, including Rabbit Hill	Brush and grass fires consumed considerable number of acres.

The Town of Bridgewater can experience multiple brush/wildfires in a year, as was the case in 2003. The potential exists for these fires to get out of hand rapidly, particularly in areas where there is a 15% slope or greater that impedes firefighting efforts. According to the Committee, areas that are particularly vulnerable to wildfire are often those that are near residential homes, especially properties that are built on steep banks where fires tend to spread more quickly. In the majority of instances, these fires tend to be man-made— from a property owner burning leaves or brush. As a result, such fires are often within the vicinity of the home. This is a testament to the need for continued, appropriate guidance for landowners. A review of recent NFIRS records indicated that there were 2 illegal trash burns in 2014.

Forest areas exist where ground-based firefighting efforts would be very difficult, due to their remoteness or steep slopes. This creates the potential for wildfire to impact private land and property and any logging operations occurring at the time of the wildfire. For better or worse, a significant amount of forestland in the Town of Bridgewater is owned by lumber companies, and as a result, has been logged off, which reduces the amount of dead material. A wildfire would likely impact or result in the damage of wildlife habitat and recreational lands used for hunting, hiking, mountain biking, and ATV and snowmobiling trails (maintained by VAST, Vermont Association of Snow Travelers), and/or damage to private property.

Two dry hydrants have been installed since 2015: one on North Bridgewater Road (below Atwood Lane), and one by Long Trail Brewery. Additional details about the town's hydrants are provided in the preceding section on Structural Fire.

Hazard	Location	Vulnerability	Extent	Estimated/ Potential Impact	Likelihood/ Probability
Wildfire/ Brushfire	Particularly areas with a 15% slope or greater. More specific areas include: Rabbit Hill; Chateauguay; and Free Stone Ledges.	Private property, town buildings, utility infrastructure.	Up to this point, the extent of damage has been minimal but all that is needed are the right conditions to experience a more damaging wildfire, particularly in less developed areas that lack access for firefighting efforts.	Unknown—data gap.	Highly Likely

VI. Mitigation

A. Mitigation Goals

- To reduce or avoid long-term vulnerabilities (including loss of life and infrastructure) to the following priority hazards:
 - Hazardous Material Spill
 - Severe Weather
 - Structural Fire
 - Flash Flood / Flood / Fluvial Erosion
 - Wildfire / Brushfire
- To reduce or avoid long-term vulnerabilities to all other hazards that could impact the Town of Bridgewater.

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

- Ensure Bridgewater stays resilient in the event of a flood or other natural disaster. (General Plan Objectives, p. i)
- Continue to annually adopt the [LEMP] to keep participating in the Emergency Relief Assistance Fund (ERAF). (Town Services and Facilities, p.14)
- Support the New Building Committee to develop plans for a new emergency services building/community center. (Town Services and Facilities, p.15)
- The Town follows federal flood hazard regulations (“Bridgewater Flood Hazard Area Regulations” adopted on November 28, 2006) that are compliant with the National Flood Insurance Program for the management and protection of flood-prone areas for a 100-year flood (a flood that has a probability of occurrence of one percent for any given year). Under these regulations, only certain non-structural land uses can be permitted in the floodway portion of these areas. The current regulations specify where, under what conditions, and in what manner any development can be undertaken in these hazardous areas within the Town. Development in the floodplain outside of floodways should be very limited, must take place in a

manner that does not lead to increased flooding elsewhere, and is safe from the damages of floods. It is the policy of this Bridgewater Municipal Plan that development in flood-prone areas follow the town’s current flood hazard regulations (as referenced by name, above). (Critical Natural Areas, p.47)

- Ensure that wetland areas are maintained in their natural state because they provide certain public benefits, including valuable wildlife habitat, filtration of pollutants, and flood protection. (Critical Natural Areas, p.50)
- Maintain the inventory of roads and culverts in Town to keep opportunities for state grants available. (Transportation Plan, p.63)
- [...] energy facility development shall be excluded from the following areas:
 - Floodways shown on FEMA Flood Insurance Rate Maps (except as required for hydro facilities).
 - Fluvial erosion hazard areas shown on Fluvial Erosion Hazard Area maps (except as required for hydro facilities). (Energy Planning and Conservation, p. 76)
- All new [energy] generation, transmission, and distribution facilities shall be sited and designed to avoid or, if no other reasonable alternative exists, to otherwise minimize and mitigate adverse impacts to [...] Special flood hazard areas identified by National Flood Insurance Program maps (except as required for hydro facilities). (Energy Planning and Conservation, p.76)

The Bridgewater Town Plan was updated and adopted on 09/25/2018, and has an 8-year lifespan.

