Town of Bridgewater, New Hampshire
Hazard Mitigation Plan Update, 2024

Prepared by the: **Bridgewater Hazard Mitigation Update Committee**

John Smith Hill Road

Winter 2024

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Town of Bridgewater, New Hampshire
Hazard Mitigation Plan Update

Winter 2024

With Assistance from:
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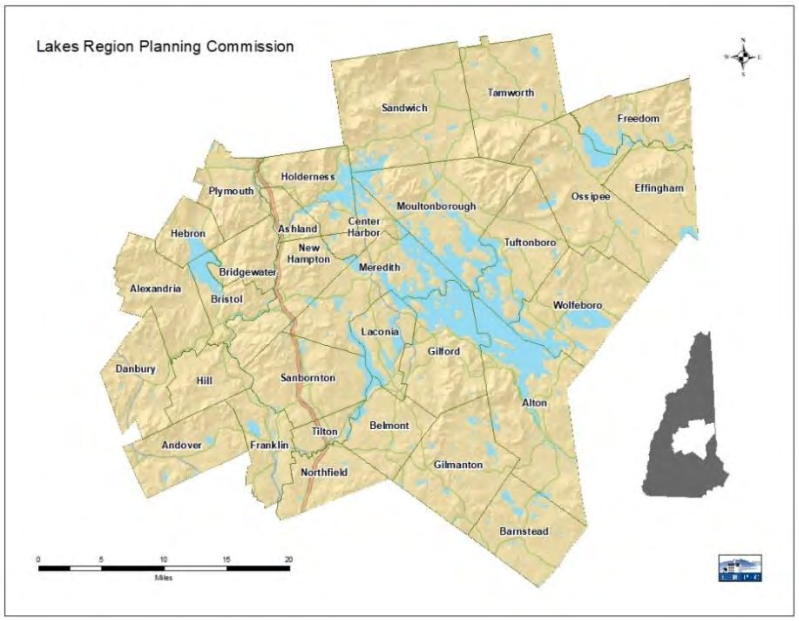
Funding for this plan was provided by the NH Department of Safety, Homeland Security and Emergency Management, and with matching funds provided by the Lakes Region Planning Commission.



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FEMA

April 19, 2024

Robert M. Buxton, Director
New Hampshire Homeland Security and Emergency Management
33 Hazen Dr.
Concord, NH 03305

Director Buxton:

The U.S. Department of Homeland Security, Federal Emergency Management Agency (FEMA) Region 1 Mitigation Division has approved the *Town of Bridgewater, New Hampshire Hazard Mitigation Plan Update, 2024* effective **April 19, 2024** through **April 18, 2029** in accordance with the planning requirements of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended; the National Flood Insurance Act of 1968, as amended; the National Dam Safety Program Act, as amended; and Title 44 Code of Federal Regulations (CFR) Part 201.

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

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

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 Jay Neiderbach at (202) 285-7769 or josiah.neiderbach@fema.dhs.gov.

Sincerely,

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

cc: Austin Brown, Mitigation & Recovery Section Chief, NH HSEM
Lynne Doyle, State Planner, NH HSEM
Dean Savramis, Mitigation Division Director, DHS, FEMA Region 1
Josiah (Jay) Neiderbach, Hazard Mitigation Community Planner, DHS, FEMA Region 1

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EXECUTIVE SUMMARY

The *Bridgewater Hazard Mitigation Plan Update* (the Plan) serves to reduce future losses from natural or man-made hazard events before they occur. The Plan was developed by the Bridgewater Hazard Mitigation Planning Update Committee (the Committee) with assistance from the Lakes Region Planning Commission and contains statements of policy adopted by the Board of Selectmen in Section VI.

The Committee agreed that some of the natural hazards identified in the 2015 Plan continue today; but the Committee's evaluation of past hazards and potential future events, along with their extent and impact resulted in a different assessment than 2015. The matrix below shows the natural hazards considered to be high risks.

Hazard Event	**Overall Risk**
Inland Flooding	High
Severe Winter Weather	High
High Wind Events	High

There have been no changes to the list of the town's Critical Facilities. Existing programs related to hazard mitigation including the following:

Existing Plans, Regulations and Practices Supporting Hazard Mitigation	
Hazard Mitigation Plan 2015	Subdivision Regulations (2007)
Code Enforcement	Site Plan Review Regulations (2016)
Zoning Ordinance (2015)	Master Plan (2006)
Floodplain Ordinance (2023)	School Emergency Operation Plan
Emergency Power Generation	Emergency Response Training and Drills

Some of the 14 Mitigation Actions from the 2015 Plan have either been completed (1) or are considered no longer pertinent (4). The nine remaining Mitigation Actions are being carried over and considered in this plan along with several new actions. In its effort to further reduce the vulnerability of the town to future hazards, new general and hazard-specific mitigation actions were developed and prioritized. based on local criteria. A schedule for implementing proposed mitigation actions was developed.

The release of new requirements from FEMA and the update to the NH State Hazard Mitigation Plan (HMP), both in 2023 led to several changes to this plan, including adjustments to a few of the hazards considered, specific consideration being given to the impacts climate change may have on hazards, the impacts of hazards on socially vulnerable populations, and consequently some of the stated hazard mitigation goals.

SECTION I: PLANNING PROCESS

A. BACKGROUND

To be eligible to receive disaster related Federal Emergency Management Agency (FEMA) grant funding to be used for hazard mitigation projects and actions that will ultimately reduce and mitigate future losses from natural hazard events, FEMA has required that municipalities within the State of New Hampshire establish local hazard mitigation plans. In response to this requirement, the NH Department of Safety's Division of Homeland Security and Emergency Management (HSEM) and the nine regional planning commissions in the state entered into agreements to aid municipalities with plan development and updates. This plan development and update process generally followed the steps outlined in FEMA's *Local Mitigation Planning Policy Guide (2023)*.

B. AUTHORITY

The town of Bridgewater Hazard Mitigation Plan was prepared pursuant to Section 322, Mitigation Planning of the Robert T Stafford Disaster Relief and Emergency Assistance Act and Section 104 of the Disaster Mitigation Act (DMA) of 2000. Section 322 of DMA 2000 emphasizes the need for state, local and tribal entities to closely coordinate mitigation planning and implementation efforts.

C. FUNDING SOURCE

NH HSEM funded this update through FEMA's Pre-Disaster Mitigation Grant Program with local soft match (participants' time) and additional funds from the Lakes Region Planning Commission.

D. PURPOSE

The Bridgewater Hazard Mitigation Plan is a planning tool to be used by the town of Bridgewater, as well as other local, state, and federal government entities, in their efforts to reduce the negative effects from natural hazards. The Plan contains statements of policy as outlined in the Implementation Schedule for Mitigation Actions (Section V.F.) and in Section VI: Plan Adoption and Monitoring. All other sections of this plan are support and documentation for informational purposes only and are not included as a statement of policy.

Developing a hazard mitigation plan allows for the following:

- Increased education and awareness around threats, hazards, and vulnerabilities.
- Building partnerships for risk reduction which include government, organizations, businesses, and the public.
- Identifying long-term, broadly supported strategies for risk reduction.
- Developing local mitigation efforts that support local mitigation efforts.
- Identifying strategies and activities that focus resources on the greatest risks and vulnerabilities; and,
- Communicating priorities to potential sources of funding.

A FEMA-approved hazard mitigation plan is a requirement for receiving certain types of non-emergency disaster assistance including funding for mitigation projects including:

- Public Assistance (Categories C-G)
- Fire Management Assistance Grants (FMAG)
- Hazard Mitigation Grant Program (HMGP)
- Pre-Disaster Mitigation (PDM)
- Flood Mitigation Assistance (FMA)
- High Hazard Potential Dam (HHPD)
- Building Resilient Infrastructure & Communities (BRIC).

E. SCOPE OF PLAN

The scope of this Plan includes the identification of natural hazards affecting the town of Bridgewater, assessment of the threats these pose to the town, and the development & prioritization of mitigation actions to be implemented. Supplemental information regarding some human-caused and technological hazards that could impact Bridgewater and a few preparation/response actions, are included in Appendix G.

In the 2023 State Hazard Mitigation Plan (SHMP), three new areas of focus were introduced: inclusive planning for equitable outcomes, the impacts of climate change, and community lifelines. While these topics are not new, this is the first time that the New Hampshire SHMP addressed them in depth, not only relative to each hazard, but also by incorporating them throughout the Plan into over-arching goals and mitigation actions. While the connections were not always explicit or direct, an effort was made to incorporate these focus areas into the Bridgewater HMP.

F. METHODOLOGY

The Lakes Region Planning Commission (LRPC) corresponded with the Bridgewater Selectmen in early 2020 to initiate the hazard mitigation update process, however early Covid-19 pandemic shutdown and distancing requirements delayed scheduling local meetings to discuss plan updates. The Selectmen established the Bridgewater Hazard Mitigation Planning Update Committee for the purpose of updating a plan for hazard mitigation. The Committee consisted of representatives from the departments of Police, Fire, Emergency Medical Services (EMS), and Public Works, as well as the Board of Selectmen (EMD), the Planning Board, and the Code Enforcement officer.

The Committee developed the content of the Plan by following the process set forth in FEMA's *Local Hazard Mitigation Planning Guide (2022).* Technical and historical information used during the development of this Plan Update was compiled from a variety of sources including local input as well as published information; a list of these resources can be found in Appendix I. Data on property valuation was provided by the Selectboard. Updated information on hazards in New Hampshire informed discussion of recommended mitigation actions.

Communication with committee members occurred at meetings and through correspondence. Meetings with the Selectboard and the committee were open to the public. The committee reviewed and rated the risk of natural hazards to the town. They reviewed implementation

progress and applicability of actions identified in the last plan. Existing challenges were identified. Additional mitigation actions were developed to address challenges/problems. All mitigation actions were evaluated, and an implementation schedule developed.

Neighboring towns were notified of Bridgewater's plan update. Some comments were received from the public during the development of the plan update through surveys, and these were incorporated into the risk analysis and development of mitigation actions phases of the process.

It is important to note that this is Bridgewater's Hazard Mitigation Plan (HMP). While all HMPs in the state (and country) must incorporate the elements set forth by FEMA, the plan update, "needs to reflect the unique situation and most effective path…to meet their specific needs"[1]. Bridgewater, a small rural community has done that by reviewing the existing plan and mitigation actions, considering what has and has not changed in the community since the last plan was adopted, identified problems associated with natural hazards, and developed a prioritized list of mitigation actions to address these problems and a plan to implement them.

G. PUBLIC INVOLVEMENT

The Bridgewater EMD (Select Board) invited a variety of Hazard Mitigation Planning stakeholders to join the Hazard Mitigation Planning Committee. The Committee was represented by municipal officials, and the Board of Selectmen. Other specific opportunities for public input occurred at each meeting.

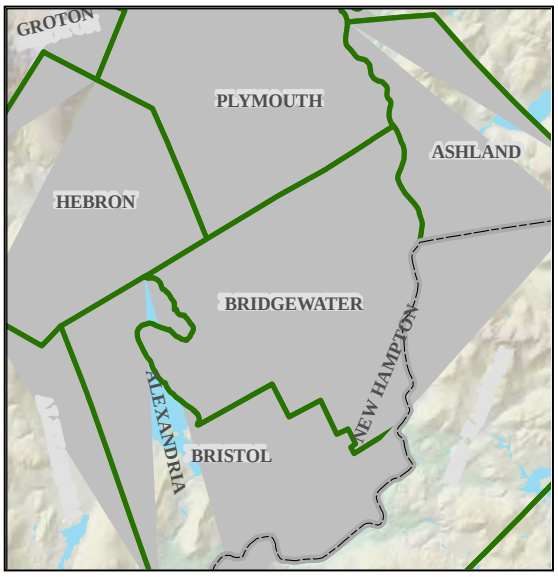
EMDs in adjacent communities and organizations working with vulnerable and underserved communities were notified of the update process and encouraged to provide input (see emails and press release Appendix C). Organizations that work with socially vulnerable communities were invited to provide input during plan development. Local businesses, neighboring communities, academia, and members of the public were encouraged to attend all meetings through press releases and postings (Appendix C & D). A survey was made available to members of the public at the Town Hall and by posting a link https://arcg.is/1fSbaD2 and QR Code on the town website (Appendix D).

The Fire Chief and Assistant EMD from neighboring Hebron participated in a planning meeting. The Public Health Network Emergency Preparedness Coordinator participated in a couple of meetings and addressed infectious diseases. No comments were received from neighboring communities. No members of the public beyond those on the committee attended meetings (in person or virtual). However, public comments received during the plan development process (nine survey responses see Appendix D) were considered by the committee and, where applicable, incorporated into the update. This resulted in refinement of the Risk Rating.

[1] FEMA, *Local Hazard Mitigation Guide (2023)*, Section 3.1 Right-Sizing Plan Development and Update.

SECTION II: COMMUNITY PROFILE

A. GEOGRAPHY



Rugged, heavily wooded slopes dominate the Bridgewater topography. Fifty-four percent or 7,361 acres of the town's land area is characterized by slopes of 15 percent or higher.

Bridgewater Mountain and Peaked Hill run down the center of the town from southwest to northeast, effectively dividing the community into two parts. The eastern portion faces the Pemigewasset River, and the western portion overlooks Newfound Lake.

The town of Bridgewater contains 21.5 square miles of land area and 0.2 square miles of inland water area. To the north are Hebron and Plymouth; to the south is Bristol. The Pemigewasset River forms the eastern border with the towns of Ashland and New Hampton. The entire western edge of town is formed by Newfound Lake. There are five streams running down the east side of the mountains and three running down the west side.

The town of Bridgewater is located on the southeastern edge of Grafton County.

B. WEATHER CONDITIONS

Like many New England towns, the temperature and precipitation in Bridgewater vary greatly. January temperatures range from an average high of 30 degrees Fahrenheit to an average low of 8 degrees Fahrenheit. July temperatures range from an average high of 81 degrees Fahrenheit to an average low of 55 degrees Fahrenheit. Annual precipitation averages 46 inches, where the distribution is slightly lower in the winter months when compared to summer months. Bridgewater averages about 75 inches of snow per year.

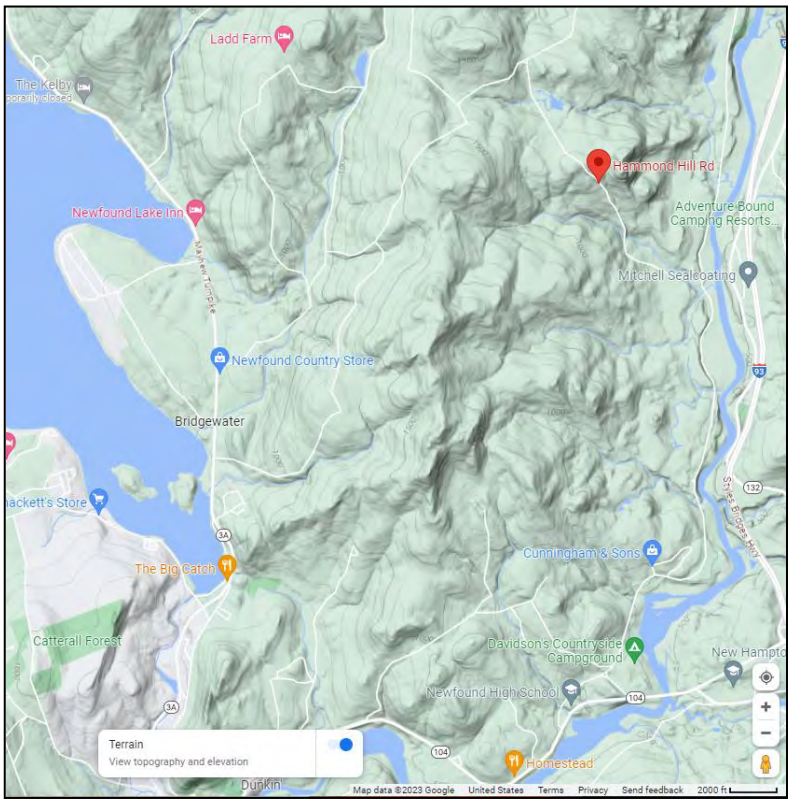
The Selectboard commented on the increased intensity of rainfall events. They also noted that the freezing of Newfound Lake has been occurring later in the season (January instead of mid-December). These sorts of changes in the climate can have distinct impacts on a community like Bridgewater. Intense rains on the town's many steep slopes have increased runoff, impacting infrastructure, water quality, and potentially the town's recreation-based economy.

C. PUBLIC SERVICES

A three-member Board of Selectmen governs the town of Bridgewater. The Board of Selectmen serve as the Emergency Management Director. The Police Chief, Fire Chief, and Public Safety Officer are all qualified to provide police, fire, and emergency medical services. The town does have one full-time, and four part-time EMS personnel. The Fire Department has a 10-member on-call staff and a part-time Fire Chief. This is half the number of Fire and EMS staff compared with eight years ago. There one part-time police officer. State Police covers when not staffed locally. The Road Agent directs a full-time staff of two who maintain 24 miles of town roads (13.6 mi. paved, 10.2 mi. unpaved). The town has a part-time Building Inspector.

Speare Memorial Hospital is in Plymouth, eight miles to the north of Bridgewater, Franklin Regional Hospital is in Franklin, 17 miles to the south, and Concord Hospital-Laconia is 22 miles southeast in Laconia. Additional hospitals are also located in Concord and Lebanon.

NH Route 3A runs north-south along the western edge of Bridgewater, near the shores of Newfound Lake. River Road runs north-south along the eastern edge of town, paralleling the Pemigewasset River. Getting from one side of town to another requires going over a rugged spine through the center of the town on small, local roads – or going north to Plymouth or driving south to Bristol – and around.



Residences and businesses rely on private wells and septic systems. Electric power is provided to Bridgewater residents and businesses by two utilities: Eversource serves the western side of town (704 properties) and NH Electric Cooperative throughout the remainder of town (347 properties).

D. DEMOGRAPHICS AND POPULATION CHARACTERISTICS

Like many Lakes Region communities, the population of Bridgewater grew rapidly in the 1980s and 1990s, from 606 to 974 residents. Growth since then has slowed a bit but remains higher than the state rate. Population growth is projected to continue but at a much slower pace in the foreseeable future.

Year-Round Population, 1980-2020 Census and Population Projections* 2030, 2040

Year	1980	1990	2000	2010	2020	2030*	2040*
Bridgewater Population	606	796	974	1,083	1,160	1,248	1,269
Bridgewater Change	---	31%	22%	11%	7.1%	7.6%	1.7%
NH Change	---	20%	11%	7%	4.6%	7.0%	2.6%

The Committee noted that school-age enrollments have been declining. From 2010 to 2020, the percentage of residents 65 years or older has grown from 18% to over 32% of the town's population. The median age of Bridgewater's residents has risen over the past several decades and at over 55 years old remains higher than the statewide median age.

Median Age, 1980-2020

Year	1980	1990	2000	2010	2020
Bridgewater	37.8	37.4	45.4	49.2	55.5
New Hampshire	30.1	32.8	37.1	41.1	43.3

Sources: US Census and Population Projections*

Some characteristics of a community's population can put them at greater risk of being impacted by hazards. Utilizing Census data the NH Department of Health and Human Services (Environmental Public Health Tracking) developed a tool called the Social Vulnerability Index.

In addition to nearly one-third of the town's residents being over 65 years old, 15% of Bridgewater's residents have some form of disability. Nearly a quarter (23%) of the households with children in Bridgewater have a single parent. Additionally, nine percent of the population is living below the federal poverty line.

E. LAND USE AND DEVELOPMENT TRENDS

There are 948 housing units in Bridgewater, according to *Current Estimates and Trends in New Hampshire's Housing Supply 2022*, published by the NH Department of Business and Economic Affairs. Estimates put the number of seasonal housing units in Bridgewater at about 50%.

Records submitted to NH Office of Planning & Development (OPD) indicate that on average 3-4 permits for Single-Family Residential (SFR) homes are approved each year (ranging from 2-7). Note: Not all permitted structures are built. The US Census indicates that there has been a decrease in the number of housing units in Bridgewater and that some of the seasonal (vacant) housing has been converted to year-round (occupied).

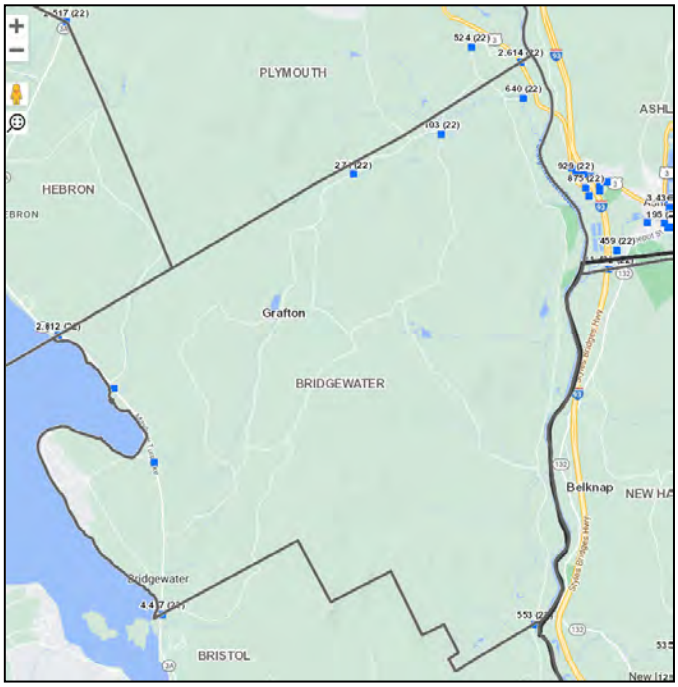
Housing Units, 2010-2020

	2010	2020	Change
Total Housing Units	995	948	-47
Occupied Housing Units	471	526	55
Vacant Housing Units	524	422	-102
% Seasonal (Vacant)	52.66%	44.51%	-8.15%

The challenges associated with demographic and development trends noted in previous hazard mitigation plans continue today, especially as they pertain to hazard mitigation and response efforts. The number of seasonal residential units is indicative of people from varying geographical areas spending a portion of their time in Bridgewater. The challenge this presents is in providing adequate information to all community members regarding the town rules and procedures. For example, fire safety information for the influx of summer residents can be of great value, not only for the high instances of campfires, but also for the general fire safety guidelines for residences in wooded areas.