C. Hazard Mitigation Strategies: Programs, Projects & Activities

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

This section of the Plan satisfies the requirements of 44 CFR 201.6(c)(3)(ii), 201.6(c)(3)(iii) and 201.6(c)(3)(iv).

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

Strategies given a “High” prioritization indicate they are either critical or potential funding is readily available, and should have a timeframe of implementation of less than two years. A “Medium” prioritization indicates that a strategy is less critical or the potential funding is not readily available, and

has a timeframe for implementation of more than two years but less than four. A “Low” prioritization indicates that the timeframe for implementation of the action, given the action’s cost, availability of funding, and the community’s need to address the issue, is more than four years.

The Town of Bridgewater understands that, in order to apply for FEMA funding for mitigation projects, a project must meet more formal FEMA benefit cost criteria. The Town must have a FEMA-approved Hazard Mitigation Plan as well.

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

Hazard(s) Mitigated	MITIGATION OR PREPAREDNESS ACTION	Local Leadership	Prioritization (Mitigation Plan Status)	Possible Resources*	Time Frame
All Hazards	<i>Ensure that Bridgewater’s Local Emergency Management Plan (LEMP) is kept up-to-date, identifies vulnerable areas, and references this Plan. (Preparedness)</i>	Emergency Management Coordinator, Town Clerk, Volunteer Fire Department, Selectboard	High	Local resources; TRORC; Vermont Emergency Management	Annually
	<i>Build a new fire department outside of the floodplain and designate as the Town’s Emergency Operations Center. (Mitigation)</i>	Emergency Management Coordinator, Selectboard, Fire Department	Medium	Local resources, state grants	Year 3 of the planning period
Severe Weather (2 or more of the following: (Thunderstorm, Lightning, High winds, Hail, and Flooding))	<i>Maintain trees and brush along Town right of way to reduce risk of power outages. (Mitigation)</i>	Road Foreman	High	Highway Department	Annually
	<i>Regularly inspect and maintain bridges and culverts. Complete repairs or upgrades as needed. (Mitigation)</i>	Selectboard / Road Foreman	High	VTrans Structures grant; Local resources	Year 2 of the planning period

Hazard(s) Mitigated	MITIGATION OR PREPAREDNESS ACTION	Local Leadership	Prioritization (Mitigation Plan Status)	Possible Resources*	Time Frame
Hazardous Material Spill	<i>Ensure that all emergency response and management personnel continue to receive HAZMAT Awareness training at a minimum. (Preparedness)</i>	Bridgewater Volunteer Fire Dept.	High	Local/Fire Dept resources; Vermont State HAZMAT Team	Annually
	<i>Continuously stock gear to help contain small spills when they occur (booms, absorbent materials, etc.). (Preparedness)</i>	Bridgewater Volunteer Fire Dept.	High	Local/Fire Dept resources; polluting party	Annually
	<i>The Town will explore the possibility of lowering the speed limit for traffic on US-4 west of Bridgewater Corners. (Mitigation)</i>	Selectboard	Low	Local resources	Year 5 of Planning Period
Structural Fire	<i>Ensure that fire department personnel maintain their Firefighter certifications. (Preparedness)</i>	Bridgewater Volunteer Fire Dept.	High	Local/Fire Dept resources; Vermont Fire Academy	Annually
	<i>Organize open houses at the Fire Department to educate the public about mitigating fire risk. (Mitigation)</i>	Bridgewater Volunteer Fire Dept.	Low	Local/Fire Dept resources	Year 5 of Planning Period
Flash Flood/ Flood/ Fluvial Erosion	<i>As opportunities arise, negotiate buyouts of repetitive loss properties and convert to open space to increase flood storage capacity. (Mitigation)</i>	Selectboard	Low	State hazard mitigation program	Year 5 of Planning Period
	<i>Update culvert inventory. (Mitigation)</i>	Selectboard / Road Foreman	High	VTrans grant; TRORC staff time; Local Resources	Year 2 of the planning period
	<i>Regularly inspect and maintain bridges and culverts. Complete repairs or upgrades as needed. (Mitigation)</i>	Selectboard / Road Foreman	High	VTrans Structures grant; Local resources	Year 2 of the planning period