Another possible challenge in dealing with hazardous events is the potential for increased special needs populations. Those who typically are the most at risk from severe weather events are the elderly and young children. Given the increasing age of the town's population, the likelihood of having residents with special medical needs is high. It is expected that calls for emergency assistance for the elderly will continue to increase.

Interstate 93 runs north/south through New Hampton and Ashland, east of Bridgewater with exits 23, 24, 25, and 26 in New Hampton, Ashland, Holderness, and Plymouth. US Route 3 connects the northeastern tip of Bridgwater with Ashland to the east and Plymouth to the north. River Road runs north/south along the eastern side and connects to NH 104 to the south (in Bristol) and US 3 in the north. NH 3A (Mayhew Turnpike) runs north/south from Bristol to Hebron and Plymouth on the west side of town, near the shores of Newfound Lake.



A standard measure of traffic volume is Average Annual Daily Traffic counts, measured in vehicles per day.[2] As this is a

[2] [2] The complete set of current and historic Bridgewater Traffic Count volumes can be found at https://nhdot.public.ms2soft.com/tcds/tsearch.asp?loc=Nhdot&mod=TCDS using the NH DOT TDMS data mapping tool.

projected average over the entire year, there are certainly many summer days when the volume of traffic on any one of these roads far exceeds these figures. While there is some variability over the years, there has been very little change in traffic volume through Bridgewater over the last thirty years (with the exceptions of 2020 and 2021 due to COVID-related changes.

Traffic Counts in Bridgewater ('Latest' is the AADT – average number of vehicles each day)

Loc ID	County	Community	On	From	To	At	Dir	Latest
82057011	GRAFTON	BRIDGEWATER	Mayhew Tpke				2-WAY	3400
82057051	GRAFTON	BRIDGEWATER	Dick Brown Rd				2-WAY	329
82057052	GRAFTON	BRIDGEWATER	Bridgewater Hill Rd				2-WAY	159
82057053	GRAFTON	BRIDGEWATER	John Jenness Rd				2-WAY	744
82057054	GRAFTON	BRIDGEWATER	Mayhew Tpke				2-WAY	2479
82057055	GRAFTON	BRIDGEWATER	Mayhew Tpke				2-WAY	2900

Another possible challenge in dealing with hazardous events is evacuation protocol. Seasonal residents may need additional guidance to find the proper evacuation routes. Bridgewater's median age is above average for the state and region, elderly and child age populations may need special consideration in hazard event.

Future Development

While much of the town remains undeveloped, Bridgewater's population increase adds pressure to develop along the roads crossing the steep central portion of town. Committee members noted that recent land clearing activity along Poole Hill Road has led to erosion and siltation downhill and downstream and put extra stress on the culvert network. However, as part of the regular maintenance, more than two dozen culverts have been replaced, with the majority being upgraded. Overall, the Selectboard/EMDs feel that the town is better protected from natural hazard events than it was five years ago.

SECTION III: RISK ASSESSMENT

A. INVENTORY OF ASSETS

Below is the list of critical infrastructure for the town of Bridgewater with assessed values for the structures. This includes four categories, 1) Essential Services; 2) Emergency Shelters; 3) Structures and Services; 4) Populations to Protect. The first category contains facilities essential in a hazard event, including the Emergency Operation Center. The second contains the emergency shelter within the town. The third category includes facilities that have been identified as facilities to protect to minimize additional risk from hazards. The fourth category contains special populations that may require additional attention in the event of a disaster.

Critical Facilities

NAME	TYPE	VALUE
Elementary School/Primary Shelter	Emergency Shelter/Special Population	$14,000,000
Incinerator/Recycling Center	Structures & Services/Hazard. Materials	$3,500,000
Public Safety - Building	Essential Services	$3,000,000
Town Clerk's Office	Structures and Services	$1,000,000
Town Highway Garage	Essential Services	$1,000,000
Town House	Structures and Services	$300,000
Town Office/EOC/Secondary Shelter	Emergency Shelter/Structures & Services	$2,000,000

** All Values are from the town's insurance carrier and are the current replacement values

B. IDENTIFYING NATURAL HAZARDS

The town of Bridgewater is prone to a variety of natural, human-caused, and technological hazards. The following hazards were identified as posing a risk to Bridgewater in the 2015 Hazard Mitigation Plan.

	Natural	
Hurricane	Severe Winter Weather (Snow)	Wildfire
Flood	Severe Winter Weather (Ice)	Lightning
Earthquake	Severe Wind (Tornado, Downburst, Thunderstorm)	Extreme Heat
	Human-Caused	
	Vehicular Accident involving Hazardous Materials	

While updating the Plan, the committee considered the hazards identified in the latest S*tate of New Hampshire Multi-Hazard Mitigation Plan (2023)*, developed by the New Hampshire

Department of Safety's Division of Homeland Security and Emergency Management, for identification and definition of hazards that might affect the town. Since the last local plan, the State Plan now utilizes a somewhat different hazard nomenclature, grouping some hazard types together, adding several hazards, and deleting some. All winter Weather events have been grouped under Severe Winter Weather. Extreme Temperature now encompasses both heat and cold. Hurricane is now Tropical & Post-Tropical Cyclone. Solar Storms and & Space Weather is a newly specified natural hazard.

Following a review of the natural hazards identified in the 2023 State Plan and in Bridgewater's 2015 Plan, as well as historical information from internet sources about past hazard events in and near Bridgewater since 2015, the following natural hazards were identified as posing the greatest risk to the town. Higher risk score indicates higher risk (See end of Section III for more information on risk ratings).

Natural Hazard Event	Risk
Inland Flooding	21.33
Severe Winter Weather	16.00
High Wind Events (Torn./Downb.)	16.00
Infectious Diseases	14.00
Extreme Temps	8.00
Tropical & Post-Tropical Cyclones	8.00
Drought	6.67
Earthquake	6.67
Wildfires	6.67
Lightning	6.00
Solar Storms & Space Weather	3.00
Landslides	2.67
Avalanche	1.00

Due to topography and geography, coastal flooding, avalanche, and landslides were not considered pertinent by the committee. While there are some steep areas in town, the committee indicated that they are not severe enough to lead to avalanche or landslide nor s there development in that area. Dams are addressed under inland flooding. While solar storms and space weather were acknowledged as potentially impacting communications equipment, it was seen as a hazard which would impact the entire state and that remaining abreast of notices from NH HSEM regarding this hazard would be the wisest course of action. While lightning certainly does occur, its impact on the town was seen as minimal.

The state HMP identifies drought and wildfire as medium risk hazards for Grafton County. Certainly, the state and Grafton County have recorded drought conditions in the last twenty years, the impacts to Bridgewater have been minimal. While there have been small fires in town, they have been readily contained and the impacts have been minimal. Locally, cyclones were listed as a medium hazard but are not included in the state plan for Grafton County. The real hazard to a community like Bridgewater is the combination of extended heavy rains and high winds and the resulting pressures placed upon their limited staff and resources.

Changes since the last update include dropping wildfire and lightning from the medium risk to low risk. Earthquake was also moved from medium to low risk as the hazard is now defined as "Earthquake > 4.0". On the other hand, flooding and high winds are now viewed locally as high risk, not medium risk.

Human-caused and Technological hazards are acknowledged in the State Hazard Mitigation Plan. They are not, however, required by FEMA to be addressed in local Hazard Mitigation Plans. The potential for terrorism/violence, long-term utility outage, hazardous materials, transportation accident, aging infrastructure, and conflagration events all have the potential to occur in Bridgewater. In the past much was done by Bridgewater to mitigation may of these human/technological hazard events as well as setting up robust response mechanisms, especially regarding the school, town office, and public safety facilities. Any of these hazards that the committee felt applicable are addressed in Appendix G.

C. PROFILING NATURAL HAZARD EVENTS

This section of the plan **defines** each of the natural hazards that might impact Bridgewater. It also describes the **extent** of the hazard, the recent **history** of these events, the likely **location** of each hazard, as well as the **probability** of an occurrence in Bridgewater. These are listed alphabetically.

Probability is a description of how likely it is that an event will occur in town within the next 10 years. Potential hazards were rated on a four-point descriptive scale including unlikely, occasional, likely, and highly likely. These were based mainly on past occurrences in the town, region, and state.

The **extent** is a description of "how bad the hazard could get" considering three factors: magnitude, onset, and duration.

- *Magnitude* is the size of the hazard, such as depth of floodwaters or wind speed.
- *Onset* is how quickly the hazard approaches. Depending on geography as well as the nature of the rainstorm, floodwaters might rise over a period of days, or it might take just a few hours to build up a concentrated flow.
- *Duration* is a matter of how long the hazard is present. A downburst or tornado exists for minutes or hours, while a hurricane or tropical depression can be around for days.

Within the Risk Assessment completed for this plan, Extent was measured on a scale ranging from Weak through Moderate, Severe, and Extreme based on magnitude and strength.

If a hazard event has occurred in the past it is listed under **history**, with a focus on those occurring since the last plan. If some parts of the town are more likely to be impacted by a particular hazard, either based on past events or local knowledge of geography, that is described under **location**.

The **impact** of a hazard is the potential degree of damage that could occur. To rate the impact of a hazard, the damages and consequences that might result from an event were considered in three separate areas Human, Property, and Business & Services. This incorporates the likelihood of injury or death, the assessed value of each critical facility, and the vulnerability of these facilities. It also anticipated disruption of services to residents and visitors. Four levels of impact were used, as defined here:

- Low: Limited structural damage, the town's ability to respond is not compromised, and residents can handle the hazard event without help from outside sources
- Moderate: Some structural damage, the town's ability to respond is compromised, regional or assistance is needed to survive and/or recover
- High: Substantial structural damage, the town's ability to respond is greatly compromised, state or federal assistance is necessary to survive and/or recover
- Catastrophic: Multiple injuries or deaths will likely result from this hazard. Damage to properties will be widespread and extensive. Essential services and other services that residents and visitors depend upon would likely be interrupted for days or weeks.

Impact

The assessed value of the critical facilities identified in Section A totals $24,800,000. This does not, however, include the contents of the building. Also not reflected in this assessment is the value of built infrastructure such as streets, bridges, curbs, drainage, and utility transmission lines. These values can also be used to determine potential loss estimates in the event of a natural hazard event that damages a part of or an entire facility. The facilities listed are structures or services that the Committee considered to be essential in terms of mitigating or responding to hazards.

Of course, critical facilities are not the only resources at risk during a hazard event. There are numerous structures in town, both residential and commercial. The total valuation of the structures in Bridgewater is nearly $250 million dollars. If even a small percentage of those structures are destroyed or damaged during a hazard event, it could be quite costly to repair or replace. More than 90% of the structural valuation in Bridgewater comes from residential structures, one of the highest proportions in the Lakes Region.

Bridgewater Structure Assessment

	Value - Structures 2022	1%	2%	5%
Residential	$220,608,100	$2,206,081	$4,412,162	$11,030,405
Manufactured Housing	$2,669,900	$26,699	$53,398	$133,495
Comm./Indust.	$9,542,100	$95,421	$190,842	$477,105
Exempt	$6,127,900	$61,279	$122,558	$306,395
Public Utilities	$6,843,500	$68,435	$136,870	$342,175
Total	**$245,791,500**	**$2,457,915**	**$4,915,830**	**$12,289,575**

Source: MS-1 form in Bridgewater Annual Report Dec. 2022

Aging infrastructure, local implementation of land use and zoning laws, and various social vulnerabilities may increase risk to natural hazards. Local jurisdictions are provided the ability to address zoning through RSAs to adopt ordinances that can reduce risk to infrastructure and vulnerable individuals within their communities. By taking advantage of federal funding available

through NH HSEM, NH DOT, and NH DHHS, Bridgewater can address the areas of greatest risk in town.

Social Vulnerability refers to the resilience of communities (the ability to survive and thrive) when confronted by external stresses on human health, stresses such as natural or human-caused disasters, or disease outbreaks. Socially Vulnerable Populations can include those who have special needs, such as, but not limited to, people without vehicles, people with disabilities, older adults, and people with limited English proficiency.[3](See Appendix B – Funding Resources.)

The aspects considered in this plan focus on those groups that comprise at least 9% of the residents or households in Bridgewater according to the State Hazard Mitigation Plan. In Bridgewater, the elderly, those with disabilities, single parent households, and those living below the federal poverty line comprise the greatest share of the town's socially vulnerable population.

[3] NH State Hazard Mitigation Plan (2023), p. 70.

NATURAL HAZARDS

Below is a list of declared disasters or incidents listed on the HSEM Resource Center page for which public assistance was made available.

Declaration ID	Dates	Hazard Type	Area
DR 4740	July 9 17, 2023	Severe Storm & Flooding	Belknap, Carroll, Cheshire, Coos, Sullivan Co.
DR 4693	Dec. 22-25, 2022	Severe Storm & Flooding	Belknap, Carroll, Coos, Grafton Co.
DR 4624	July 29 – Aug. 2, 2021	Flooding	Cheshire & Sullivan Co.
DR 4622	July 17-19, 2021	Flooding	Cheshire Co.
EM 3445 & DR 4516	Jan. 20, 2020 & Ongoing	Infectious Disease: COVID-19	Statewide
DR 4457	July 11-12, 2019	Flooding	Statewide
DR 4371	March 13, 2018	Severe Winter Storm	Statewide
DR 4370	March 2-5, 2018	Flooding	Statewide
DR 4355	Oct. 30. 2017	Flooding	Belknap & 4 other counties
4329	July 1, 2017	Severe Thunderstorms	Grafton Co.

The information above was utilized as a guide for further discussion of hazards by the Committee with an emphasis on those most likely to impact Bridgewater. The following section describes the hazard, its **extent**, **history**, likely **location**, **probability** of occurrence, and its likely **impact** in Bridgewater. Hazard names are highlighted based on local risk (Orange - high, yellow – medium, blue – low).

AVALANCHE

An avalanche is a slope failure consisting of a mass of rapidly moving, fluidized snow that slides down a mountainside. The flow can be composed of snow, ice, water, soil, rocks, and trees. An avalanche is a large mass of snow and ice, falling, sliding, or flowing under the force of gravity. An avalanche can be comparable to a landslide, only with snow instead of earth.

Natural and human-caused snow avalanches most often result from structural weaknesses of mountainside and unstable snow and ice formations. Factors leading to these conditions include recent heavy snow, temperature, wind direction, snowpack conditions, slope angle, and slope orientation. Heavy snowfall followed by high winds often create areas of unstable snow accumulations that can be set in motion by human activities, such as hiking, ice climbing, skiing, and snowboarding.

There are three categories of avalanches:

- Soft Slab – consists of soft, low-density snow
- Hard Slab – consists of dense, hard-packed snow
- Loose Snow (also called sluffs or point releases) – release from a single point, typically on a very steep slope

Extent: Low
The North American Public Avalanche Danger Scale (NAPADS) from the National Avalanche Center (www.avalanche.org) is a system that rates avalanche danger and provides general travel advice based on the likelihood, size, and distribution of expected avalanches. It consists of five levels, from least to highest amount of danger: 1 – Low, 2 – Moderate, 3 – Considerable, 4 – High, 5 – Extreme. Danger ratings are typically provided for three distinct elevation bands. Although the danger ratings are assigned numerical levels, the danger increases exponentially between levels. In other words, the hazard rises more dramatically as it ascends toward the higher levels on the scale.

History: Records (NOAA Storm Events database) indicate no avalanches have occurred in southern Grafton County. There was no local knowledge of a landslide occurring in Bridgewater.

Location: The mountainous regions of Carroll, Coos, and Grafton counties are at risk for avalanches, with the highest risk of avalanches occurring in the Presidential Range, particularly on Mount Washington.

The committee determined that there are no locations in Bridgewater where avalanches would occur.

Probability of Occurrence: Low
Avalanches are a common occurrence in high terrain areas in New Hampshire during the winter and spring months. Early warning systems have resulted in less impact lately, however, as more people get involved in outdoor recreation, the number exposed to avalanche threat could increase.

Impact: Low
Avalanches present a significant threat to hikers, skiers, and other people recreating on the mountain. Falling ice and rocks can cause injury or death. Cracks, holes, and crevasses in the snowpack can cause individuals to become trapped or buried in snow, which can result in extreme cold injuries, suffocation, and possibly death. Twenty-five to thirty people die each year nationally from avalanches.

Probability and Impact of Climate Change on Avalanche events: Increasing precipitation associated with climate change are likely to lead to heavier, wetter snowfalls and more layers of snow and ice (less stability). Increased temperatures will raise the snow line to higher elevations, reducing the risk of lower altitude avalanches. As there are no avalanche locations in Bridgewater, climate change will have no effect on the probability and impact of avalanche.

Impact on Vulnerable Communities: Potential impacts associated with avalanche on Bridgewater's vulnerable populations include:

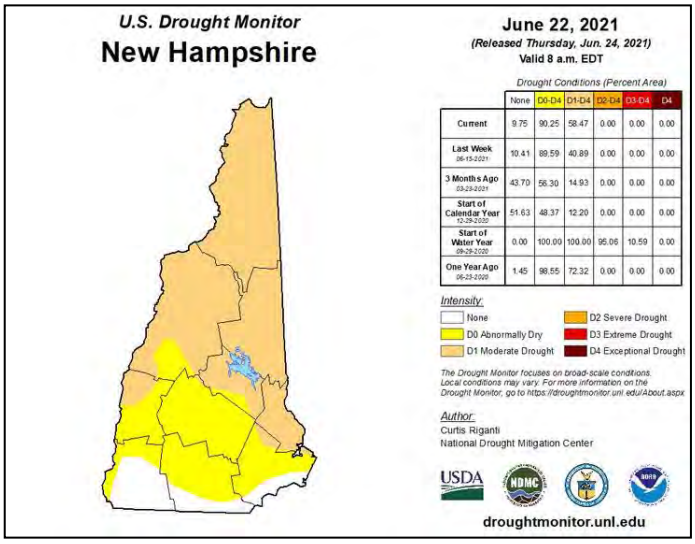
- May have limited access to early warning alerts
- Living in poorly maintained housing with aging infrastructure
- May have limited mobility for getting assistance/evacuation, dependence upon others to travel
- Limited resources for seeking medical assistance

DROUGHT

Drought occurs when less than the normal amount of water is available for extended periods of time. It is often but not always, accompanies elevated temperatures. Effects may include decreased soil moisture, groundwater levels, streamflow, and lake, pond, and well levels may drop. Factors that may contribute to drought include reduced rain/snowfall, increased rates of evaporation, and increased water usage. New Hampshire generally receives adequate rainfall; it is rare that the state experiences extended periods of below normal water supplies.

Drought is the absence of water due to below-average precipitation over an extended period, resulting in low stream flows, low surface water, and low groundwater levels. According to NOAA, the climatological community has defined four types of droughts to address their cause(s), timeframe, and effects:

- **Meteorological Drought**: Occurs when dry weather patterns dominate an area, resulting in a lack of precipitation
- **Hydrological Drought**: Occurs when low water supply becomes evident, especially in streams, reservoirs, and groundwater levels—usually after many months of meteorological drought
- **Agricultural Drought**: Occurs when crops become affected by drought conditions
- **Socioeconomic Drought**: Effects of supply and demand of commodities affected by drought conditions



Extent: Moderate

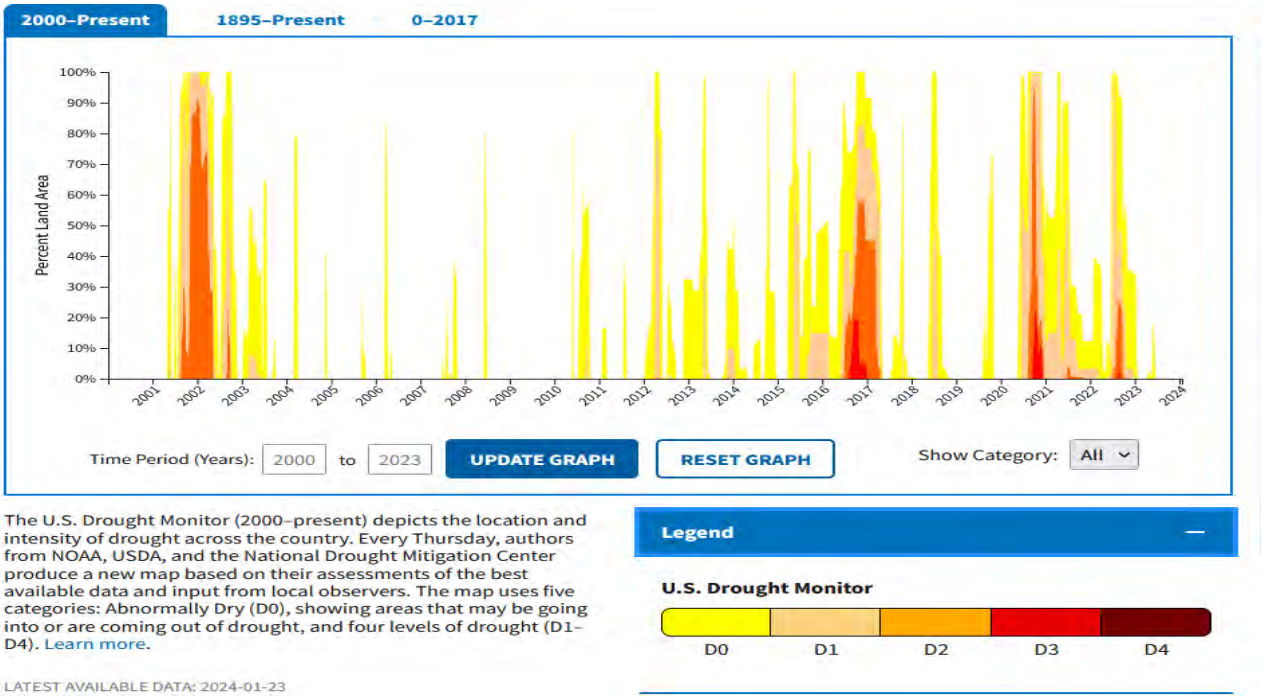
A drought can last for months, or even years. Since 1990 New Hampshire has had a state Drought Emergency Plan, which identifies four levels of action indicating the severity of the drought:

- Alert
- Warning
- Severe
- Emergency

Effects may include decreased soil moisture, groundwater levels, streamflow,

and lake, pond, and well levels may drop. Factors that may contribute to drought include reduced precipitation, increased rates of evaporation, and increased water usage. New Hampshire generally receives adequate rainfall; it is rare that the state experiences extended periods of below normal water supplies. The US Drought Monitor uses a five-level drought intensity scale ranging from Abnormally Dry to Exceptional Drought.