Hazard(s) Mitigated	MITIGATION OR PREPAREDNESS ACTION	Local Leadership	Prioritization (Mitigation Plan Status)	Possible Resources*	Time Frame
Flash Flood/ Flood/ Fluvial Erosion	<i>As part of Town Plan updates, review the Town's Flood Hazard Area Regulations to ensure that they are compliant and consistent with state and federal guidelines and statutes. (Mitigation)</i>	Planning Commission; Selectboard	Low	Local resources; TRORC; Municipal Planning Grants	Year 5 of Planning Period
	<i>Upsize culvert near the Town Line on Cox District Road to improve the resilience of the road to flood damage. (Mitigation)</i>	Selectboard / Road Foreman	High	VTrans Structures grant; Local resources	Year 1 or 2 of the Planning Period
	<i>Support town or conservation organization assistance to landowner(s) of property(ies) in Bridgewater on the NFIP's repetitive and severe repetitive loss list to reduce flood damages, through elevation, floodproofing, acquisition or relocation, or an infrastructure project if one is found to address the source of flooding. (Mitigation)</i>	Selectboard (as needed)	Low	Local resources; State hazard mitigation program	Year 5 of Planning Period
Wildfire / Brushfire	<i>Work with the state and FEMA to make wildfire prevention education resources available to the public. (Mitigation)</i>	Fire Dept, Fire Warden	Low	Local resources; Vermont Emergency Management; FEMA	Year 5 of the planning period

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

Appendices

Appendix A: Hazard Ranking Methodology

The “Hazard Score” presented in section V.A of this plan is calculated according to the following formula:

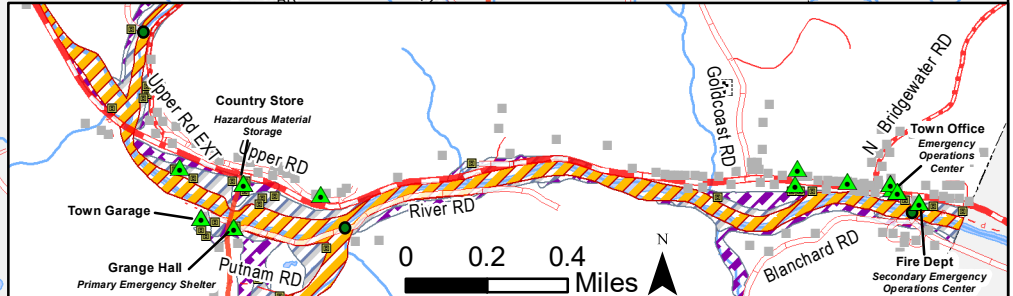
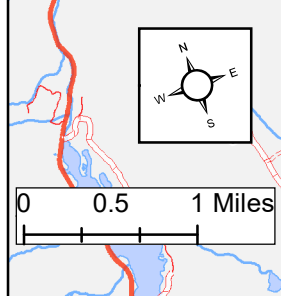
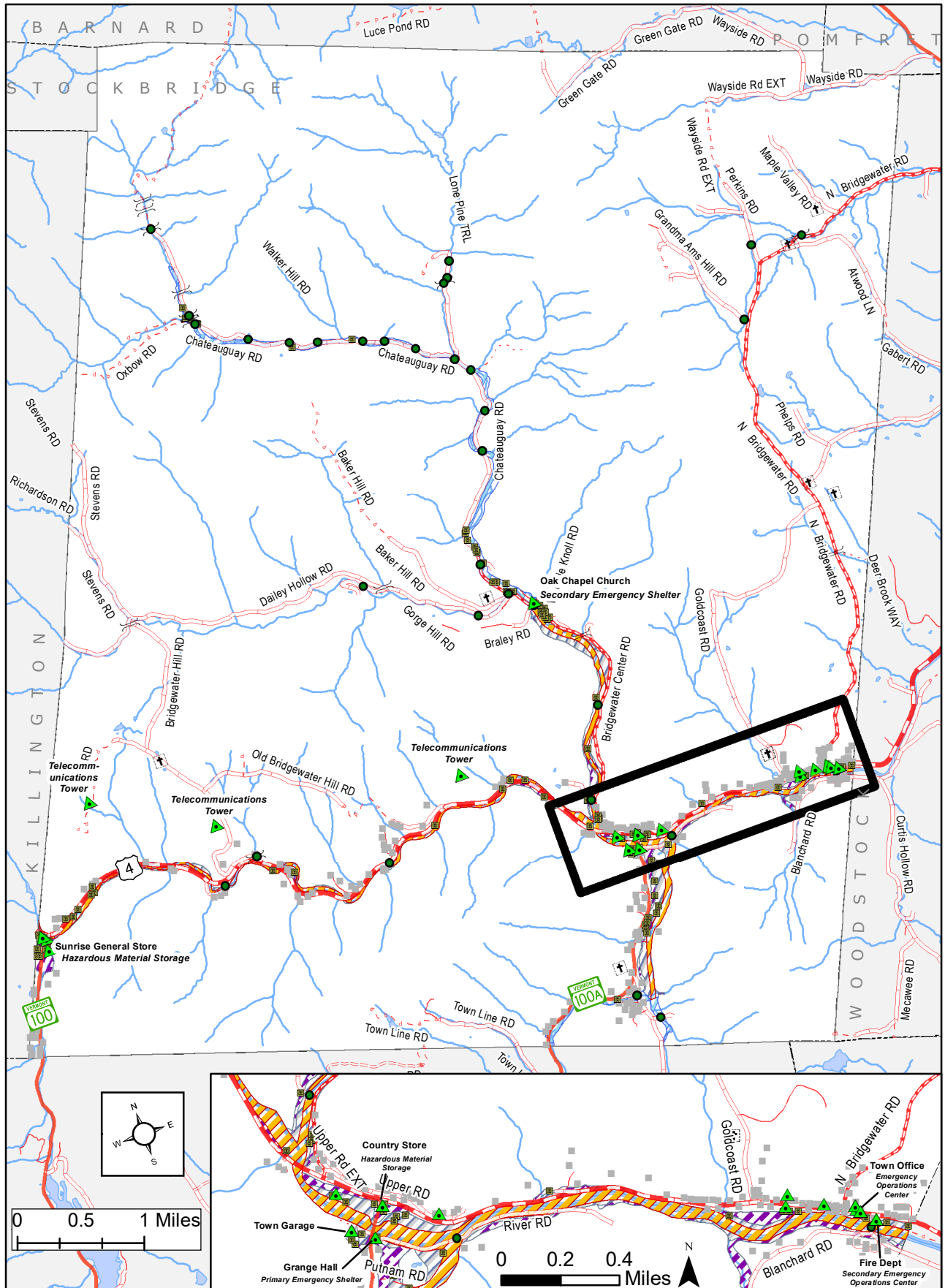
Frequency of Occurrence score + Warning Time score + Potential Impact score.

<u>Frequency of Occurrence</u> Probability	<u>Warning Time</u> Amount of time generally given to alert people to hazard	<u>Potential Impact</u> Severity and extent of damage and disruption
<p>1 = <i>Unlikely</i> <1% probability of occurrence per year</p> <p>2 = <i>Occasionally</i> 1–10% probability of occurrence per year, or at least one chance in next 100 years</p> <p>3 = <i>Likely</i> >10% but <75% probability per year, at least 1 chance in next 10 years</p> <p>4 = <i>Highly Likely</i> >75% probable in a year</p>	<p>1 = More than 12 hours</p> <p>2 = 6–12 hours</p> <p>3 = 3–6 hours</p> <p>4 = None–Minimal</p>	<p>1 = <i>Negligible</i> Isolated occurrences of minor property and environmental damage, potential for minor injuries, no to minimal economic disruption, or minor disruption of critical facilities and infrastructure</p> <p>2 = <i>Minor</i> Isolated occurrences of moderate to severe property and environmental damage, potential for injuries, minor economic disruption, or brief disruption of critical facilities and infrastructure</p> <p>3 = <i>Moderate</i> Severe property and environmental damage on a neighborhood scale, injuries or fatalities, short-term economic impact, or temporary shutdown of critical facilities</p> <p>4 = <i>Major</i> Severe property and environmental damage on a community or regional scale, multiple injuries or fatalities, significant economic impact, or shutdown of critical facilities</p>

Attachments

Attachment A: Map of the Town of Bridgewater

Hazard Mitigation Plan Map Bridgewater, VT



Legend