History: There have been five extended droughts in New Hampshire in the past century: 1929 to 1936, 1939 to 1944, 1947 to 1950, 1960 to 1969, and 2001 to 2002. While much of the country experienced drought conditions in 2012, New Hampshire received adequate precipitation. Moderate drought conditions existed in New Hampshire during parts of 2015, 2016 and into April of 2017. In 2020 Grafton County experienced a moderate drought.



Location: Since drought is a state-wide or regional event, it would affect most areas of the town. Those with shallow wells would likely be affected first.

Probability of Occurrence: Occasional

Impact: Minimal
Those with shallow wells would be most affected by drought. Due to limited reliance on agriculture in Bridgewater, limited number of shallow wells, and capacity to supply emergency water, the impact of a drought on Bridgewater would be minimal; there would be no direct impact to structures. Lower water levels could affect water quality, however, which may have some impacts on the town's outdoor recreational economy.

Impact of Climate Change on Drought events: Heat waves can exacerbate droughts, leading to negative impacts on the agriculture sector. More intense rain events certainly may reduce drought, conversely because of their intensity, it can be a situation of so much rain coming down in a short period of time that much of the water runs off as stormwater and does not have an opportunity to seep in and replenish the aquifer. More frequent or more intense drought could have negative impacts on the agriculture sector.

Impact on Vulnerable Communities: Potential impacts associated with drought on Bridgewater's vulnerable populations include:

- Living in poorly maintained housing with aging infrastructure, such as shallow wells
- May be dependent upon others to travel
- Limited resources for seeking medical assistance

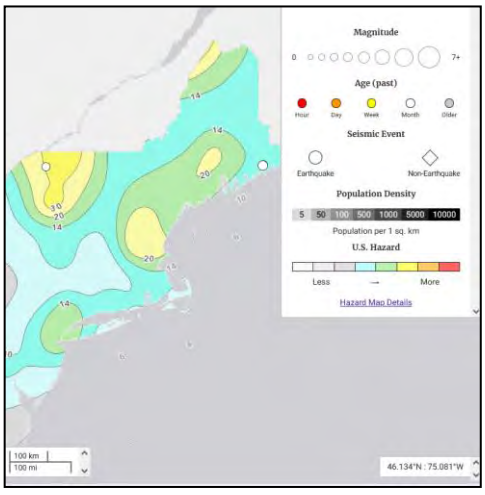
Earthquake > 4.0 Richter

An earthquake is a series of vibrations induced in the Earth's crust by the abrupt rupture and rebound of rocks in which elastic strain has been slowly accumulating.

Extent: Moderate

Earthquakes are commonly measured using *magnitude*, or the amount of seismic energy released at the epicenter of the earthquake. The Richter magnitude scale is a mathematical device used to compare the size of earthquakes, shown in the table below. Note: The 2023 NH State HMP now qualifies this hazard as *Earthquakes>4.0* as opposed to simply *Earthquakes*.

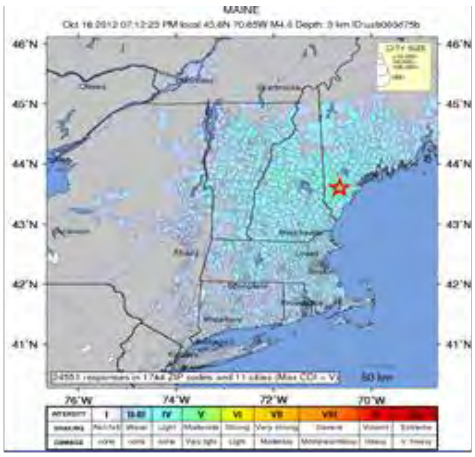
Richter Magnitude	Earthquake Effects
2.5 or less	Usually not felt, but can be recorded by seismograph.
2.5 to 5.4	Often felt, but only causes minor damage.
5.5 to 6.0	Slight damage to buildings and other structures.
6.1 to 6.9	May cause a lot of damage in very populated areas.
7.0 to 7.9	Major earthquake. Serious damage.
8.0 or greater	Great earthquake. Can destroy communities near the epicenter.



New Hampshire is in an area of moderate seismic activity with respect to other regions of the country. There is the potential for nearby earthquakes to register 5.5 on the Richter Scale, causing slight damage to buildings and structures. Due to the unique geology of New Hampshire, earthquake propagation waves travel up to 40 times further than they do in the western United States, possibly enlarging the area of damage.[4] The strongest earthquakes to strike New Hampshire occurred December 20 and 24, 1940 in the town of Ossipee. Both earthquakes had a magnitude of 5.5 and were felt over an area of 400,000 square miles. The image at left shows the expected number of damaging earthquakes shaking in 10,000 years.

[4] http://www.nh.gov/safety/divisions/hsem/NaturalHazards/index.html visited February 8, 2011.

History: On average, every other year the Lakes Region experiences an earthquake, though these earthquakes are mild and go mostly undetected by people. Sanbornton and Tamworth are identified as two epicenters in the region.[5] A search of the USGS National Earthquake Information Center database shows that since 1977 there have been 15 earthquakes with a magnitude of at least 3.0 within a 100 km (62 mi.) radius of Bridgewater; the largest was magnitude 4.5. Two such earthquakes have occurred since 2006; a 3.4 event in 2010 centered in Penacook, NH and a 4.0 quake in southern Maine shook the region on October 16, 2012. The image at right indicates the communities where people reported feeling this event.[6].



Areas where the October 16, 2012 earthquake

Location	Date	Magnitude
Ossipee	December 24, 1940	5.5
Ossipee	December 20, 1940	5.5
Ossipee	October 9, 1925	4
Portsmouth	November 10, 1810	4
Off Hampton	July 23, 1823	4.1
15km SE of Berlin	April 6, 1989	4.1
5km NE of Berlin	October 20, 1988	4
W. of Laconia	January 19, 1982	4.7
Central NH	June 11, 1638	6.5

Location: An earthquake of 4.0 or greater could affect all areas of Bridgewater, mainly multi-level structures and those that are either constructed of masonry or have masonry chimneys. Some bridges might be impacted.

Probability of Occurrence: Occasional

Impact: Moderate: Low
According to the US Geologic Survey, the overall earthquake risk to the state is high due to the built environment which means that many structures in the state are old or not built to withstand an earthquake.

A relatively large earthquake would likely impact the roads including the bridges, limiting the ability of emergency services to be rendered. Damages could range from cracked foundations, chimneys, and supports to full collapse. Structures that are taller, older, or built of masonry are

[5] http://des.nh.gov/organization/commissioner/pip/factsheets/geo/documents/geo-3.pdf , pg. 3, visited January 25, 2011.
[6] USGS, Earthquake Archive Search. https://earthquake.usgs.gov/earthquakes/map/

most at risk. Additionally, earthquake shaking could damage the dams controlling water that passes through Bridgewater.

Damage from the 1940 earthquakes in Ossipee included some damage to most of the chimneys in the epicenter region of Ossipee, ranging from cosmetic cracks to total collapse. Sections of several foundations collapsed and at least one house rotated on its foundation. In the town of Conway, 15 miles from the epicenter, one house was lost to fire when sparks in a cracked chimney started the blaze. Splits found in the rafters and trusses temporarily closed Ossipee High School. No damages were associated with the October 2012 earthquake, but the potential does exist for some damages to occur.

The fire department could have some response problems if the bridges were impacted, requiring redeployment of apparatus and people or mutual aid assistance. Areas of town with only one egress could become isolated from direct assistance.

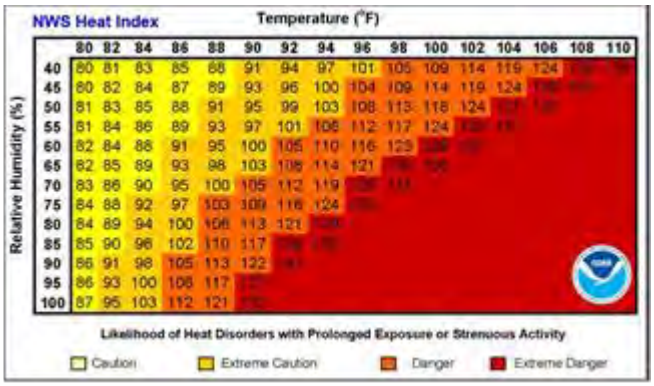
All structures in Bridgewater are susceptible to damage by an earthquake. Assuming 1% town-wide damage to buildings, an earthquake could result in nearly $2.5 million in damages any given year.

Impact of Climate Change on Earthquake events: The impacts to Bridgewater associated with an earthquake would not be affected by climate change.

Impact on Vulnerable Communities: Potential impacts associated with earthquakes on Bridgewater's vulnerable populations include:

- Living in poorly maintained housing with aging infrastructure
- May have limited mobility for getting assistance, dependence upon others to travel
- Limited resources for seeking medical assistance

EXTREME TEMPERATURES

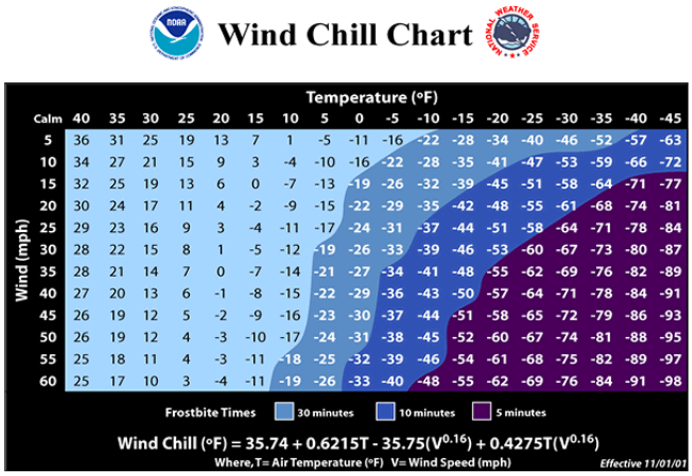


Extreme temperatures are a period of prolonged and/or excessive heat or cold that presents a danger to human health and life. Extreme Heat events occur because of above normal temperatures, which often coincide with high relative humidity, that increase the likelihood of heat disorders with prolonged exposure or strenuous activity. Heat related disorders include heat cramps, heat exhaustion, and heat stroke. High heat and humidity can also adversely affect air quality, leading to respiratory problems. Extreme heat can also damage or kill crops and animals (wild, farm, or domesticated), potentially presenting a risk to the economy.

Extreme Cold events are caused by the southern transport of arctic airmasses into the Northeast. This effect is exacerbated when there are winds present that effectively lower the temperature that is perceived by the human body, known as the wind chill. The risk comes from when the body is losing heat faster than it can produce it. Wind acts to carry heat away from the body, therefore amplifying the perceived temperature by the human body and reducing the body's core temperature. Cold disorders can include frostbite and hypothermia.

Frostbite occurs when uncovered skin/extremities are exposed to extreme cold and the body tissue is either injured or killed. Hypothermia is when the body is unable to heat itself at the rate it is being cooled and the body's core temperature begins to drop below normal values. A normal core body temperature is 98.6°F: mild hypothermia occurs when core body temperature drops between 90 to 95°F and severe hypothermia occurs at core body temperatures of below 90°F. If left untreated, hypothermia can result in unconsciousness and eventually death. Extreme cold can also damage or kill crops and animals (wild, farm, or domesticated), potentially presenting a risk to the economy.

Extent: Moderate



- Heat Advisory—Two or more consecutive hours of Heat Index values of 95-99 °F for two or more days *OR* any duration of Heat Index values of 100-104 °F. A Heat Advisory is issued within 12 hours of the onset of extremely dangerous heat conditions.
- Excessive Heat Warning—Two or more hours with Heat Index values of 105 °F or greater. An Excessive Heat Warning is issued within 12 hours of the onset of extremely dangerous heat conditions.
- Excessive Heat Watches—Heat watches are issued when conditions are favorable for an excessive heat event in the next 24 to 72 hours. A Watch is used when the risk of a heat wave has increased but its occurrence and timing is still uncertain.
- Excessive Heat Outlooks—Issued when the potential exists for an excessive heat event in the next 3-7 days. An Outlook provides information to those who need considerable lead-time to prepare for the event.
- Wind Chill Watch: The National Weather Service (NWS) issues a wind chill watch when dangerously cold wind chill values are *possible*. As with a warning, adjust your plans to avoid being outside during the coldest parts of the day. Make sure your car has at least half a tank of gas and update your winter survival kit.
- Wind Chill Advisory: NWS issues a wind chill advisory when seasonably cold wind chill values but not extremely cold values are expected or occurring. Be sure you and your loved ones dress appropriately and cover exposed skin when venturing outdoors. A Wind

Chill Advisory is issued for New Hampshire is wind chill values are expected to be -20°F to -29°F and winds are greater than 5 mph.

- Wind Chill Warning: NWS issues a wind chill warning when dangerously cold wind chill values are expected or occurring. A Wind Chill Advisory is issued for New Hampshire is wind chill values are expected to be -30°F and winds are greater than 5 mph.

History:

Event Date	Event Description	Impacts	Location	Additional Information
July 1911	Heat Wave	Record high temperatures set in Concord, New Hampshire	Statewide	Extreme heat was recorded from July 3rd through July 5th, with high temperatures ranging from 101-102°F in Concord on these days.[116] These three days account for three of the top 10 hottest days on record for Concord, New Hampshire.
March 2012	Heat Wave	Record high temperatures set in Concord, New Hampshire	Statewide	High temperature records in Concord, New Hampshire were broken for 5 consecutive days, with the hottest day being 84°F.
September 2017	Heat Wave	High temperature records set across New Hampshire	Statewide	Mount Washington set record a daily high temperatures for four consecutive days. Manchester, Concord, and other areas across the State and New England also saw daily temperature records broken.[117]
December 2017	Cold Wave	Record low temperatures set across New Hampshire	Statewide	Record low temperatures were set across the State as a result of a cold wave. Portsmouth saw a low of -1°F and Mount Washington saw a low of -33°F (with a wind chill of -51°). Wind Chill Advisories were posted in central and southern New Hampshire, and Wind Chill Warnings were posted for northern New Hampshire.
February 2018	One Day Winter Heat Wave	High temperature records set across New Hampshire	Statewide	Exceptionally strong high pressure ridge in place across the Eastern Seaboard. Record high temperatures were broken across the State.[118]
2/3/2023	Wind Chill	Most areas recorded top 3 coldest wind chill readings on record.	Grafton Co.	Plym. airport Windchill -43 F. NOAA Events

Bridgewater has experienced regular extreme hot and cold temperatures annually since the last plan update. In February 2023 severe wind chill conditions were reported at nearby Plymouth airport. No damage was reported in Bridgewater.

Location:
Extreme temperatures can occur anywhere throughout the town of Bridgewater. Those at higher elevation and greater exposure to wind are most likely to be impacted by cold. People living in less accessible parts of town are more likely to be impacted during winter cold spells.

Probability of Occurrence: Occasional

Impact: Moderate
Heat related disorders include heat cramps, heat exhaustion, and heat stroke. Extreme heat can also damage or kill crops and animals (wild, farm, or domesticated), potentially presenting a risk to the economy.

Frostbite occurs when uncovered skin and extremities are exposed to extreme cold and body tissue is either injured or killed. Hypothermia occurs when the body is unable to heat itself at the rate it is being cooled and the body's core temperature begins to drop below normal values. A normal core body temperature is 98.6°F. Mild hypothermia occurs when core body temperature drops between 90 and 95° F, and severe hypothermia occurs at core body temperatures of below 90° F. If left untreated, hypothermia can result in unconsciousness and eventually death. Extreme cold can also damage or kill crops and animals (wild, farm, or domesticated), potentially presenting a risk to the economy.

While most of the impact from extreme temperatures is to people and animals, there can also be structural impacts, especially from freezing and expansion of water in pipes and the resulting damages. During committee discussion it was pointed out that the town's critical facilities have generators – in part to enable drainage of pipes in the event of power loss during a cold period, protecting the structure.
The Board of Selectmen also noted that warmer temperatures in the winter are resulting in later freezing of Newfound Lake (January instead of December). This can impact the lake's ecosystem and consequently the local tourist/recreation-based economy.

Impact of Climate Change on Extreme Temperature events: An increase in extreme temperatures will create ecosystem stress based on more intense heat waves and more extreme cold weather waves. The extreme temperatures will create additional health impacts due to high heat/extreme cold exposure, and poor outdoor air quality during extreme heat events. Heat waves can exacerbate droughts and wildfire, which can lead to negative impacts on the agriculture sector.

Impact on Vulnerable Communities: Potential impacts associated with extreme temperature events on Bridgewater's vulnerable populations include:

- May have limited access to early warning alerts
- Living in poorly maintained housing with aging infrastructure
- May have limited mobility for getting assistance/evacuation, dependence upon others to travel
- Limited resources for seeking medical assistance

HIGH WIND EVENT (THUNDERSTORM/TORNADO/DOWNBURST)

Bridgewater is likely to experience either of two types of high wind events that usually result from other severe storms and can occur at any time of the year: tornados and straight-line winds. A **tornado** is a narrow, violently rotating column of air that extends from the base of a thunderstorm to the ground. It is hard to see a tornado unless it forms a condensation funnel made up of water droplets, dust and debris. Tornadoes are the most violent of all atmospheric storms. **Straight-line winds** describe any thunderstorm wind that is not associated with rotation and is usually used to differentiate from tornadic winds. There are several sub-types of straight-line winds, including **downdraft**, which is a small-scale column of air that rapidly sinks towards the ground; and **downburst**, which is the result of a downdraft, referred to as a **macroburst** when the area affected is greater than 2.5 miles and **microburst** when less than 2.5 miles.[7]

Image source: NH HSEM

Extent: Moderate

[7] http://ww.nssl.noaa.gov/education/svrwx101/wind/types

Tornadoes are violent rotating storms that extend to the ground with winds that can reach 300 miles per hour. They are produced from thunderstorms and can uproot trees and buildings. According to the National Oceanic and Atmospheric Administration (NOAA) a downburst is a strong downdraft, rotational in nature, which causes damaging winds on or near the ground. Winds can exceed 130 mph.

The Enhanced Fujita Scale is used to categorize tornados based on a combination of wind speed and the type of damage that is observed.

Operational Enhanced Fujita (EF) Scale

Enhanced Fujita Scale						
EF Number	0	1	2	3	4	5
3-Second Gust (mph)	65-85	86-110	111-135	136-165	166-200	Over 200
Damage Indicator		Small barns, Farm Outbuildings	One-or two-family residences	Single-Wide Mobile Home	Double-Wide Mobile Homes	Apt, Condo, Townhouse (3 Stories or less)

History:
The most recent damaging tornado to touch down in New Hampshire was on July 24, 2008 rendering around 100 homes "uninhabitable" and killing one person. This event traveled from Epsom to Effingham. Although damage resulted in some Lakes Region locations, areas affected were many miles southeast of Bridgewater. Since 2015 there have been two reported high wind events in Grafton County.

History of High Wind Events

Event Type	Date	Location	Extent	General Impacts	Source
High Wind Events (Torn./Downb.)	10/30/2017	County-wide	Wind>50 mph Rain 2-5 in.	Downed Trees and wires	NOAA Events
High Wind Events (Torn./Downb.)	12/23/2022	State-wide	Wind>50 mph Rain 2-5 in.	Downed Trees and wires (120K without power)	NOAA Events

Location: While thunderstorms can be localized, they often hit the whole town. On average, six tornadoes touch down somewhere in New England each year. There is no way of knowing where or when the next damaging tornado will strike as they are among the most unpredictable weather phenomena. Downbursts are 10 times more likely to occur than tornadoes. All areas of town are susceptible to damage from high winds.
Probability of Occurrence: Highly Likely

Impact: High
In Bridgewater, the major damage from downbursts or tornados would come from falling limbs and trees, which may take down power lines, block roads, or damage structures and vehicles. Damage can occur to most structures in town because of downed trees in any high wind event, including the commonly occurring thunderstorms. These winds can bring down limbs and trees, causing damage to structures as well as pulling down power and telephone lines and blocking roads. This is particularly the case along private roadways that may only get limited cutback of vegetation. Trees and wires down across evacuation routes could slow evacuation efforts and draw limited emergency response personnel away from other safety efforts.

Tornados and downbursts could strike anywhere in town with little, if any warning. While individual events may be small and rare, their impacts could be devastating. All structures, especially older ones, which are not necessarily built to the current building code standards, could be at risk.

Damage can occur to most structures in town due to downed trees in any high wind event, including the commonly occurring thunderstorms. These winds can bring down limbs and trees, causing damage to structures as well as pulling down power and telephone lines and blocking roads. This is particularly the case along private roadways that may only get limited cutback of vegetation.

All structures in Bridgewater, including most critical facilities, are susceptible to damage by high wind events, whether through downburst, tornado, or hurricane. Assuming 1% to 5% town-wide damage to buildings, high winds could result in $2,457,915 to $12,289,575 in damages.

Impact of Climate Change on High Wind Events: Changes in New Hampshire's climate could potentially lead to an increase in any of high wind events. This will lead to additional damage being created from these storms, including more extreme and widespread power outages statewide due to increased sustained wind speeds and gusts, downing trees and wires. This will result in greater damage to natural resources, property, and infrastructure. The increased damage and loss will also lead to larger, more complex, and longer lasting restoration efforts for each storm that occurs.

Impact on Vulnerable Communities: Potential impacts associated with high wind events on Bridgewater's vulnerable populations include:

- Living in poorly maintained housing with aging infrastructure
- May have limited mobility for getting assistance, dependence upon others to travel
- May have limited access to early warning alerts
- Limited resources for seeking medical assistance

INFECTIOUS DISEASES

Infectious diseases are illnesses caused by organisms such as bacteria, viruses, fungi or parasites. Some infectious diseases can be passed from person to person, some are transmitted by bites

from insects or animals, and others are acquired by ingesting contaminated food or water or being exposed to organisms in the environment. Signs and symptoms vary depending on the organism causing the infection, but often include fever and fatigue. Mild infections get better on their own without treatment, while some life-threatening infections may require hospitalization.

While some diseases are so rare in each population that a single case warrants an epidemiologic investigation (e.g., rabies, plague, polio), there are other diseases that occur more common so that only deviations from the norm (i.e. seeing more cases than expected) warrants investigation.

Extent: Moderate
Experience with the Covid-19 pandemic has dramatically changed views on the risk of infectious diseases as compared to risk mitigation planning for the 2015 Plan. The magnitude and severity of infectious diseases is described by its speed of onset (how quickly people become sick or cases are reported) and how widespread the infection is. Some infectious diseases are inherently more dangerous and deadly than others, but the best way to describe the extent of infectious diseases relates to the disease occurrence:

- Endemic – Constant presence and/or usual prevalence of a disease or infection agent in a population within a geographic area
- Hyperendemic – The persistent, high levels of disease occurrence
- Cluster – Aggregation of cases grouped in place and time that are suspected to be greater than the number expected even though the expected number may not be known
- Epidemic – An increase, usually sudden, in the number of cases of a disease above what is normally expected
- Outbreak – The same as epidemic, but over a much smaller geographical area
- Pandemic – Epidemic that has spread over several countries or continents, usually affecting many people

The NH Department of Health and Human Services (DHHS) developed an epidemic response plan so that communities can be prepared and respond to outbreaks. The school district has an up-to-date Emergency Operations Plan with policies for addressing epidemics.

History: The 2012-13 flu season was much more severe in New Hampshire than any of the previous decade; 35 deaths occurred statewide, the most since 1997. In 2016, the DHHS responded to a total of 102 outbreaks: 73 gastrointestinal illnesses, 23 respiratory illnesses, and 6 other types of illness.

Since March of 2020, the Covid-19 pandemic has had a significant impact on all facets of life, including on emergency medical responders and the operations of municipal services and local schools. While there certainly have been minor outbreaks of flu in town, other outbreaks of infectious disease haven’t compared to the coronavirus pandemic.

Date	Description	Impacts	Location	Additional Info
Fall 2014	Enterovirus D-68	>40 ill children in New Hampshire	Statewide	A rare strain of enterovirus resulting in infections nationwide.
2016	Gonorrhea	465 people infected	Statewide	465 cases reported; 250% higher than previous years
2017-2018	Seasonal Influenza Outbreak	As of 2018, 63 influenza related deaths were identified in NH	Statewide	In 2018 the overall effectiveness of the flu vaccine at this time was 36%
2020-23	COVID-19 or Coronavirus pandemic	Hospitals, schools, municipalities, & businesses have taken extra precautions, cancelled many events, and adjusted policies	Worldwide	Respiratory disease >379K cases and 3,177 deaths in NH >23,510 cases and 111 deaths in Grafton Co.
Annually	Foodborne outbreaks	Ill individuals associated with outbreaks	Statewide	5-10 outbreaks per year
Annually	Influenza and other raspatory virus outbreaks	Ill individuals associated with outbreaks	Statewide	25-50 outbreaks per year primarily to vulnerable populations
Annually	Norovirus and other gastrointestinal virus outbreaks	Ill individuals associated with outbreaks	Statewide	60-80 outbreaks a year primarily to vulnerable populations

Location: An epidemic is an outbreak of a disease, generally isolated to one area. The disease spreads easily person-to-person and can cause serious illness, with long-lasting side effects and deaths. An outbreak could impact anyone in town. Transmission of germs and diseases between people is accelerated in a close living and socializing environment. Schools, and congregate care centers for the elderly are places where transmission is likely to occur.

Probability of Occurrence: Likely
Epidemics do occur in Bridgewater and other Lakes Region communities from time to time. The Central NH Regional Health Network representative noted in a meeting that it is likely that a future epidemic could involve multiple outbreaks at once.

Impact: Moderate
The concerns associated with an infectious disease include local capacity to respond to not only the residents of Bridgewater but also any visitors. The cost of infectious diseases in Bridgewater is difficult to calculate as any cost would primarily result from health care response. Experience with COVID-19 pandemic has revealed the human and economic costs resulting from the shut down or slowdown of many businesses in town and the region.

Impact of Climate Change on Infectious Disease events: Changes in New Hampshire's climate could potentially lead to an increase in precipitation. Increased precipitation may lead to more flooding. This could lead to increased impacts from mold in affected areas including homes and

businesses. This could also result in greater instances of stagnant water, leading to more vector-borne diseases. In Bridgewater this would be of particular concern during the summer seasons when there are many extra visitors to the area.

Impact on Vulnerable Communities: Potential impacts associated with infectious disease on Bridgewater's vulnerable populations include:

- Limited resources for seeking medical assistance
- Living in poorly maintained housing with aging infrastructure
- May have limited mobility for accessing attention
- More likely to have compromised immune systems

INLAND FLOODING

Flooding is defined as a temporary overflow of water onto lands that are not normally covered by water. It results from the overflow of rivers and tributaries or inadequate drainage. Flooding is rarely associated with lakeshore properties, especially if there are appropriate setbacks, and is more likely to be associated with major rivers, such as the Pemigewasset. The Selectmen did note that there has been some flooding of lakefront properties recently due in part to dam control issues.

Flooding is most associated with structures and properties located within the 1% annual (or 100-year) floodplain. Areas in this floodplain have been identified as having a 1% chance of flooding any given year. This means that flooding in this area is projected to have an average recurrence interval of 100 years; however, that does not mean that a flood in this area will only occur once every 100 years.

Bridgewater participates in the National Flood Insurance Program (NFIP) through the administration of its floodplain ordinance by the Board of Selectmen and the Building Inspector. This includes correspondence with the NH Floodplain Coordinator regarding specific issues and periodically updating the town's floodplain ordinance in cooperation with the Planning Board. A floodplain ordinance update was approved by Bridgewater residents at the March 2023 Town Meeting. These ordinance amendments are the result of a review by and consultation with the NH Office of Planning and Development on August 24, 2022.

The Building Inspector is responsible for maintaining floodproofing and elevation certificates. There is land along the Pemigewasset River that is prone to flooding. In addition to the floodplain Ordinance, the town has a Shoreline Protection Overlay Area with enhanced setbacks and limits on development and the removal of vegetation to maintain water quality and limit flooding and erosion.

From the Bridgewater Floodplain Development Ordinance, adopted March 14, 2023.

ITEM III: PERMIT APPLICATION REVIEW

The Building Inspector shall review all building permit applications for new construction or substantial improvements to determine whether proposed building sites will be reasonably safe from flooding. If a

proposed building site is located in a special flood hazard area, all new construction or substantial improvements shall:

(i) be designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy,

(ii) be constructed with materials resistant to flood damage,

(iii) be constructed by methods and practices that minimize flood damage,

(iv) be constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment, and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding..

Definitions:

SUBSTANTIAL DAMAGE means damage of any origin sustained by a structure whereby the cost of restoring the structure to its before-damaged condition would equal or exceed fifty percent (50%) of the market value of the structure before the damage occurred.

SUBSTANTIAL IMPROVEMENT means any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the "start of construction" of the improvement. This terms includes structures which have incurred "substantial damage," regardless of the actual repair work performed. The term does not, however Include either:

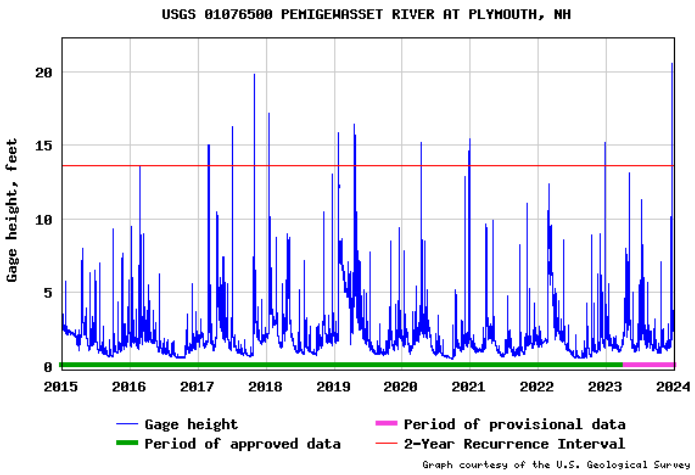
a. Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions; or
b. Any alternation of a "historic structure," provided that the alteration will not preclude the structure's continued designation as a "historic structure."

By actively participating in the NFIP property owners can purchase flood insurance through the FEMA program. Bridgewater joined the National Flood Insurance Program on June 17, 1991. The original Flood Insurance Rate Maps (FIRM) were published by FEMA on June 17, 1991; the FIRM were updated February 20, 2008; and are available at Town Hall and in digital form (DFIRM) at http://msc.fema.gov/portal. The current date for the Flood Insurance Study (FIS) is also February 20, 2008. New FIRM products (maps and FIS) for Grafton County are scheduled to become effective February 8,2024.

As of March 2023, there were six flood insurance policies, all covering single-family residential properties in Bridgewater. One of these properties is in AE zone, and four are in B, C, X zones. There have been four paid losses totaling $17,610, but none of the six properties experienced repetitive losses. The amount of insurance in force in Bridgewater was $1,211,000, according to the NH Office of Planning and Development.

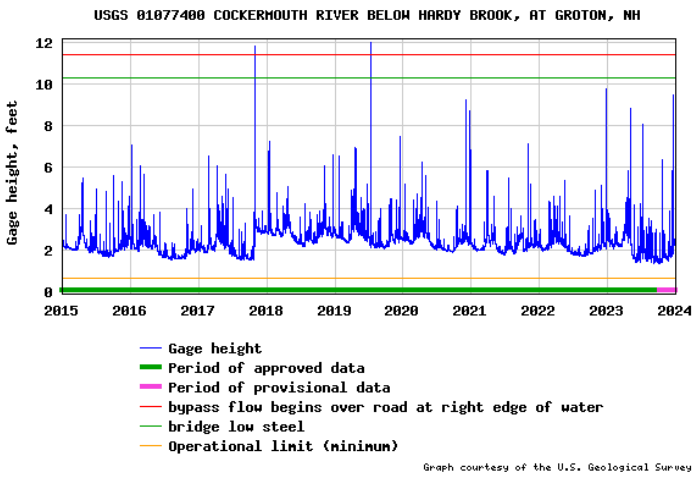
Extent: Moderate

The stream gauge along the Pemigewasset River upstream in Plymouth can give an indication of both current and historic water levels in the river[8]. This US Geological Survey (USGS) graph of the Pemi River indicates that the height of the river varies a great deal throughout the year from less than two feet to well over fifteen feet.



The USGS also provides volume data indicating the amount of water flowing through the river in cubic feet per second (cfs). A graph of historic flows is shown.

Streamflow data can also be found for the Cockermouth River below Hardy Brook in Groton. It then flows through Hebron and into Newfound Lake. It, too has fluctuated seasonally with the water level at the gauge ranging from two feet to over ten feet on a few occasions since 2015.



Land development can contribute to flood hazards. As areas are covered with additional impervious surfaces, less water is allowed to infiltrate, evaporate, or be transpired by vegetative growth, resulting in more water runoff directly into surface drainages and water bodies. This increases the likelihood of flash floods and substantial overland flow.

Dam Failure

Although Dam Failure is classified as a technological hazard, it seems appropriate to include a discussion of dams in Bridgewater when assessing risks associated with Inland Flooding.

Dams in New Hampshire are classified by the New Hampshire Department of Environmental Services Dams Bureau. The four dam hazard classifications (High, Significant, Low, and Non-Menace) are based on the potential losses associated with a dam failure (see Appendix G for a detailed description). High (H) and Significant (S) Hazard dams have the highest potential for damage; this could include damage to state or municipal roadways as well as structures.

[8] USGS Water Resources, https://waterdata.usgs.gov/nh/nwis/current/?type=flow.

While there are five active dams in Bridgewater; none are High or Significant Hazard dams, one is Low Hazard, and four are Non-Menace Hazard dams. While there are high hazard dams downstream of Bridgewater (in Bristol), the likely impact on Bridgewater of failure or mis-operation of these dams would be lowered water levels in the Pemigewasset River or Newfound Lake, temporary impacts to the local economy. Failure or mis-operation of a Non-Menace dam would not result in probable loss of life or loss of property. Failure or mis-operation of a Low Hazard dam would not result in the possible loss of life. It would result in any of the following:

- Low economic loss to structures or property.
- Structural damage to a road accessing property other than the dam owner's that could render the road impassable or otherwise interrupt public safety services.
- The release of liquid industrial, agricultural, or commercial wastes, septage, or contaminated sediment under certain conditions.
- Reversible environmental losses to environmentally-sensitive sites.

Dams in Bridgewater

HAZCL	NAME	RIVER	STATUS	TYPE	IMPOUND	HEIGHT
L	DICK BROWN POND	DICK BROWN BROOK	ACTIVE	EARTH/STONE	13.000	10.00
NM	BRIDGEWATER POWER COMPANY	RUNOFF	ACTIVE	EARTH	1.000	13.00
NM	LIZOTTE POND DAM	RUNOFF	ACTIVE		0.110	6.00
NM	DICK BROWN BROOK DAM	DICK BROWN BROOK	ACTIVE	CONCRETE	0.150	10.00
NM	HOT HOLE OUTLET BROOK DAM	TILTON BROOK	ACTIVE		0.250	10.00
	SWANSON FIRE POND	RUNOFF	EXEMPT	EARTH	0.100	2.50
	MITCHELL DAM	CLAY BROOK	RUINS	CONCRETE	0.000	15.00

Source: NH Department of Environmental Services, Dam Bureau

History - Inland Flooding:

Historically, the state's two largest floods occurred in 1936 and 1938. The 1936 flood was associated with snowmelt and heavy precipitation. The 1938 flooding was caused by the Great New England Hurricane of 1938. Those floods prompted the construction of a series of flood control dams throughout New England, built in the 1950s and 1960s. They continue to be operated by the US Army Corps of Engineers.

A series of floods in New Hampshire began in October 2005 with a flood that primarily affected the southwest corner of the state and devastated the town of Alstead. The flood killed seven people. It was followed by floods in May 2006 and April 2007 and a series of floods during the late summer and early fall of 2008, one caused substantial flash flooding and washouts in Ashland, New Hampton, Center Harbor, and Meredith. In addition to property damages, one young girl died in Ashland because of the floodwaters from this storm.

Dates	Location	Extent	General Impacts
2/25/2016	Plymouth, Woodstock	Pemi R. at flood stage	$0 K
2/24-26/2017	Plymouth, Woodstock	Pemi R. 2' above flood stage	$100K - PSU parking lot flooded, damaging 48 vehicles.

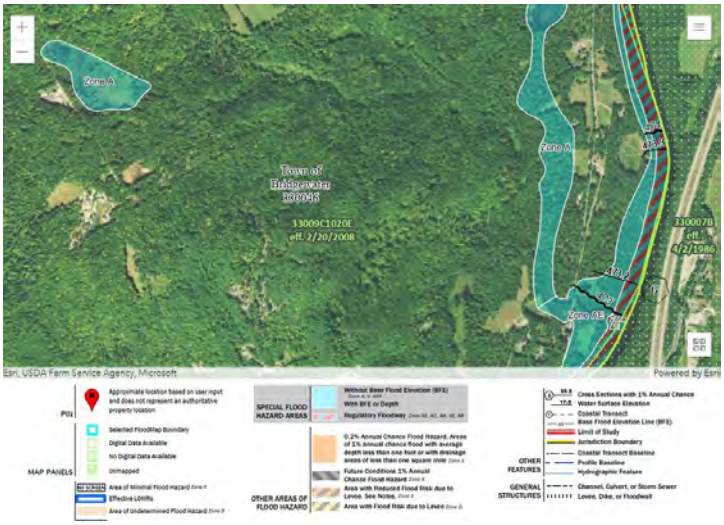
Dates	Location	Extent	General Impacts
7/1/2017	Plymouth, Woodstock, Rumney	Pemi R. 3' above flood stage	$65 K - NH Rte 175A & two campgrounds flooded. Damage to roads. **DR 4329**
10/30 - 11/1/2017	Plymouth, Woodstock, Rumney, Bristol	Pemi R. 4' above flood stage	$325K - Most rivers in watershed flooded. **DR 4355**
1/12/2018	Plymouth	Pemi R. 4' above flood stage	$50K - Several buildings on NH Rte 175A were flooded.
12/21/2018	Plymouth, Woodstock	Pemi R. at flood stage	$0K - Ice jams
1/24/2019	Plymouth	Pemi R. 2' above flood stage	$0K - Ice jams
4/20/2019	Plymouth	Pemi R. 3' above flood stage	$15K - Ice jams NH Rte 175 closed due to flooding.
4/13/2020	Plymouth	Pemi R. 2' above flood stage	$0K - Ice jams
12/25/2020	Plymouth, Woodstock	Pemi R. at flood stage	$0 K
12/23/2022	Plymouth, Groton, Woodstock	Pemi R. 2' above flood stage	$40K in N. Woodstock. Heavy rain and snowmelt. Multiple roads flooded. Major disaster Declaration **DR 4693**

Source: NOAA Events

Flooding in the region was associated with Tropical Storm Irene in September 2011 and Tropical Storm Sandy in October 2012. The extended, heavy rains of Tropical Storm Irene (2011) resulted in hillside washouts and the overwhelming of culverts in Bridgewater. There were several culverts along Dick Brown Road that required replacement; these were upgraded with FEMA assistance. Additional culvert enlargement was conducted along Dick Brown Road in 2023.

The NOAA database reports a total of 11 flooding events in eastern Grafton County since January 2015, resulting in $550,000 in property damage.

Probability of Occurrence: Flooding – Highly Likely, Dam Failure - Unlikely

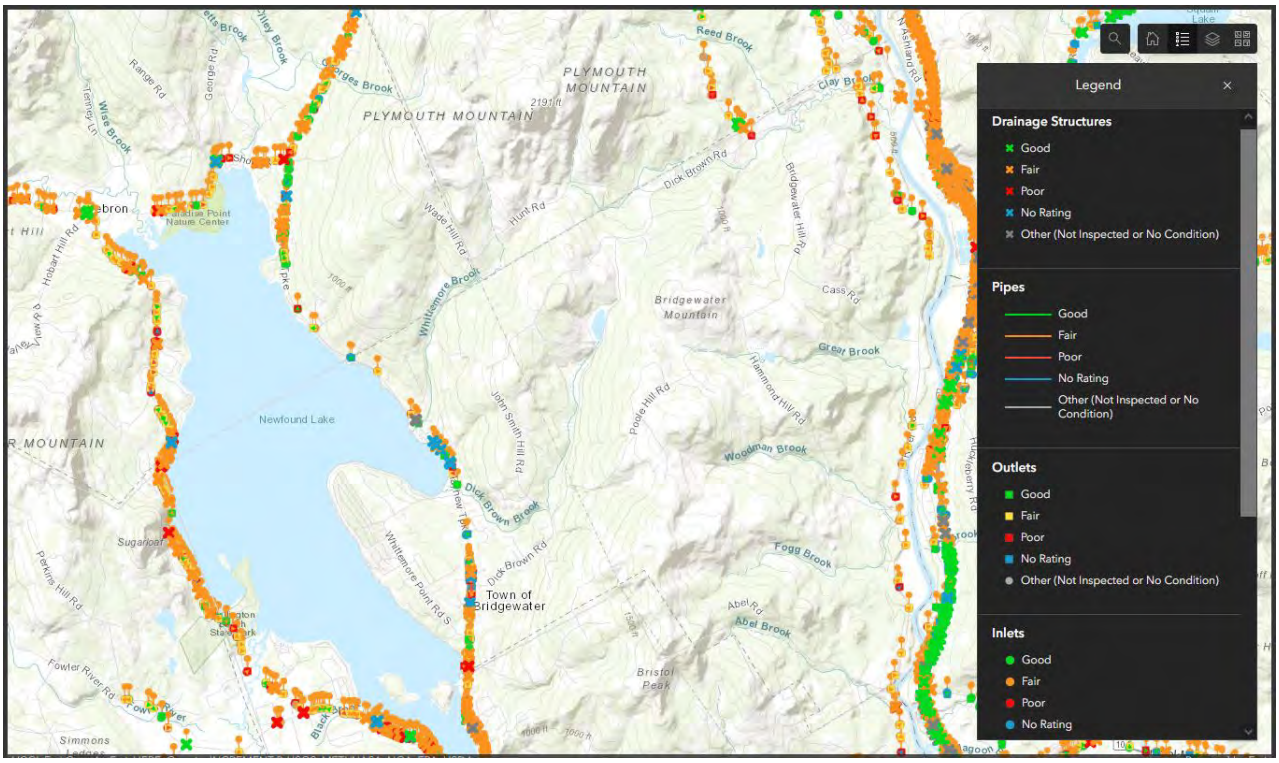


Location: Committee members and survey responses noted flooding along a section of NH Route 3A, River Road, and Dick Brown Road can result in dangerous road conditions and could lead to erosion.

The FEMA Flood maps identify floodplains along the Pemigewasset River (and River Road) along with portions of Clay, Great, and Woodman Brooks. In the western side of town several areas near Dick Brown Brook, which is paralleled by Dick Brown Road, are identified as floodplain areas. This includes the mouth of the brook as it drains into Newfound

Lake near the intersection of NH Route 3A and Whittemore Point Road.

The NH Stream Crossing Initiative and Mapping Tool, coordinated by UNH T2 can be useful resources for tracking the location and status of bridges and culverts. In Bridgewater state roads have been mapped. Mapping local features is usually done through the regional planning commission.



Impact – Moderate/High
Flooding, whether from heavy rains or ice jams, carries great risk for the town of Bridgewater. Floods could impact dams and bridges and have the potential to cause damage to roads, properties, and structures, as well as loss of life.

Culvert improvements and roadwork have been conducted throughout the region because of localized flooding events. Of particular concern are areas of steep slopes and soils with limited capacity to accept rapid volumes of rainwater. Roads and culverts near these conditions are most at risk of localized flooding. Bridgewater has steep slopes in the central portion of the town so maintaining proper drainage on town roads in these areas is important to avoid road and culvert washouts. Dick Brown Road was noted as an area prone to flooding and washout.

The town Road Agent reports that since the last HMP update twenty-five culverts have been replaced during regular maintenance. Twenty-three of these were upgrades. Most of these upgrades/replacements were on Poole Hill Road, Bridgewater Hill Road, and Hammond Hill Road. All funding was local

The Board of Selectmen noted that excessive runoff has resulted from more intense rainstorms, along with recent clearcutting on some higher elevation properties. This in turn has visibly impacted water quality in the Cockermouth River and Newfound Lake. Similar impacts were also noted by members of the public regarding the eastern side of town with impacts to the Pemigewasset River and erosion near River Road.

Many structures in Bridgewater are susceptible to damage due to flooding. Those in the floodplain are most likely to be impacted. Assuming 1% to 2% town-wide damage to buildings, flooding could result in $2,457,915 to $4,915,830 in damages.

Impact of Climate Change on Flooding: Flooding is influenced by how much water enters the watershed upstream. With warmer temperatures, more water evaporates and then falls as precipitation. Increased precipitation is likely to increase stream flow. Increased stream flow can increase soil erosion, impair water quality, and disrupt ecosystems. Increased temperatures could also impact the amount of snowpack and timing of snow melt & ice out. With an increase in heavy rain events more of the erosion events noted above can be expected.

Impact on Vulnerable Communities: Potential impacts associated with flooding on Bridgewater's vulnerable populations include:

- May have limited access to early warning alerts
- May live in areas prone to flooding
- Living in poorly maintained housing with aging infrastructure
- May have limited mobility for getting assistance/evacuation, dependence upon others to travel
- Limited resources for seeking medical assistance

LANDSLIDE

A landslide is the downward or outward movement of earth materials on a slope that is reacting to a combination of the force of gravity and a predisposed weakness in the material that allows the sliding process to initiate. The broad classification of landslides includes mudflows, mudslides, debris flows, rockslides, debris avalanches, debris slides and earth flows. Landslides may be formed when a layer of soil on a slope becomes saturated by significant precipitation and slides along a more cohesive layer of soil or rock. Although gravity becomes the primary reason for a landslide once a slope has become weak through a process such as the one just described, other causes can include: [1]

- Erosion by rivers or the ocean that creates over-steepened slopes through erosion of the slope's base. In the case of rivers, this can occur because of flash flooding
- Rock and soil slopes are weakened through saturation by snowmelt or heavy rains
- Earthquake creates stress that makes weak slopes fail—earthquakes of 4.0 magnitude and greater have been known to trigger landslides
- Wildfires (loss of vegetation)
- Excess weight from accumulation of rain or snow, stockpiling of rock or ore, the formation

of waste piles, or building of man-made structures may stress weak slopes to the point of failure.

Extent: Moderate
While there is no universally accepted standard or scientific scale has been developed for measuring the severity of all landslides, severity can be measured several other ways:

- Steepness/grade of the Slope (measured as a percent)
- Geographical Area
    - o Measured in square feet, square yards, etc.
    - o More accurately measured using LiDAR/GIS systems
- Earthquake, either causing the event or caused by the event
    measured using the Moment Magnitude Intensity or Mercalli Scale

There are also multiple types of landslides:

- Falls: A mass detaches from a steep slope or cliff and descends by free-fall, bounding, or rolling
- Topples: A mass tilts or rotates forward as a unit
- Slides: A mass displaces on one or more recognizable surfaces, which may be curved or planar
- Flows: A mass moves downslope with a fluid motion. A significant amount of water may or
may not be part of the mass

Like flooding, landslides are unique in how they affect different geographic, topographic, and geologic areas. Therefore, consideration of a multitude of measurements is required to determine the severity of the landslide event.

Although New Hampshire is mountainous, it consists largely of relatively old geologic formations that have been worn by the forces of nature for eons. Consequently, much of the landscape is relatively stable and the exposure to this hazard type is generally limited to areas in the north and north central portion of the state. Formations of sedimentary deposits along the Connecticut and Merrimack Rivers also create potential landslide conditions.

Although the overall vulnerability for landslides in the state is low, there is considerable terrain susceptible to landslide action. This was exemplified in May of 2003 when the Old Man of the Mountain collapsed. The continuous action of freezing and thawing of moisture in rock fissures causes it to split and separate. This action occurs frequently on the steeply sloped areas of the state, increasing the risk of landslides. In addition to being susceptible to this freeze/thaw process, the Ossipee Mountain Range, Squam Range, and other mountains throughout the Lakes Region are also close to seismic faults and at risk to increased pressure to development.

Consideration should be given to the vulnerability of man-made structures in these areas due to seismic- and/or soils saturation-induced landslide activity. Landslide activities are also often attributed to other hazard events. For example, during a recent flood event, a death occurred

when a mass of saturated soil collapsed. This death was attributed to the declared flood event.[9] Also, during the 2007 Nor'easter a landslide occurred in Milton, NH resulting in the temporary closure of NH Route 101.

History: Records (NOAA Storm Events database) indicate no landslides have occurred in southern Grafton County. The steep slopes on the western shores of Newfound Lake (Hebron) experience occasional rockfalls. There was no local knowledge of a landslide occurring in Bridgewater.

Location: Although New Hampshire is mountainous, it consists largely of relatively old geologic formations that have been worn by the forces of nature for eons. Consequently, much of the landscape is relatively stable and the exposure to this hazard type is generally limited to areas in the north and north central portion of the state. Formations of sedimentary deposits along the Connecticut and Merrimack Rivers also create potential landslide conditions.

Probability of Occurrence: Low

Impact: Low
The primary impacts of a landslide are the damage and destruction to property and infrastructure located in the area where the landslide occurred. The land material moved during a landslide can cause damage to roads, buildings, and infrastructure at the base of the slope on which the landslide occurred. Buildings or infrastructures that are atop the slide, or on the side of the slope where the slide occurs, can be severely damaged or destroyed through its consumption by the slide. The hazard of death and injury to individuals atop, on, or at the base of a slide exists if such individuals are present in those locations when the landslide occurs.

Landslides that occur adjacent to a waterbody, such as a river or lake, can introduce excess sediment, increasing the turbidity of the receiving waterbody and impacting water quality if the quantity of sediment is of sufficient quantity. A very large landslide into a river could cause an obstruction that acts like a dam, creating an impoundment of water which leads to sediment and woody material deposition within it. This could also further create an additional risk of a "dam failure" at some future time when the natural dam breaks down, resulting a rapid release of the stored water from upstream.

As there are no significant steep slopes near structures nor adjacent to rivers or lakes, the potential impact to Bridgewater is minimal.

Probability and Impact of Climate Change on Landslide events: Increased heat due to changes in the climate results in increased severity of precipitation events. This could lead to increased bank erosion along rivers. The erosion near local roads in Bridgewater was addressed under Flooding.

Impact on Vulnerable Communities: Potential impacts associated with landslide on Bridgewater's vulnerable populations include:

[9] http://www.nh.gov/safety/divisions/hsem/NaturalHazards/index.html visited February 8, 2011.

- May have limited access to early warning alerts
- Living in poorly maintained housing with aging infrastructure
- May have limited mobility for getting assistance/evacuation, dependence upon others to travel
- Limited resources for seeking medical assistance

LIGHTNING

Lightning is a giant spark of electricity that occurs within the atmosphere, or between the atmosphere and the ground. As lightning passes through the air, it heats the air to a temperature of about 50,000 degrees Fahrenheit, considerably hotter than the surface of the Sun. During a lightning discharge, the sudden heating of the air causes it to expand rapidly, resulting in thunder.

Extent: Moderate

All thunderstorms have the potential to create lightning, which can cause death, injury, and property damage and have great potential to cause damage to electronic equipment as well as structure and wildfires. Although the numbers have trended downward in recent decades, during the last half of the twentieth century more people were killed in the United States each year by lightning than by any other weather event. It can also wreak havoc with electrical and communications systems.

The National Weather Service does utilize a six-point scale for characterizing lightning activity called the Lightning Activity Level (LAL) based on frequency of ground strikes along with rainfall and ground conditions.

Lightning Activity Level (LAL)	
LAL 1	No thunderstorms
LAL 2	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud to ground strikes in a five-minute period.
LAL 3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a 5-minute period.
LAL 4	Scattered thunderstorms. Moderate rain is commonly produced Lightning is frequent, 11 to 15 cloud to ground strikes in a 5-minute period.
LAL 5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 cloud to ground strikes in a 5-minute period.
LAL 6	Dry lightning (same as LAL 3 but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag Warning.

History of Lightning Events

Hazard	Date	Location	Magnitude/ Description	Damage	Source
Lightning	7/4/2012	BELKNAP – WEIRS BEACH	3 Injuries	Two Men and a Woman struck by lightning	NOAA
Lightning	6/24/2013	BELKNAP – WEST ALTON	30 Injuries	Full Boy Scout troop struck by lightning	NOAA
Lightning	5/15/2020	Meredith	0 injury/fatality $20K property	House struck by lightning	NOAA

There have not been any known impacts from lightning in Bridgewater since the last plan update.

Location: Lightning can strike anywhere in town. Exactly where and when lightning will strike is unknown.

Probability of Occurrence: Likely.
In the Lakes Region, fewer than two lightning strikes occur per square kilometer annually. While this value is not particularly high compared with other parts of the country, the frequency of storms with lightning is a local concern, especially during the summer months.

Impact: Low
Forest fires or structural fires can result from lightning strikes. Lightning can injure or kill people near the strike. Structures that are not grounded are the most susceptible to damage.

Power outages, associated with natural hazards like lightning, high winds, inland flooding, severe winter weather have the potential to cause disruption to residents and the functioning of the town. The elderly and disabled who rely on powered medical devices are at risk.

All structures in Bridgewater are susceptible to damage by lightning and resulting fires. There is back-up power for most municipal facilities. The Incinerator is the town facility most likely to be impacted by lightning. Assuming 1% town-wide damage to buildings, each year lightning could result in $2,457,915 in damages.

Impact of Climate Change on Lightning events: Climate change is beginning to shift seasons resulting in longer, warmer summer months, and an earlier spring onset, which may create more intense heat waves. Lightning is mostly observed during the warmer summer months, and the longer the season becomes, the opportunity for damaging lightning increases. The impact of any individual lightning strike would remain the same, but they may become more frequent with a warmer, wetter climate.

Impact on Vulnerable Communities: Potential impacts associated with lightning on Bridgewater's vulnerable populations include:

- May have limited access to early warning alerts
- Living in poorly maintained housing with aging infrastructure
- May have limited mobility for getting assistance/evacuation, dependence upon others to travel
- Limited resources for seeking medical assistance

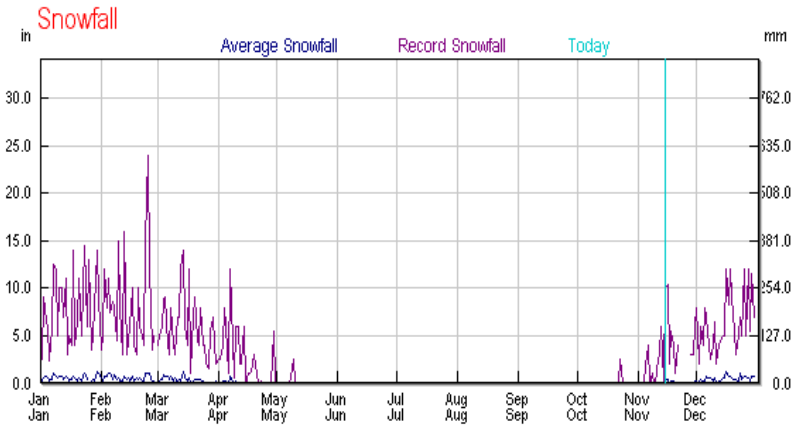
SEVERE WINTER WEATHER (SNOWSTORMS, ICE STORMS)

Bridgewater experiences four types of severe winter weather: heavy snow, blizzards, nor'easters, and ice storms.

Extent: Moderate

A heavy snowstorm can be defined as one that deposits four or more inches of snow in a 12-hour period. Snowstorms are a common occurrence throughout the Lakes Region. Blizzards, which may dump 12 to 36 inches or more of snow in a one- to three-day period are less frequent, but can have a serious impact on structures, utilities, and services. The region typically receives greater than 66 inches of snow annually. Records indicate that eight or more inches have fallen in a single day on most dates from late November through mid-March but the average snowfall on any day from November through April is less than an inch. This record also shows that deposits of more than 10 inches have happened in each of these months and on several days in February the area has seen more than 15 and even 20 inches of snow in one day.

Records indicate that Bridgewater's average snowfall on any day from November through April is less than one inch. These records also show that most days from late December through February snowfalls of 10 inches or more have been seen and that during the month of February daily snowfalls of more than 15 inches have occurred several times since 1948.



CATEGORY	NESIS VALUE	DESCRIPTION
1	1–2.499	Notable
2	2.5–3.99	Significant
3	4–5.99	Major
4	6–9.99	Crippling
5	10.0+	Extreme

A couple of scales have been adopted by NOAA for comparing snowstorms that incorporate the number of inches of snow that accumulate, the area of the storm, and the number of people that could be impacted by the storm. The Northeast Snowfall Impact Scale (NESIS) applies specifically to the northeastern United States. It groups high-impact snowstorms into five categories.

An ice storm coats trees, power lines, streets, vehicles, and roofs with a very slick and heavy coating of ice. In the winter of 1998, a major ice storm crippled much of New Hampshire, coating everything with as much as three inches of ice. The U.S. Army Corps of Engineers, Cold Regions Research and Engineering Laboratory estimates a 40- to 90-year return period for an event with a uniform ice thickness of between 0.75 and 1.25 inches. In 2008, just 10 years later, however, New Hampshire was struck again by another severe ice storm.

The Sperry-Piltz Ice Accumulation (SPIA) Index is used to forecast and classify ice storms based on a combination of the average thickness of ice coating (referencing expected temperature and precipitation levels) and wind speed; ratings range from 0 to 5.

Snow load in severe winter storms is of concern as well. This is particularly true for flat roofed structures. Several small storms can produce the same snow load as a single larger storm and the combined weight of the snow load can damage rooftops. Ice adds additional weight as well. It is not uncommon in New Hampshire to experience mixes of winter precipitation as temperatures fluctuate above and below the freezing mark. While not widespread, instances of collapsed roofs are not uncommon.

The Sperry-Piltz Ice Accumulation Index, or "SPIA Index" – Copyright, February, 2009

ICE DAMAGE INDEX	* AVERAGE NWS ICE AMOUNT (in inches) *Revised-October, 2011	WIND (mph)	DAMAGE AND IMPACT DESCRIPTIONS
0	< 0.25	< 15	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
1	0.10 – 0.25	15 - 25	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
	0.25 – 0.50	< 15	
2	0.10 – 0.25	25 - 35	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
	0.25 – 0.50	15 - 25	
	0.50 – 0.75	< 15	
3	0.10 – 0.25	> = 35	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1 – 5 days.
	0.25 – 0.50	25 - 35	
	0.50 – 0.75	15 - 25	
	0.75 – 1.00	< 15	
4	0.25 – 0.50	> = 35	Prolonged & widespread utility interruptions with extensive damage to main distribution feeder lines & some high voltage transmission lines/structures. Outages lasting 5 – 10 days.
	0.50 – 0.75	25 - 35	
	0.75 – 1.00	15 - 25	
	1.00 – 1.50	< 15	
5	0.50 – 0.75	> = 35	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.
	0.75 – 1.00	> = 25	
	1.00 – 1.50	> = 15	
	> 1.50	Any	

(Categories of damage are based upon combinations of precipitation totals, temperatures and wind speeds/directions.)

New Hampshire generally experiences at least one or two nor'easters each year with varying degrees of severity. A nor'easter is defined as a large anticyclone weather system that resides near the New England region. These storms have the potential to inflict more damage than many hurricanes because high winds can last from 12 hours to three days, while the duration of hurricanes ranges from 6 to 12 hours. A nor'easter also has the potential to sustain hurricane force winds, produce torrential rain, and create blizzard conditions in winter months.

In the winter months, the state may experience the additional coincidence of blizzard conditions with many of these events. A blizzard is characterized by sustained winds or frequent gusts to 35 miles per hour or greater and considerable amounts of falling or blowing snow that last for a duration of three hours or longer. The combination of winds and snow reduces visibility to less than a quarter mile.

History: The 1998 ice storm was the costliest FEMA/Presidential Declared disaster in New Hampshire's history. The ice load bent trees and power lines and led to massive power outages throughout the state. The December 2008 ice storm surpassed the 1998 storm, in terms of state-wide damage. The President declared this storm as a major disaster and the state received $15 million in federal aid for recovery.

The NOAA Storm database lists 35 severe winter storm events since 2015. Severe winter weather disaster and states of emergency declarations have been issued in New Hampshire several times since 2015, including:

- January (state of emergency) and March (major disaster declaration) 2015
- March 2017 (major disaster declaration)
- March 2018 blizzard (major disaster declaration).

These events resulted in nearly $12 million in damages statewide. The storm on March 14, 2017 hit particularly hard, causing numerous downed trees and utility wires.

Location: Severe winter weather occurs frequently in the northeast and the possibility exists for Bridgewater residents to have to withstand several days without power. There are segments of the population that are more at risk. These include the elderly, people that need regular medical care, and young children. These weather events can vary greatly based on slight differences in temperature, humidity, and elevation. Some events will produce a combination of winter weather types. Snow and ice storms can affect the entire town. Those having to travel on roads at elevation, that are particularly steep, or those that receive limited maintenance are most at risk (Hammond Hill Rd., Bridgewater Hill Rd., John Smith Rd., and Dick Brown Road).

Probability of Occurrence: Highly Likely

Impact: Moderate
Major roads, essential services, and flat-roofed buildings are all likely to be impacted by winter storms. While the town is accustomed to seasonal heavy snowfall, any particularly severe event with significant accumulations, especially combined with severe cold can be a burden. These events often lead to ice accumulation, and power loss, significantly increasing the vulnerability of populations and facilities.

Heavy snow can cause damage to property, disrupt services, and make travel unsafe, even for emergency responders. Due to poor road conditions, residents may be stranded for several days. Extra pressure is placed on road crews and emergency services under these conditions.

The major threats to a community due to ice storms include structural damage due to heavy loads on roofs, interruptions of services such as electricity, fuel, water, and communications, as well as hazardous road conditions. Downed limbs and wires and unplowed or untreated roads can severely limit emergency access to many residences.

Downed limbs and wires and unplowed or untreated roads can severely limit emergency access to many residences. The potential for very cold temperatures and loss of power can quickly compound the issue. A severe ice storm struck central and southern New Hampshire and New England on December 11, 2008. Over 400,000 people were without power, some for over two weeks, and overall damages exceeded $15 million.

The primary critical facilities in Bridgewater identified as being vulnerable to snow or ice event were NH Route 3A, River Road, and Dick Brown Road. Flat-roofed buildings are all susceptible to damage from snow and ice loads.

While maintenance on a few roads (US 3 - River Road & NH 3A) falls to NH DOT, most of the other roads in Bridgewater are the town's responsibility, including most of the town's evacuation routes. The precipitation from some storms, especially multi-day nor'easters, can outpace the capacity of equipment and staff. It was noted that three roads (going over the top of the ridge) are one way in and out during winter conditions due to limited maintenance (Hammond Hill, Bridgewater Hill, and John Smith). As more people chose to live here and build homes further out on these roads, services may be impacted.

All structures in Bridgewater are susceptible to damage by winter weather events, whether through ice storms, blizzards, or the heavy, wet snow often associated with a nor'easter. Town facilities are not particularly at risk to Severe Winter Weather. Assuming 1% to 5% town-wide damage to buildings, winter weather could result in $2,457,915 to $12,289,575 in damages annually. The potential for impact to the town from severe winter weather is seen as moderate.

Impact of Climate Change on Winter Weather Events: Changes in New Hampshire's climate could potentially lead to an increase in any of the four types of winter precipitation. This possible increase could result in an increase of unsafe structures due to increased weight to do snow, ice, and rain accumulating on rooftops. It could also lead to roof collapses, compromising personal safety. An increase of winter precipitation also creates unsafe travel conditions throughout the state. These events also use a considerable amount of resources to deal with the clean-up.

In Bridgewater the impacts may include changes to expected snow & ice loads on roofs, different timing and nature of ice jams in the river, and different patterns for clearing winter weather debris. It was also noted that impacts are already being seen in the timing and length of ice covering Newfound Lake with potential impacts to the lake's ecosystem and potentially the town's outdoor recreation economy.

Impact on Vulnerable Communities: Potential impacts associated with severe winter weather on Bridgewater's vulnerable populations include:

- May have limited access to early warning alerts
- Living in poorly maintained housing with aging infrastructure
- May have limited mobility for getting assistance/evacuation, dependence upon others to travel
- Limited resources for seeking medical assistance

SOLAR STORMS & SPACE WEATHER

The term space weather is relatively new and describes conditions in the Earth's outer space environment. Space weather includes conditions and events on the sun, in the solar wind, in near-Earth space, and in Earth's upper atmosphere that can affect space-borne and ground-based

technological systems.[10] Although space weather has occurred since the beginning of time, little was understood about the causes and impacts of these instances on the planet. It has only been in the last 200 or so years where multiple science fields have come together to study space weather.[11] Not all space weather is damaging or effects humans or technology. Perhaps one of the most well-known effects of space weather on the Earth's atmosphere is the Aurora Borealis (aka Northern Lights – northern hemisphere) and the Aurora Australis (southern hemisphere). Aurora displays are a result of solar wind where some of the charged particles become trapped in the Earth's atmosphere.

Extent: Weak

The State of New Hampshire Hazard Mitigation Plan (2023) describes three different types of events: Geomagnetic Storms, Solar Radiation Storms, and Radio Blackout. Each of these is then rated on a five-level scale (minor, moderate, strong, severe, extreme), with descriptions of increasing impacts on power, spacecraft, biological, satellite, high frequency radio, and navigation systems. A solar storm may exacerbate radio communications problems. The Radio Blackout Scale[12] offers a measure of the extent of solar storms on radio communications.

Radio Blackout

Scale	Description	Effect	Physical measure	Average Frequency (1 cycle = 11 years)
R 5	Extreme	**HF Radio:** Complete HF (high frequency) radio blackout on the entire sunlit side of the Earth lasting for a number of hours. This results in no HF radio contact with mariners and en route aviators in this sector. **Navigation:** Low-frequency navigation signals used by maritime and general aviation systems experience outages on the sunlit side of the Earth for many hours, causing loss in positioning. Increased satellite navigation errors in positioning for several hours on the sunlit side of Earth, which may spread into the night side.	X20 (2×10^{-3})	Less than 1 per cycle
R 4	Severe	**HF Radio:** HF radio communication blackout on most of the sunlit side of Earth for one to two hours. HF radio contact lost during this time. **Navigation:** Outages of low-frequency navigation signals cause increased error in positioning for one to two hours. Minor disruptions of satellite navigation possible on the sunlit side of Earth.	X10 (10^{-3})	8 per cycle (8 days per cycle)
R 3	Strong	**HF Radio:** Wide area blackout of HF radio communication, loss of radio contact for about an hour on sunlit side of Earth. **Navigation:** Low-frequency navigation signals degraded for about an hour.	X1 (10^{-4})	175 per cycle (140 days per cycle)
R 2	Moderate	**HF Radio:** Limited blackout of HF radio communication on sunlit side, loss of radio contact for tens of minutes. **Navigation:** Degradation of low-frequency navigation signals for tens of minutes.	M5 (5×10^{-5})	350 per cycle (300 days per cycle)
R 1	Minor	**HF Radio:** Weak or minor degradation of HF radio communication on sunlit side, occasional loss of radio contact. **Navigation:** Low-frequency navigation signals degraded for brief intervals.	M1 (10^{-5})	2000 per cycle (950 days per cycle)

History: There have not been any known occurrences in Bridgewater of solar storms or space weather, and no significant events have been reported statewide. Nearby events include Quebec, Canada, which experienced a 9-hour blackout in March 1989 when solar winds caused a fluctuation in the Earth's magnetic field and caused Hydro-Quebec's transmission to go down.[13]
Location: All of Bridgewater and the entire State of New Hampshire are at risk of solar storms and space weather. While the Earth is somewhat protected from solar storms and space weather by its upper atmosphere, the potential for a loss of communications, power, and GPS exists.

Probability of Occurrence: Occasional
Impact: Low

Solar storms and space weather impact the Earth daily, although the effects are not often felt. It is difficult to estimate the impact of this hazard on Bridgewater as knowledge of this hazard is evolving, but committee members acknowledge that while human and property impacts are low,

[10] https://www.nasa.gov/mission_pages/sunearth/spaceweather/index.html#q12
[11] https://www.nasa.gov/mission_pages/sunearth/spaceweather/index.html#q12
[12] https://prd.blogs.nh.gov/dos/hsem/wp-content/uploads/2015/11/State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018_FINAL.pdf, p. 141
[13] Adapted from the *State of New Hampshire Multi-Hazard Mitigation Plan Update (2018)*, https://prd.blogs.nh.gov/dos/hsem/wp-content/uploads/2015/11/State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018_FINAL.pdf.

compromised communications could impact communications and response during other types of hazards, including reaching out for mutual aid. While town personnel mainly rely on cell phones (not radios) cell service can be impacted by these events also.

Probability and Impact of Climate Change on Solar Storm events: The probability and impacts associated with a solar storm would not likely be affected by climate change.

Impact on Vulnerable Communities: Potential impacts associated with solar storms and space weather on Bridgewater's vulnerable populations all are related to compromised electronic communication and response associated with some other emergency.

TROPICAL & POST-TROPICAL CYCLONES

Tropical and Post-Tropical cyclones are large storms with winds rotating in a counterclockwise manner. Tropical depressions and hurricanes form over the Atlantic Ocean and often come ashore in the southeastern United States, frequently moving up the Eastern Seaboard. Occasionally such storms come ashore along the northeast coast. Sustained high winds and heavy rains for 12 to 36 hours are characteristic of tropical depressions and hurricanes. There are many stages throughout the life cycle of a tropical cyclone.

- Potential Tropical Cyclone: Describes a disturbance that is not yet a tropical cyclone, however, poses the threat of becoming one
- Tropical Disturbance: A cluster of showers and thunderstorms that flare up over the tropics. These are usually 100-300 miles in diameter and generally move westward.
- Tropical Storm: Sustained wind levels are between 34 knots and 64 knots (39 to 74 MPH)
- Hurricane: Once a tropical cyclone sustains wind levels between 64 and 96 knots (74 to 111 MPH)
- Major Hurricane: A tropical cyclone with maximum sustained winds of 96 knots (111 MPH) and higher. Major hurricanes are classified as category 3 or higher.
- Post-tropical Cyclone: A former tropical cyclone, this term is used to describe a cyclone that no longer possesses sufficient tropical characteristics to be considered a tropical cyclone. These post-tropical cyclones often undergo an extratropical transition and form frontal boundaries. Post-tropical cyclones can continue carrying heavy rains and high winds and cause storm surge.

Extent: Moderate

Hurricanes are severe tropical storms that have winds at least 74 miles per hour. In the Lakes Region they could produce heavy rain and strong winds that could cause flooding or damage buildings, trees, power lines, and cars. Because hurricanes form over the ocean and move relatively slowly, people usually have time to prepare for the event. However, this also means that once the storm arrives, heavy rain and wind can be expected for a couple of days.

Hurricanes are measured by the Saffir-Simpson Hurricane Scale: a 1-5 rating based on a hurricane's intensity using wind speed as the determining factor (see table below). The scale is

used to give an estimate of the potential property damage and flooding expected from a hurricane landfall.

Saffir-Simpson Hurricane Scale

Category	Characteristics
1	Winds 74-95 mph (64-82 kts or 119-153 km/hr). Storm surge generally 4-5 ft above normal. No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Some damage to poorly constructed signs. Also, some coastal road flooding and minor pier damage.
2	Winds 96-110 mph (83-95 kts or 154-177 km/hr). Storm surge generally 6-8 feet above normal. Some roofing material, door, and window damage of buildings. Considerable damage to shrubbery and trees with some trees blown down. Considerable damage to mobile homes, poorly constructed signs, and piers. Coastal and low-lying escape routes flood 2-4 hours before arrival of the hurricane center. Small craft in unprotected anchorages break moorings.
3	Winds 111-129 mph (96-113 kts or 178-209 km/hr). Storm surge generally 9-12 ft above normal. Some structural damage to small residences and utility buildings with a minor amount of curtainwall failures. Damage to shrubbery and trees with foliage blown off trees and large trees blown down. Mobile homes and poorly constructed signs are destroyed. Low-lying escape routes are cut by rising water 3-5 hours before arrival of the center of the hurricane. Flooding near the coast destroys smaller structures with larger structures damaged by battering from floating debris. Terrain continuously lower than 5 ft above mean sea level may be flooded inland 8 miles (13 km) or more. Evacuation of low-lying residences with several blocks of the shoreline may be required.
4	Winds 130-156 mph (114-135 kts or 210-249 km/hr). Storm surge generally 13-18 ft above normal. More extensive curtainwall failures with some complete roof structure failures on small residences. Shrubs, trees, and all signs are blown down. Complete destruction of mobile homes. Extensive damage to doors and windows. Low-lying escape routes may be cut by rising water 3-5 hours before arrival of the center of the hurricane. Major damage to lower floors of structures near the shore. Terrain lower than 10 ft above sea level may be flooded requiring massive evacuation of residential areas as far inland as 6 miles (10 km).
5	Winds greater than 156 mph (135 kts or 249 km/hr). Storm surge generally greater than 18 ft above normal. Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. All shrubs, trees, and signs blown down. Complete destruction of mobile homes. Severe and extensive window and door damage. Low-lying escape routes are cut by rising water 3-5 hours before arrival of the center of the hurricane. Major damage to lower floors of all structures located less than 15 ft above sea level and within 500 yards of the shoreline. Massive evacuation of residential areas on low ground within 5-10 miles (8-16 km) of the shoreline may be required.

Source: http://www.nhc.noaa.gov/aboutsshs.shtml

History: On September 21, 1938, a Category 3 hurricane claimed 13 lives in New Hampshire and many more throughout New England. Official records at the Weather Bureau in Concord show sustained winds of 56 miles per hour, but around the state, gusts around 100 miles per hour were reported, mostly due to topographical acceleration. The Merrimack River rose nearly 11 feet above its flood stage, *The Hanover Gazette* reported that in New Hampshire, 60,000 people were homeless, and many areas were without power. Damages were estimated at $22 million. New Hampshire has not experienced a severe hurricane directly since 1938.

Hurricane Bob, a category 2 storm, in 1991, was declared a major federal disaster in New Hampshire and is recorded as a severe storm in the state's history. According to NOAA, while 2010 was one of the busiest hurricane seasons on record, 2013 was one of the least active hurricane seasons.

In the past five years no hurricanes have hit the region. By the time that a hurricane reaches central New Hampshire, it is rare that it retains the characteristics of a hurricane. Wind speeds usually dissipate but they can still bring a great deal of rainfall to the region. That was the case with the remnants of Hurricanes Irene and Sandy, which hit the area in 2011 and 2012 as tropical depressions.

A tropical depression hit the state in 2020 resulting in downed trees and loss of power. There was no damage specific to Bridgewater.

Location: A cyclone could affect all areas of Bridgewater. Stream crossings, floodplains, and steep slopes are most likely to be impacted.

Probability of Occurrence: Occasional

Impact: Moderate
Hurricanes in the Lakes Region could produce heavy rain and strong winds that could lead to flooding and damage to property and infrastructure. Tropical and post-tropical cyclones can cause the same damage that high wind events cause, with the added hazard of possible flooding.

All structures in Bridgewater are susceptible to damage by cyclonic events, whether through tropical depression or hurricane. Assuming 2% to 5% town-wide damage to buildings, high winds could result in $4,915,830 to $12,289,575 in damage in Bridgewater in any given year.

Impact of Climate Change on Tropical & Post-Tropical Cyclone events: An increase in temperature could potentially lead to stronger, and more frequent storms. Storms that produce a higher level of precipitation will lead to an increase in flooding and potential flooding damage.

Impact on Vulnerable Communities: Potential impacts associated with cyclonic events on Bridgewater's vulnerable populations include:

- May have limited access to early warning alerts
- Living in poorly maintained housing with aging infrastructure
- May live in areas prone to flooding
- May have limited mobility for getting assistance/evacuation, dependence upon others to travel
- Limited resources for seeking medical assistance

WILDFIRE

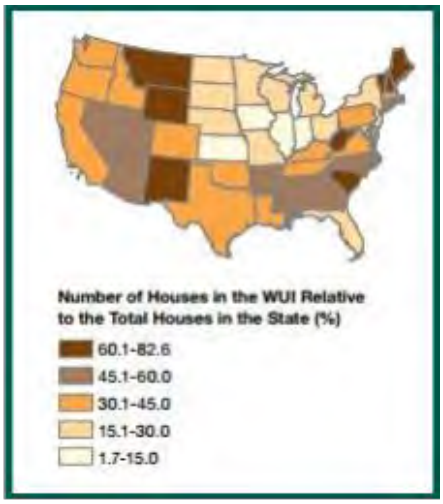
A wildfire is defined as a fire in wooded, potentially remote areas that may endanger lives. A wildfire is any non-structural fire, other than prescribed fire, that occurs in wildland areas consisting of vegetation or natural fuels. Wildfires can be referred to as brush fires, wildland fires, or grass fires depending on the location and what is burning.

Extent: Moderate

New Hampshire has about 500 wild land fires each year; most burn less than half an acre. Much of the Lakes Region (and Bridgewater) is forested and susceptible to fire.

The National Wildfire Coordinating Group (NWCG) has defined seven classes of wildfire based on size:

- Class A - one-fourth acre or less;
- Class B - more than one-fourth acre, but less than 10 acres;
- Class C - 10 acres or more, but less than 100 acres;
- Class D - 100 acres or more, but less than 300 acres;
- Class E - 300 acres or more, but less than 1,000 acres;
- Class F - 1,000 acres or more, but less than 5,000 acres;
- Class G - 5,000 acres or more.



History:
From 2014-2018 there were 724 wildfires statewide amounting to 2,007 acres burned. In the last three years (2020-2022) Grafton Co. had a total of 40 separate fires, burning just under 27 acres. Forest fires have occurred in the recent past, including on Poole Hill Road and Dick Brown Road, but were small in terms of acreage affected and structural damage.

Location: Portions of Bridgewater are heavily wooded; a fire could occur anywhere.

Probability of Occurrence: Occasional

Impact: Low-Moderate
Some sections of town may have limited access to potential wildfire areas, especially due to steep slopes, but fires in these locations would have limited impact on structures, the only critical facilities that might be impacted are the Town Highway Garage and the Town Clerk's Office. Due to the heavily wooded nature of the town, all properties in town have the potential to be impacted by a wildland fire. Assuming 1% town-wide damage to buildings, each year wildfire could result in $2,457,915 in damages.

Impact of Climate Change on Wildfire events: Increased precipitation from severe thunderstorms, hurricanes, wind events, ice storms may damage trees and forests. This can lead to insect or disease outbreaks that may result in a significant amount of woody debris in the forests which may increase the risk of wildfires. Increased temperatures associated with climate change increases the likelihood of drought, enhancing the chance of wildfire.

Impact on Vulnerable Communities: Potential impacts associated with wildfire on Bridgewater's vulnerable populations include:

- May have limited access to early warning alerts
- Living in poorly maintained housing with aging infrastructure

- May have limited mobility for getting assistance/evacuation, dependence upon others to travel
- Likely to be more prone to the effects of air pollutants (smoke) associated with wildfire
- Limited resources for seeking medical assistance

Summary of Risk

A matrix was created to determine an overall hazard risk assessment rating (next page). Each criterion (**Probability** of occurrence, **Extent**, and **Impact** – an average of three types) was given a rating to show which hazards are the greatest threat to the community, based on historic events and local knowledge, the town's ability to respond, along with economic and environmental issues.

These ratings were transformed into numerical values 4, 3, 2, and 1, with 4 as high and 1 as low. The overall risk rating associated with each hazard was determined by multiplying the three factors. For Natural Hazards, a total score of 16 or more was deemed to be High Risk, a total of between 8 and 15 was deemed to be Medium Risk, and a score of less than 8 was deemed Low Risk.

It should be noted that the ranking of individual hazards for the purposes of planning discussion should not in any way diminish the potential severity of the impacts of a given hazard event. Further, hazards ranked as low risk may have the impact of increasing the risk of other hazards when they occur. For example, in the event of a drought, the risk of woodland fire may be greater. In combination, hazard events may have the impact of overwhelming existing emergency response systems.

Hazard Risks are color coded: High Risk, Medium Risk, Low Risk.

Bridgewater 2023 Hazards	Probability	Extent	Human Impact	Property Impact	Business Impact	Average Impact	Risk
Definition	Likelihood this will occur w/in 10 yrs	(Magnitude/ Strength)	Probability of Death or Injury	Physical Loss or damage	Interruption of Service	Average of Human, Property, Business	Probability x Exent x Avg. Impact
Scale **Natural Hazards**	1: Unlikely 2: Occasional 3: Likely 4: Highly Likely	1: Weak, 2: Moderate, 3: Severe, 4: Extreme	1: Low 2: Moderate 3: High 4:Catastrophic	1: Low 2: Moderate 3: High 4:Catastrophic	1: Low 2: Moderate 3: High 4:Catastrophic	1: Low 2: Moderate 3: High 4:Catastrophic	**Low Medium High**
Inland Flooding	**4**	**2**	2	3	3	**2.67**	**21.33**
Severe Winter Weather	**4**	**2**	2	2	2	**2.00**	**16.00**
High Wind Events (Torn./Downb.)	**3**	**2**	2	3	3	**2.67**	**16.00**
Infectious Diseases	**3**	**2**	3	1	3	**2.33**	**14.00**
Extreme Temps	**2**	**2**	2	2	2	**2.00**	**8.00**
Tropical & Post-Tropical Cyclones	**2**	**2**	2	2	2	**2.00**	**8.00**
Drought	**2**	**2**	1	2	2	**1.67**	**6.67**
Earthquake	**2**	**2**	1	2	2	**1.67**	**6.67**
Wildfires	**2**	**2**	1	2	2	**1.67**	**6.67**
Lightning	**3**	**2**	1	1	1	**1.00**	**6.00**
Solar Storms & Space Weather	**3**	**1**	1	1	1	**1.00**	**3.00**
Landslides	**1**	**2**	1	2	1	**1.33**	**2.67**
Avalanche	**1**	**1**	1	1	1	**1.00**	**1.00**

High Risk - Top 1/4 score

Medium Risk - Top 1/2 score

Definitions of scales on next page.

Probability of Future Events

- **Unlikely**: <10% probability of occurrence in the next year or a recurrence interval of more than every ten years
- **Occasional**: 10 - 25% probability of occurrence in the next year or a recurrence interval of three to ten years
- **Likely**: 25 - 80% probability of occurrence in the next year or a recurrence interval of two to three years
- **Highly Likely**: 80-100% probability of occurrence in the next year or a recurrence interval of nearly every year

Extent - How bad could it get?

- **Weak:** limited magnitude, slow onset, short duration, little damage.
- **Moderate:** moderate magnitude, moderate onset speed, moderate duration, some damage/loss of service for days.
- **Severe:** Severe magnitude, fast speed of onset, long duration, devastating damage and loss of service for weeks
- **Extreme:** Extreme magnitude, immediate onset, extended duration, catastrophic damage, uninhabitable conditions.

Impact - Human, Property, Business

Low: There is little likelihood that injury or death will result from this hazard. The damage to land and property will likely be limited. Essential services and other services that residents and visitors depend upon will not be interrupted.

Moderate: There is some likelihood that injury or death will result from this hazard. There will likely be some damage to land and property. There will likely be some interuption of essential services and other services that residents and visitors depend upon for hours of days.

High: It is quite likely that injury or death will result from this hazard. There will be damage to multiple properties. Essential services and other services that residents and visitors depend upon be likely be interupted for days.

Catastrophic: Multiple injuries or deaths will likely result from this hazard. Damage to properties will be widespread and extensive. Essential services and other services that residents and visitors depend upon be likely be interupted for days or weeks.

SECTION IV: VULNERABILITY ASSESSMENT

Critical Facilities and Infrastructure were assessed for their vulnerability to natural hazards. Key: Low – 1, Medium – 2, High – 3.

Vulnerability of Critical Facilities & Infrastructure Matrix: Bridgewater 2023	High Wind Events	Lightning	Inland Flooding	Wildfire	Earthquake	Severe Winter Weather	Tropical/Post-tropical Storms	Infectious Disease	Extreme Temps	Drought	Solar Storms & Space Weather	Landslide	Avalanche	Other:	Total
Town House	3	2	2	3	1	3	2	1	1	1	1	1	1		22
Dick Brown Road	3	1	3	3	1	3	2	1	1	1	1	1	1		22
Elementary School/Shelter	3	2	1	1	1	1	2	3	2	2	1	1	1		21
Rymes Oil Company	2	2	2	2	2	2	1	1	1	1	1	1	1		19
River Road	2	1	3	2	2	2	1	1	1	1	1	1	1		19
Public Safety - Building	3	2	1	1	1	1	2	2	1	1	2	1	1		19
Power Substation	2	2	2	2	2	2	1	1	1	1	1	1	1		19
NH Route 3A	2	2	2	2	2	2	1	1	1	1	1	1	1		19
Bridgewater Power Company	2	2	2	2	2	2	1	1	1	1	1	1	1		19
Town Offices/Secondary Shelter	3	2	1	1	1	1	2	2	1	1	1	1	1		18
Town Highway Garage	3	2	1	2	1	1	2	1	1	1	1	1	1		18
Town Clerk's Office	3	2	1	2	1	1	2	1	1	1	1	1	1		18
Incinerator/Recycling Center	3	3	1	1	1	1	2	1	1	1	1	1	1		18
Hammond Hill Rd. bridge	1	1	3	1	2	1	1	1	1	1	1	1	1		16
Dick Brown Pond Dam	1	1	3	1	2	1	1	1	1	1	1	1	1		16
Bridgewater Hill Rd. bridge	1	1	3	1	2	1	1	1	1	1	1	1	1		16
Tilton Brook Dam	1	1	2	1	2	1	1	1	1	1	1	1	1		15
Drews Pond Dam	1	1	2	1	2	1	1	1	1	1	1	1	1		15
Dick Brown Brook Dam	1	1	1	1	2	1	1	1	1	1	1	1	1		14
Bridgewater Power Company Dam	1	1	1	1	2	1	1	1	1	1	1	1	1		14
Total	**41**	**32**	**37**	**31**	**32**	**29**	**28**	**24**	**21**	**21**	**21**	**20**	**20**		

*Vulnerability is susceptibility to damage or economic loss. It includes how exposed or susceptible to damage an asset is and depends on: a) location (floodplain, steep slope), b) construction (elevated, meets codes), and c) contents (haz. mat.)

❑Low - not particularly exposed to hazard, constructed to code or hardened against hazard, contents are not particularly hazardous or exposed.

❑Medium - some exposure to hazard, some deficiencies in construction or could be hardened against hazard, some contents are exposed or hazardous.

❑High - site or structure is exposed to the hazard, structure is not up to code or should be hardened against hazard, contents are exposed or hazardous.

SECTION V: MITIGATION STRATEGIES

A. CURRENT PLANS, POLICIES, AND REGULATIONS

The planning decisions that affect community growth patterns have evolved over the years as Bridgewater has developed. Many local programs have the effect of mitigating disasters; some of these have been in effect for years, others were implemented since the development of the 2015 Hazard Mitigation Plan. A review of existing mitigation strategies was conducted and included review of pertinent documents including the zoning ordinance, subdivision regulations, emergency management plan, site plan regulations, and discussion with Committee members. The following strategies detail existing plans and regulations related to hazard mitigation. Also included is a column with comments noted by the Committee. The review of existing capabilities and effectiveness utilized these categorizations:

Poor *..... The policy, plan or mutual aid system does* ***not work as well as it should*** *and* ***often*** *falls short of meeting its goals.*
Fair *.....The policy, plan or mutual aid system does* ***not work as well as it should*** *and* ***sometimes*** *falls short of meeting its goals.*
Good *.....The policy, plan or mutual aid system* ***works well*** *and* ***is achieving its goals****.*
Excellent *.....The policy, plan or mutual aid system* ***works very well*** *and* ***often exceeds its goals.***
Untested *.....The policy, plan or mutual aid system* ***has not yet been tried or put to the test.***

Table V-1: Existing Protections and Policies

Existing Protection	Description	Area Covered	Responsible Party	Comments (2023)	How Effective?	Gaps in Haz. Mit. Coverage
Zoning Ordinance (2015)	Zoning Ordinance (2015)			ZO updated in 2015	Good	
	Floodplain Development Ordinance (2023)	Town	Selectmen	Restricts development in the floodplain, reducing the likelihood of damage. Updated Floodplain Ordinance adopted March 2023.	Excellent	None
	FIRM maps			Digital format Current digital map effective 2/20/2008. New effective map date slated for 2/8/2024.	Good	
	No subdivision on slopes > 15%			Can still take down trees	Fair	
	Shoreland Water Quality & Protection Act			Protects both the lake and the river.	Good	
	Wetland Overlay			Protects natural resources	Good	
	Separated Zoning (2015)			Three areas - Lake/Mountain/River • Mtn. has 5 ac. Minimum •River has some flooding potential	Good	
Subdivision Regulations (2007)	Cistern or dry hydrant is required for subdivision of seven or more lots	Town	Selectmen	Policy ensures that water resources will be available for firefighting.	Good	

Existing Protection	Description	Area Covered	Responsible Party	Comments (2023)	How Effective?	Gaps in Haz. Mit. Coverage
Site Plan Regulations (2016)	Conversion Permit Required	Town	Selectmen	Ensures that adequate protections are in place for homes being utilized year-round.	Good	
	Driveways must be less than 12%			Limits erosion and increases accessibility by EMS.	Good	
	Any change of use requires Site Plan Review			Ensures opportunity for review by Planning Board and FD.	Good	
Sewer/Water Service	All structures on wells and septic systems	Town	Selectmen Health Officer		Good	
Radio Communications	Lakes Region Dispatch & Plymouth Police Dispatch	Region – partial coverage due to mountains	Emergency Management Directors (EMDs)	The new repeater in Groton helps.	Fair	Mainly utilize cell phones.
Fire Department/	Part-time FD Chief	Town/Region	Fire Chief	Paid	Good	
Public Safety	10 On-Call Fire Fighters			FD and Selectmen are NIMS-trained.	Fair	Need to increase numbers
	Inspection/Maintenance Plan for equipment				Good	
	Class VI roads are mapped and cleared regularly.			Private roads are also designated as emergency access roads.	Good	
	Equipment purchases are bonded				Good	
	Elementary School has an Emergency Plan and conducts drills			Have enhanced security and emergency communications at the school.	Excellent	

Existing Protection	Description	Area Covered	Responsible Party	Comments (2023)	How Effective?	Gaps in Haz. Mit. Coverage
Public Safety	Participate in Lakes Region Mutual Aid	Town/Region		Not particularly cost-effective. Not guaranteed priority.	Fair	
Police Department/ Public Safety	Full-time PD Chief, 1 part-time staff	Town	Police Chief	State Police responsible for uncovered hours.	Good	
	Rely on State Police for assistance with special operations				Good	
	Have a regular schedule for Equipment Inspection and Maintenance				Good	
Public Safety/EMS	Nine part-time staff	Town	Selectmen		Good	
	Transport Ambulance				Good	
Highway Department	Full-time Road Agent	Town	Road Agent		Good	
	Two additional full-time staff				Good	
	Equipment purchases are bonded				Good	
	Several members in the Public Safety/EMS				Good	
	Town maintenance plan which is incorporated into the Master Plan				Good	
	Culvert replacement & upgrade	Town	Road Agent	25 culverts replaced (23 upgrades) since last plan.	Good	
Emergency Operations Plan (EOP)	Guide for local Emergency Response. Should be updated every five years.	Town	Emergency Management Directors	Last updated in 2006.	Fair	Ought to be updated after the HMP is adopted.

Existing Protection	Description	Area Covered	Responsible Party	Comments (2023)	How Effective?	Gaps in Haz. Mit. Coverage
Building Codes and Inspector	Uses state code system and ICC/NFPA International Code Council/National Fire Protection Association [No town building codes].	Town	Building Inspector & Selectboard	Setbacks have been increased from 15' to 20'	Good	
	Have part-time Building Inspector			Inspection required prior to a Building Permit.	Good	Noticing a lot more RVs around - not considered a structure in Zoning.
Dry Hydrants	Have 14 in Bridgewater and mapped through E911.	Town	Fire Chief		Good	
Backup power	Generators	Highway Dept.	Selectboard	Have hand-pump fuel system, if needed.	Good	
		Elementary School		Has large generator.	Good	
		Public Safety Building		Very good diesel system	Good	
		Town Hall			Good	
		Town Clerk's Office		Several smaller generators will need replacement soon.	Fair	Interested in grant funds, if available
		Refuse District			Good	
H-B Refuse District	2 full-time staff	Town	H-B Refuse District Commissioners	Usually manage solid waste well through sorting, baling, incineration. Important in hazard event recovery and reducing infectious disease transmission.	Good	Permitting challenges kept incinerator offline part of the past year.

Existing Protection	Description	Area Covered	Responsible Party	Comments (2023)	How Effective?	Gaps in Haz. Mit. Coverage
Shelters	Primary - Bridgewater-Hebron Village District School	Town, shared with Hebron	EMDs and Village District Directors		Good	
	Secondary - Town Hall - limited		EMDs		Good	
Town Administration	Two servers and the Cloud to back up town data	Town files	Selectmen		Good	
	Fireproof walk-in safe				Good	
Land Use	Governed by Zoning Ordinance, Subdivision, and Site Plan Regulations	Town	PB & ZBA		Good	
Emergency Management Directors	Directs the planning for and response to local and regional emergencies.	Town	Selectmen		Good	
Fiscal Capacity	Local funding decisions are made by the Board of Selectmen subject to Town Meeting approval of the annual budget and warrant articles.	Town	Selectmen		Good	

Poor ..... The policy, plan or mutual aid system does not work as well as it should and often falls short of meeting its goals.
Fair .....The policy, plan or mutual aid system does not work as well as it should and sometimes falls short of meeting its goals.
Good .....The policy, plan or mutual aid system works well and is achieving its goals.
Excellent .....The policy, plan or mutual aid system works very well and often exceeds its goals.
Untested .....The policy, plan or mutual aid system has not yet been tried or put to the test.

The primary planning mechanism in Bridgewater addressing land use development is the master plan. Bridgewater's Master Plan was last revised in 2006. The town's Zoning Ordinance (2015) along with Subdivision (2007) and Site Plan Review Regulations (2016) are the tools for implementing the vision and goals of the master plan (which may include hazard mitigation goals). These various planning documents are generally responsible for promoting the health, safety, and welfare of the community.

The Site Plan Review Regulations were updated since the last HMP. NH RSA 674:2(e) does allow for the inclusion of a natural hazards Section in a local master plan. The town should consider adopting this Hazard Mitigation Plan as part of the master plan by reference.

Bridgewater does have a part-time Code Enforcement Officer who works with the Selectboard to implement and enforce the town's various ordinances, including the State Building Code (https://www.nh.gov/safety/boardsandcommissions/bldgcode/nhstatebldgcode.html). On larger projects, such as the recent renovation of an inn, a consultant will be brought in to inspect the work.

How the town appropriates its funds is another form of planning, indicating local priorities. In Bridgewater, the Selectmen are responsible for the development of annual and long-term town budgets, which would include most hazard mitigation expenses. Recent town budgets have funded mitigation and response expenses identified in the hazard mitigation plan notably upgrading several culverts.

A Capital Improvements Program (CIP) is a tool that can be useful in helping a community budget for a variety of expensive capital projects, including those that mitigate hazards (NH RSA 674.5). The CIP can be developed by the Planning Board or a committee appointed by the Board of Selectmen; in either case, formation of the CIP committee requires a vote at Town Meeting. Bridgewater does not have a CIP at this time.

B. STATUS OF 2015 ACTIONS

The 2015 HMP contained 24 recommended actions; some were mitigation actions, others enhanced local preparedness or response. The status of the mitigation actions recommended in the 2015 plan is indicated in Table V-2 as either Completed (C), Deleted (X), or Deferred (D). Some of the deleted Actions are now listed above as "Current Plans, Policies, and Regulations" (Table V-1). A review of the status of these actions reveals that four have been completed and nine others are no longer considered pertinent. Deferred Actions (or portions of deferred Actions) were carried forward to be considered along with new Mitigation Actions (Table V-3). Also noted is whether the Action was designed to mitigate a hazard or whether it primarily addresses preparedness and response.

Table V-2: Status of Mitigation and Response Actions from the 2015 Plan (C-Completed, X – Delete, D – Deferred)

Hazard	ID	Action	Status 2023	Comment	Mitigation or Response/Prep
Fire	5	Encourage the Planning Board to re-evaluate the requirements and review process for an on-site water supply for residential units in the Subdivision and Site Plan Regulations.	C	Do have fire protection requirements for developments of seven or more lots or principal buildings.	Response/Prep
MV with HazMat	15	Ensure that local personnel maintain training and have the appropriate equipment in initial spill response.	C	We have that.	Response/Prep
Fire	2	Purchase a track vehicle for better access to homes and recreation areas that are difficult to reach.	C	Purchased.	Response/Prep
MV with HazMat	14	Maintain and improve signage and continue policing along NH Rte. 3A, NH Rte. 3, River Rd., and Dick Brown Rd. to reduce the likelihood of an accident.	C		**Mitigation**
Fire	3	Identify more water sources near the top of Bridgewater Hill for firefighting.	X	Not a priority	Response/Prep
All	19	Make arrangements (MOU) for utilizing regional supplies with the Red Cross.	X	The supplies are needed. Would prefer to obtain and store locally.	Response/Prep
All	22	Consider adopting a community notification system such as Reverse 911 or Code Red.	X	Not seen as applicable to a small town.	Response/Prep
Fire	4	Create more water sources for firefighting near the top of Bridgewater Hill.	X	Not a priority.	Response/Prep
All	17	Set up a repeater to improve communication capability in the northern section of town for the Highway, Police, and Fire Departments.	X	Failed. Tenney Mtn. repeater. Other communications are used (cell phones).	Response/Prep
Fire	7	Encourage homeowners to protect their properties against lightning strikes.	X	Not a priority	**Mitigation**

Hazard	ID	Action	Status 2023	Comment	Mitigation or Response/Prep
All	9	Develop a town policy for regular tree maintenance along roads and utilities.	X	Not workable.	**Mitigation**
All	10	Implement a town policy for regular tree maintenance, including funding.	X	Not workable.	**Mitigation**
Fire	6	Install lightning protection on all critical facilities	X	Seen as to expensive and not pertinent.	**Mitigation**
Fire	1	Maintain Class VI roads and Trails for Emergency Access to homes and recreation areas that are difficult to reach.	D	Being done. Also have designated Private Roads for Emergency Access.	Response/Prep
All	18	Purchase cots and MREs for the emergency shelter and identify storage space.	D	Still a need.	Response/Prep
Winter Weather	13	Ensure that vegetation is cut back, allowing greater solar exposure and melting along higher elevation roads (especially Clements Rd.).	D	Ongoing	**Mitigation**
Winter Weather	12	Ensure that extra attention is given to clearing snow and ice from higher elevation roads (especially Clements Rd.).	D	Ongoing need	**Mitigation**
All	11	Provide information to landowners regarding tree maintenance	D	Done through newsletter and recommend the use of a licensed forester.	**Mitigation**
All	21	Continue to utilize the town's new website as a resource area for citizens, visitors, and businesses. Add information for homeowners about fire prevention, severe winter weather, and emergency preparedness.	D	Improved	**Mitigation**
Flood/ Erosion	20	Upgrade the culvert near the intersection of Poole Hill Road and Dick Brown Road.	D	Has only flooded the road once in recent years.	**Mitigation**
All	8	Work with PSNH and NHECoop to ensure that trees around wires are trimmed back on a regular basis.	D	Ongoing. Companies have done a better job in recent years.	**Mitigation**
Flood/ Erosion	24	Raise and widen the red-listed Hammond Hill bridge	D	Almost all ledge and awkward geometry. Insufficient funding.	**Mitigation**
Flood/ Erosion	25	Replace one abutment and the concrete deck at the bridge at Bridgewater Hill and Dick Brown Road.	D	Have had some washout. Need funding.	**Mitigation**
Flood/ Erosion	23	Complete reconstruction & rechanneling at the red-listed Hammond Hill bridge.	D	Continues to be a challenge. Funding required.	**Mitigation**

C. MITIGATION GOALS AND TYPES OF ACTIONS

GOALS

In the 2015 Plan, the committee affirmed its support for the goals stated in the State HMP at the time. This included both general and hazard-specific local goals. In 2023 the New Hampshire State Hazard Mitigation Plan published six overarching goals to help align the plan with new focuses on equity, the impacts of climate change, and community lifelines. The Bridgewater HMP Committee reviewed both sets of goals and adopted wording that incorporates elements of both sets of goals as they apply to Bridgewater.

1. Improve the protection of all residents and workers in Bridgewater and its visitors from all significant hazards (including the potential impacts from a changing climate), raise general awareness, and reduce the liability to the town for hazard events.
2. Reduce the potential impact of hazard events on Bridgewater's critical support services, facilities, and infrastructure.
3. Reduce the potential impact of hazard events on private and public property, the natural environment, and economic resources.
4. Goals 1, 2, & 3 will be achieved through:
    a. Identifying and assessing hazards posing a risk to Bridgewater and developing mitigation measures through a community outreach effort, including vulnerable populations.
    b. a coordinated and collaborative effort between federal, State, and local authorities along with other partners (private, NGOs, and VOADs*) to implement appropriate and cost-effective hazard mitigation measures.
    c. public education about disaster preparedness and resilience and expanded awareness of the threats and hazards which face the town.
    d. strengthen Continuity of Operations and Continuity of Government to ensure continuation of essential services through training, outreach, and education.

*NGO – Non-governmental Organization, VOAD - Voluntary Organizations Active in Disaster

TYPES OF ACTIONS

There are six **types of actions** that communities may take to reduce the likelihood that a hazard might impact the community. Below each **action type** are several examples of those actions.

A. Actions that will keep things from getting worse - Prevention

- a. Zoning – floodplain and steep slope overlays
- b. Open space preservation
- c. Subdivision and Site Plan Review
    - i. Impervious surface limits
    - ii. Stormwater management
- d. Capital Improvements Plan – limiting the extension of public infrastructure into hazard areas
- e. Building and Fire codes

B. Actions that address individual buildings - <u>Property Protection</u>

a. Flood-proofing existing buildings
b. Retrofitting existing buildings to reduce damage
c. Relocating structures from hazard-prone areas
d. Public procurement and management of land vulnerable to hazard damage

C. Actions that will inform the public - <u>Public education and awareness</u>

a. Make hazard information and maps available to residents and visitors.
    i. Paper or electronic
    ii. Targeted at residents and businesses in hazard-prone areas
    iii. Set up displays in public areas, or homeowners associations.
    iv. Give educational programs in schools.
    v. Make information available through newspapers, radio, TV.
b. Ask businesses to provide hazard information to employees.
c. Adopt a real estate disclosure requirement so that potential owners are informed of risks prior to purchase.

D. Actions that will <u>protect natural resources</u>

a. Erosion and sediment control programs
b. Wetlands protection programs
c. Expand public open space
d. Environmental restoration programs

E. Actions that will protect emergency services before, during, and immediately after an event (<u>Long-term continuity</u>)

a. Protect warning system capability
b. Protection or hardening of critical facilities such as fire stations or hospitals
c. Protection of infrastructure, such as roads that are needed in emergency response

F. Actions that will control the hazard – <u>Structural projects</u>

a. Diversion of stormwater away from developed areas
b. Reservoirs to store drinking water

D. MITIGATION ACTIONS

Through a review of the risk assessment and local vulnerabilities, several Problem Statements were identified and refined by the Committee. Through discussion an updated list of mitigation strategies was developed to address these current problems. Hazards are listed alphabetically and color-coded by risk level. ID letters/numbers do not indicate any prioritization. Blue and grey highlighting of ID and Problem Statements indicate multiple actions addressing the same problem.

Table V-3: Problem Statements and Potential Mitigation Actions

Hazard	ID	Problem	Action	Comment
All Hazards	AH 1	Getting information out to residents and visitors can reduce confusion during an emergency event, reducing the likelihood of injury.	Continue to utilize the town's website as a resource area for citizens, visitors, and businesses. Add information for homeowners about fire prevention, severe winter weather, and emergency preparedness.	Improved. The committee discussed a variety of methods for reaching as many in the community as possible for distributing informational materials.
All Hazards	AH 2	The town Master Plan (2006) is due for an update. This document is the foundation for the ordinances and regulations that guide land use and development in town.	Update the town's Master Plan.	New. RSA 674:2 & 674:3 Master plan may include a Natural Hazards section, "revisions recommended every 5-10 years".
Drought	D 1	NH experienced drought conditions in 2017 & 2020, Grafton Co. was in Moderate Drought (D1). This can reduce agricultural production, lead to increased irrigation, and increase the chance of wildfires.	Post resources to town website for homeowners regarding drought status and actions that can be taken to reduce the impacts of drought.	New.
Earthquake > 4.0	EQ 1	While Bridgewater has not been directly impacted by an earthquake recently, the town is in one of the most active seismic areas in New Hampshire.	Compile, distribute and promote outreach materials to residents and business owners regarding the risks posed by earthquakes and steps that building owners can take to mitigate those risks.	New.
Extreme Temps	ET 1	There are times when either extreme heat or cold make it difficult for some people to keep cool or stay warm.	Distribute information (electronic & hard copies) on improving weatherproofing homes as well as accessing cooling/heating centers.	New.
Extreme Temps	ET 2	Warmer, wetter climate is resulting in later and later ice cover on the lake. This is impacting the ecosystem.	Work with NHDES Dam Bureau to adjust lake levels to mitigate some of the ecosystem impact.	New.
Flood/ Erosion	FE 1	Washouts occur on Poole Hill Road and Dick Brown Road near the intersection of the two roads.	Upgrade the culvert near the intersection of Poole Hill Road and Dick Brown Road.	Has only flooded the road once in recent years.

Hazard	ID	Problem	Action	Comment
Flood/ Erosion	FE 2a	Work was done on Hammond Hill. Still on NH DOT's Municipal Red List - concern about wooden stringers and laid rock. It is an expensive job.	Phase I. Develop a plan to identify and pursue funding to repair Hammond Hill bridge..	New. Note - Municipal Red List bridges are now eligible for funding through NHDOT's 10YR Plan.
Flood/ Erosion	FE 2b	Work was done on Hammond Hill. Still on NH DOT's Municipal Red List - concern about wooden stringers and laid rock.	Raise and widen the red-listed Hammond Hill bridge	Almost all ledge and awkward geometry. Insufficient funding.
Flood/ Erosion	FE 2c	Work was done on Hammond Hill. Still on NH DOT's Municipal Red List - concern about wooden stringers and laid rock.	Complete reconstruction & rechanneling at the red-listed Hammond Hill bridge.	Continues to be a challenge. Funding required.
Flood/ Erosion	FE 3a	The bridge at Bridgewater Hill near Dick Brown Road needs repair. It is an expensive job.	Develop a plan to identify and pursue funding to repair the Bridgewater Hill bridge. Consider breaking the project into phases.	New.
Flood/ Erosion	FE 3b	The bridge at Bridgewater Hill near Dick Brown Road needs repair.	Replace one abutment and the concrete deck at the bridge at Bridgewater Hill and Dick Brown Road.	Have had some washout. Need funding.
Flood/ Erosion	FE 4	Homes along the shores of Newfound Lake have experienced flooding. This is linked to increased rainfall and insufficient releases at the dam.	Work with NHDES Dam Bureau to adjust lake levels to better accommodate the changing levels of rainfall.	
High Wind Events	HW 1	Strong winds can take down trees and limbs, damaging properties, bringing down power lines and blocking roads.	Provide information to landowners regarding tree maintenance	Done through newsletter and recommend the use of a licensed forester.
High Wind Events	HW 2	Strong winds can take down trees and limbs, damaging properties, bringing down power lines and blocking roads.	Work with Eversource and NHECoop to ensure that trees around wires are trimmed back on a regular basis.	Ongoing. Companies have done a better job in recent years.
Infectious Disease	ID 1	Elderly housing, schools, and areas where many congregate are places where communicable diseases could spread quickly.	Work with Central NH Public Health Network to post information and target areas to conduct outreach regarding prevention.	New. There will be an ongoing need for this.

Hazard	ID	Problem	Action	Comment
Infectious Disease	ID 2	The town's incinerator has been offline for nearly a year. With Solid Waste disposal options limited, the possibility of spreading contamination or disease is heightened.	Work with NHDES in order to re-establish reliable waste disposal options for the town.	New.
Lightning	Li 1	Some people are not aware of how to reduce the likelihood of being struck by lightning (person or structure).	Post fire and lightning prevention materials on the town website and refer homeowners and residents to the information.	New.
Solar Storm & Space Weather	SW 1	Solar storms and Space weather can impact electronic communications.	Regularly monitor NH HSEM for alerts regarding anticipated events and appropriate responses to limit the impact on communications.	New.
Tropical & Post-Tropical Cyclones	TC 1	Warmer, wetter climate may result in more tropical storms impacting the town with extended periods of wind & intense rain. This can put pressure on Highway Dept. and limited local resources.	Establish and annually update agreements with public and/or private partners to assist with damages to trees, roads, culverts, and wires.	New. Do participate in the UNH T2 Mutual Aid program.
Wildfire	Wf 1	More homes are being developed in more remote areas of town. While there have not been recent instances of wildfire damage, there are steps that homeowners can take to reduce the impact of a wildfire to their property.	Make information about the FireWise program (or similar programs) available to residents in these areas.	New. The intent of thethis program is to encourage incorporation of fire protection into site or landscaping designs.
Wildfire	Wf 2	Large bonfires or setting off fireworks can start fires. While there have not been recent instances of wildfire damage, there are steps that homeowners can take to reduce the likelihood of a wildfire to their property.	Distribute information about state and local regulations and best management practices regarding outdoor burning and use of fireworks to residents and visitors.	New. Especially in higher density or recreation areas such as Whittemore Point.
Winter Weather	WW 1	Several higher elevation roads (especially Clements Rd.) get icy and dangerous.	Ensure that vegetation is cut back, allowing greater solar exposure and melting along higher elevation roads.	Ongoing
Winter Weather	WW 2	Several higher elevation roads (especially Clements Rd.) get icy and dangerous.	Ensure that extra attention is given to clearing snow and ice from higher elevation roads.	Ongoing need

The Committee identified the various costs and benefits associated with each action. The estimated cost represents what the town estimates it will cost in terms of dollars or staff hours to implement each action. Table V-4 shows the costs as well as the various benefits associated with each action. This table also includes notes whether the action addresses existing structures/infrastructure or future (new) structures/infrastructure as well as which goal(s) they address and the type of mitigation action each represents. The ID letters are used simply for tracking purposes; they do not indicate any sort of prioritization. IDs with similar colored highlighting address similar problem statements. Note: The goals and their numbers are listed in Section C.

Table V-4: Actions indicating Hazard, Cost, Structure, Goal, and Type of Action

Hazard	ID	Action	Anticipated Cost ($ or Hours)	Comment	Existing/ New Structure	Goal	Type of Action
All Hazards	AH 1	Continue to utilize the town's website as a resource area for citizens, visitors, and businesses. Add information for homeowners about fire prevention, severe winter weather, and emergency preparedness.	20 Staff hours	Improved. The committee discussed a variety of methods for reaching as many in the community as possible for distributing informational materials.	E	1,3,4a,4c	Educ./ Aware.
Drought	D 1	Post resources to town website for homeowners regarding drought status and actions that can be taken to reduce the impacts of drought.	10 hours Staff time	New.	E	1,3,4a,4c	Educ./ Aware.
Extreme Temps	ET 1	Distribute information (electronic & hard copies) on improving weatherproofing homes as well as accessing cooling/heating centers.	10 hours Staff time	New.	E	1,3,4a,4c	Educ./ Aware.
Flood/ Erosion	FE 2a	Phase I. Develop a plan to identify and pursue funding to address the Hammond Hill bridge.	$20K	New. Note - Municipal Red List bridges are now eligible for funding through NHDOT's 10YR Plan.	E	1,2,4b	Structural
Flood/ Erosion	FE 3a	Develop a plan to identify and pursue funding to fix the Bridgewater Hill bridge. Consider breaking the project into phases.	$20K	New.	E	1,2,4b	Structural
High Wind Events	HW 1	Provide information to landowners regarding tree maintenance	20 Staff hours	Done through newsletter and recommend the use of a licensed forester.	E	1,3,4a,4c	Educ./ Aware.

Hazard	ID	Action	Anticipated Cost ($ or Hours)	Comment	Existing/ New Structure	Goal	Type of Action
Infectious Disease	ID 1	Work with Central NH Public Health Network to post information and target areas to conduct outreach regarding infectious disease prevention.	20 Staff hours	New. There will be an ongoing need for this.	E	1,4a,b,c	Educ./ Aware.
Lightning	Li 1	Post fire and lightning prevention materials on the town website and refer homeowners and residents to the information.	10 staff hours	New.	E	1,3,4a,c	Educ./ Aware.
Solar Storm & Space Weather	SW 1	Regularly monitor NH HSEM for alerts regarding anticipated events and appropriate responses to limit the impact on communications.	12 staff hours per year	New.	E	1,2,4d	Aware.
Tropical & Post-Tropical Cyclones	TC 1	Establish and annually update agreements with public and/or private partners to assist with damages to trees, roads, culverts, and wires.	20 hours per year	New. Do participate in the UNH T2 Mutual Aid program.	E	1,2,4a,b,d	Long term Continuity
Wildfire	Wf 1	Make information about the FireWise program (or similar programs) available to residents in these areas.	10 Staff hours	New. The intent of this program is to encourage incorporation of fire protection into site or landscaping designs.	E	1,3,4a,c	Educ./ Aware.
Wildfire	Wf 2	Distribute information about state and local regulations and best management practices regarding outdoor burning and use of fireworks to residents and visitors.	10 Staff hours	New. Especially in higher density or recreation areas such as Whittemore Point.	E	1,3,4a,c	Prevention Educ./ Aware.
Winter Weather	WW 1	Ensure that vegetation is cut back, allowing greater solar exposure and melting along higher elevation roads.	$1,000/ year	Ongoing	E	1,2,4b	Long term Continuity
Winter Weather	WW 2	Ensure that extra attention is given to clearing snow and ice from higher elevation roads.	10 Staff hours/ year	Ongoing need	E	1,2,4b	Long term Continuity

Hazard	ID	Action	Anticipated Cost ($ or Hours)	Comment	Existing/ New Structure	Goal	Type of Action
All Hazards	AH 2	Update the town's Master Plan.	$40K	New. RSA 674:2 & 674:3 Master plan may include a Natural Hazards section, "revisions recommended every 5-10 years".	N	1,2,3,4a,c	Prevention
Earthquake > 4.0	EQ 1	Compile, distribute and promote outreach materials to residents and business owners regarding the risks posed by earthquakes and steps that building owners can take to mitigate those risks.	10 hours Staff time	New.	E	1,3,4a,c	Educ./ Aware.
Extreme Temps	ET 2	Work with NHDES Dam Bureau to adjust lake levels to mitigate some of the ecosystem impact.	50 hours Staff time	New.	E	1,3,4b,d	Natural Resources
Flood/ Erosion	FE 4	Work with NHDES Dam Bureau to adjust lake levels to better accommodate the changing levels of rainfall.	40 Staff hours		E	1,3,4b,d	Property Protection
High Wind Events	HW 2	Work with Eversource and NHECoop to ensure that trees around wires are trimmed back on a regular basis.	20 Staff hours	Ongoing. Companies have done a better job in recent years.	E	1,3,4b	Long term Continuity
Infectious Disease	ID 2	Work with NHDES to re-establish reliable waste disposal options for the town.	200 hours Staff time	New.	E	1,2,4b,d	Long term Continuity
Flood/ Erosion	FE 1	Upgrade the culvert near the intersection of Poole Hill Road and Dick Brown Road.	$150,000	Has only flooded the road once in recent years.	E	1,2,4b	Structural
Flood/ Erosion	FE 2b	Raise and widen the red-listed Hammond Hill bridge	$300,000	Almost all ledge and awkward geometry. Insufficient funding.	E	1,2,4b	Structural

Hazard	ID	Action	Anticipated Cost ($ or Hours)	Comment	Existing/ New Structure	Goal	Type of Action
Flood/ Erosion	FE 2c	Complete reconstruction & rechanneling at the red-listed Hammond Hill bridge.	>$2M	Continues to be a challenge. Funding required.	E	1,2,4b	Structural
Flood/ Erosion	FE 3b	Replace one abutment and the concrete deck at the bridge at Bridgewater Hill and Dick Brown Road.	$1.2M	Have had some washout. Need funding.	E	1,2,4b	Structural

Hazard mitigation is defined as "any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards". 44 CFR 201.2 Definitions - Code of Federal Regulations

E. PRIORITIZATION OF ACTIONS

After considering the various merits and limitations of each project, the Committee prioritized the projects which had been identified. Committee members agreed to the standard STAPLEE prioritization tool to reflect the concerns of the community. The tool asks the committee to consider seven separate aspects for each Action. There was much discussion during this prioritization process and the final scores were reached through group consensus. Table V-5 shows the Actions and their scores. Total scores range from a high of 18 to a low of 7. See Appendix H for further details regarding the STAPLEE prioritization method and the detailed scores.

Scoring: 3 = Highly effective of feasible, 2 = Neutral, 1 = Ineffective or not feasible

Table V-5: Recommended Actions in Ranked Order

Hazard	ID	Action	STAPLEE Total
Flood/ Erosion	FE 2a	Phase I. Develop a plan to identify and pursue funding for Hammond Hill bridge work.	18
Flood/ Erosion	FE 3a	Develop a plan to identify and pursue funding for Bridgewater Hill bridge work. Consider breaking the project into phases.	18
All Hazards	AH 2	Update the town's Master Plan.	17
Extreme Temps	ET 2	Work with NHDES Dam Bureau to adjust lake levels to mitigate some of the ecosystem impact.	17
Flood/ Erosion	FE 1	Upgrade the culvert near the intersection of Poole Hill Road and Dick Brown Road.	17
Flood/ Erosion	FE 2b	Raise and widen the red-listed Hammond Hill bridge	17
Flood/ Erosion	FE 2c	Complete reconstruction & rechanneling at the red-listed Hammond Hill bridge.	16
Flood/ Erosion	FE 3b	Replace one abutment and the concrete deck at the bridge at Bridgewater Hill and Dick Brown Road.	16
Infectious Disease	ID 1	Work with Central NH Public Health Network to post information and target areas to conduct outreach regarding infectious disease prevention.	15
Wildfire	Wf 2	Distribute information about state and local regulations and best management practices regarding outdoor burning and use of fireworks to residents and visitors.	15
Flood/ Erosion	FE 4	Work with NHDES Dam Bureau to adjust lake levels to better accommodate the changing levels of rainfall.	15
All Hazards	AH 1	Continue to utilize the town's website as a resource area for citizens, visitors, and businesses. Add information for homeowners about fire prevention, severe winter weather, and emergency preparedness.	14

Hazard	ID	Action	STAPLEE Total
Drought	D 1	Post resources to the town website for homeowners regarding drought status and actions that can be taken to reduce the impacts of drought.	14
Extreme Temps	ET 1	Distribute information (electronic & hard copies) on improving weatherproofing homes as well as accessing cooling/heating centers.	14
High Wind Events	HW 1	Provide information to landowners regarding tree maintenance	14
Lightning	Li 1	Post fire and lightning prevention materials on the town website and refer homeowners and residents to the information.	14
Tropical & Post-Tropical Cyclones	TC 1	Establish and annually update agreements with public and/or private partners to assist with damages to trees, roads, culverts, and wires.	14
Wildfire	Wf 1	Make information about the FireWise program (or similar programs) available to residents in these areas.	14
Winter Weather	WW 1	Ensure that vegetation is cut back, allowing greater solar exposure and melting along higher elevation roads.	14
Winter Weather	WW 2	Ensure that extra attention is given to clearing snow and ice from higher elevation roads.	14
High Wind Events	HW 2	Work with Eversource and NHECoop to ensure that trees around wires are trimmed back on a regular basis.	14
Infectious Disease	ID 2	Work with NHDES in order to re-establish reliable waste disposal options for the town.	14
Solar Storm & Space Weather	SW 1	Regularly monitor NH HSEM for alerts regarding anticipated events and appropriate responses to limit the impact on communications.	12
Earthquake > 4.0	EQ 1	Compile, distribute and promote outreach materials to residents and business owners regarding the risks posed by earthquakes and steps that building owners can take to mitigate those risks.	7

F. IMPLEMENTATION OF MITIGATION ACTIONS

There are many factors that influence how a town chooses to spend its energy and resources in implementing recommended actions. Factors include:

- Urgency
- How quickly an action could be implemented
- Likelihood that the action will reduce future emergencies
- Regulations required to implement the action
- Administrative burdens
- Time (both paid and volunteer)
- Funding availability
- Political acceptability of the action.

In the context of these factors, the Committee discussed the mitigation actions and relative level of priority, recognizing that some actions are of greater priority to different town departments. This implementation schedule is a matrix (Table V-6) indicating the estimated cost of implementation, potential funding sources, the parties responsible for bringing about these actions, and implementation time frame. The time frame used fits within the 5-year term of this plan (Short 1 yr, Medium 2-3 yr, Long 4-5 yr). These are listed in order of their Time Frame. To keep the plan current, the implementation schedule should be updated and re-evaluated on a regular basis as outlined in the monitoring section of this plan and a record of this process and progress documented in Appendix K.

Table V-6: Implementation Schedule for Mitigation Actions by Time Frame

Hazard	ID	Action	Anticipated Cost ($ or Hours)	Potential Funding	Responsible Party	Time Frame S:1 yr, M: 2-3 yr, L: 4-5 yr
All Hazards	AH 1	Continue to utilize the town's website as a resource area for citizens, visitors, and businesses. Add information for homeowners about fire prevention, severe winter weather, and emergency preparedness.	20 Staff hours	Operating Budget	Selectboard	Short
Drought	D 1	Post resources to the town website for homeowners regarding drought status and actions that can be taken to reduce the impacts of drought.	10 hours Staff time	Operational Budget	Selectboard	Short
Extreme Temps	ET 1	Distribute information (electronic & hard copies) on improving weatherproofing homes as well as accessing cooling/heating centers.	10 hours Staff time	Operational Budget	Selectboard	Short
Flood/ Erosion	FE 2a	Phase I. Develop a plan to identify and pursue funding to repair and improve the Hammond Hill bridge.	$20K	Highway Dept., Warrant Article	Road Agent	Short

Hazard	ID	Action	Anticipated Cost ($ or Hours)	Potential Funding	Responsible Party	Time Frame S:1 yr, M: 2-3 yr, L: 4-5 yr
Flood/ Erosion	FE 3a	Develop a plan to identify and pursue funding to repair and improve the Bridgewater Hill bridge. Consider breaking the project into phases.	$20K	FEMA HMPGrant, NH DOT, Highway Dept., Warrant Article	Road Agent	Short
High Wind Events	HW 1	Provide information to landowners regarding tree maintenance	20 Staff hours	Operating Budget	Road Agent	Short
Infectious Disease	ID 1	Work with Central NH Public Health Network to post information and target areas to conduct outreach regarding infectious disease prevention.	20 Staff hours	Operating Budget	Selectboard	Short
Lightning	Li 1	Post fire and lightning prevention materials on the town website and refer homeowners and residents to the information.	10 staff hours	Operating Budget	Selectboard	Short
Solar Storm & Space Weather	SW 1	Regularly monitor NH HSEM for alerts regarding anticipated events and appropriate responses to limit the impact on communications.	12 staff hours per year	Operating Budget	Police Chief	Short
Tropical & Post-Tropical Cyclones	TC 1	Establish and annually update agreements with public and/or private partners to assist with damages to trees, roads, culverts, and wires.	20 hours per year	Operating Budget	Selectboard	Short
Wildfire	Wf 1	Make information about the FireWise program (or similar programs) available to residents in these areas.	10 Staff hours	Operating Budget	Fire Warden	Short
Wildfire	Wf 2	Distribute information about state and local regulations and best management practices regarding outdoor burning and use of fireworks to residents and visitors.	10 Staff hours	Operating Budget	Fire Warden	Short
Winter Weather	WW 1	Ensure that vegetation is cut back, allowing greater solar exposure and melting along higher elevation roads.	$1,000/ year	NHElecCoop	Road Agent	Short
Winter Weather	WW 2	Ensure that extra attention is given to clearing snow and ice from higher elevation roads.	10 Staff hours/ year	Highway Department Budget	Road Agent	Short
All Hazards	AH 2	Update the town's Master Plan.	$40K	Operational Budget/ Warrant article	Planning Board	Medium

Hazard	ID	Action	Anticipated Cost ($ or Hours)	Potential Funding	Responsible Party	Time Frame S:1 yr, M: 2-3 yr, L: 4-5 yr
Earthquake > 4.0	EQ 1	Compile, distribute and promote outreach materials to residents and business owners regarding the risks posed by earthquakes and steps that building owners can take to mitigate those risks.	10 hours Staff time	Operational Budget	Selectboard	Medium
Extreme Temps	ET 2	Work with NHDES Dam Bureau to adjust lake levels to mitigate some of the ecosystem impact.	50 hours Staff time	Operational Budget	Selectboard	Medium
Flood/ Erosion	FE 4	Work with NHDES Dam Bureau to adjust lake levels to better accommodate the changing levels of rainfall.	40 Staff hours	Operating Budget	Selectboard	Medium
High Wind Events	HW 2	Work with Eversource and NHECoop to ensure that trees around wires are trimmed back on a regular basis.	20 Staff hours	Operating Budget	Road Agent	Medium
Infectious Disease	ID 2	Work with NHDES in order to re-establish reliable waste disposal options for the town.	200 hours Staff time	Operating Budget	HB Refuse District	Medium
Flood/ Erosion	FE 1	Upgrade the culvert near the intersection of Poole Hill Road and Dick Brown Road.	$150,000	FEMA HMPGrant, Highway Dept.	Road Agent	Long
Flood/ Erosion	FE 2b	Raise and widen the red-listed Hammond Hill bridge	$300,000	NH DOT(10YR Plan), FEMA HMPGrant, Highway Dept., Warrant Article	Road Agent	Long
Flood/ Erosion	FE 2c	Complete reconstruction & rechanneling at the red-listed Hammond Hill bridge.	>$2M	NH DOT(10YR Plan), FEMA HMPGrant, Highway Dept., Warrant Article	Road Agent	Long
Flood/ Erosion	FE 3b	Replace one abutment and the concrete deck at the bridge at Bridgewater Hill and Dick Brown Road.	$1.2M	Highway Dept., Warrant Article	Road Agent	Long

SECTION VI: PLAN ADOPTION AND MONITORING

A. IMPLEMENTATION

The Bridgewater Hazard Mitigation Plan Update Committee, established by the Emergency Management Directors/Selectboard, will meet annually to review the Plan and provide a mechanism for ensuring that an attempt is made to incorporate the actions identified in the plan into ongoing town planning activities. Essential elements of implementation require that all responsible parties for the various recommendations understand what is expected of them, and that they are willing to fulfill their role in implementation. It is therefore important to have the responsible parties clearly identified when the town adopts the final plan. Where appropriate it would be helpful to have any hazard mitigation activities identified in job descriptions.

Many of the actions in this plan rely on the town's operating budget along with grant funds available through FEMA, NH HSEM, state agencies, and other sources such as those listed in Appendix B. The EMDs will coordinate with the department heads to ensure that funds and staff time for these projects are available. The EMD and Hazard Mitigation Committee will work with the Selectmen to incorporate the various projects into subsequent budgets where appropriate. The EMDs will also coordinate with the NH HSEM Field Representative to ensure that the town applies for appropriate grant funds.

For those mitigation actions which involve updates to the Master Plan, Zoning, or the Subdivision or Site Plan Regulations or development of regulations or standards, members of the Hazard Mitigation Committee will work with the Planning Board to develop appropriate language.

When appropriate, an effort will be made to incorporate this plan into the Emergency Operations Plan. Within a year after the town officially adopts the 2024 update to the Hazard Mitigation Plan, an attempt will be made to have hazard mitigation strategies integrated into existing mechanisms and into all other ongoing town planning activities.

B. PLAN MAINTENANCE & PUBLIC INVOLVEMENT

Plan Evaluation

To track progress and evaluate the mitigation strategies identified in Section V.F., the Bridgewater Hazard Mitigation Planning Committee and the Selectboard will review the Hazard Mitigation Plan **every year (by the end of April) or after a major hazard event**. The **Selectboard/Emergency Management Director** is responsible for initiating this review and shall consult with members of the HMP Committee identified in this Plan. Responsible parties identified for specific mitigation actions will be asked to submit a status report of those actions in advance of the meeting. Tables A and B in Appendix K may be used for recording this plan evaluation.

Meetings will entail the following actions:

- Documentation of natural hazard events during the past year, local damages (and costs) associated with these events, costs associated with mitigation actions (and any match or reimbursement). Documentation could include a brief description, any associated costs and funding sources, as well as images.
- Track progress toward implementation of the current mitigation plan based on status reports from responsible parties. Refer to Section V.B. for an applicable evaluation scale.
- Assess the effectiveness of the plan at achieving the plan's stated purpose (Section I.D.) and goals (Section V.C.). Refer to Section V.A. for an applicable evaluation scale.
- Other activities and discussions may include:
    - Review previous hazard events to discuss and evaluate major issues and possible mitigation for future events.
    - Assess how the mitigation strategies of the plan can be integrated with other Town plans and operational procedures, including the zoning ordinance and local Emergency Operations Plan.

Plan Update

The Emergency Management Directors are also responsible for updating and resubmitting the plan to FEMA to be re-approved every five years. The EMDs will convene a plan update committee in mid-2027 to begin updating this plan before it expires. The plan update process will follow the same planning process used in this plan update. If modifications have been made either to the FEMA Local Mitigation Planning Policy Guide or the NH State Hazard Mitigation Plan, these will be incorporated into the planning process. Administrative staff may be utilized to assist, especially with the public involvement process.

Public Participation

For annual monitoring/evaluation process and for the five-year update, techniques that will be utilized for public involvement include:

- ❖ Provide invitations to municipal department heads as well as the Planning Board;
- ❖ Post notices of meetings at the Town Office and on the town website;
- ❖ Submit press releases for publication in the *Plymouth Record Enterprise*, *Newfound Landing*, *Laconia Daily Sun*, and other appropriate newspapers or media outlets.
- ❖ Additional steps to consider include conducting a public survey, holding an evening meeting, or providing for remote participation in meetings.

Entities to invite to future Hazard Mitigation monitoring/evaluation meetings and plan updates include the Emergency Management Directors of the neighboring communities of Ashland, New Hampton, Bristol, Hebron, and Plymouth. Additionally, the Emergency Preparedness Planner from Central NH Regional Health Network, social service providers such as Tri-County CAP, and others working with socially vulnerable communities in Bridgewater.

C. SIGNED CERTIFICATE OF ADOPTION

BOARD OF SELECTMEN
A RESOLUTION ADOPTING THE
BRIDGEWATER, NH
HAZARD MITIGATION PLAN UPDATE 2024

WHEREAS, the Town of Bridgewater, NH has historically experienced damage from natural hazards, and it continues to be vulnerable to the effects of those natural hazards as profiled in this plan, potentially resulting in loss of property and life, economic hardship, and threats to public health and safety; and

WHEREAS, the Town of Bridgewater, NH has developed and received approval pending adoption from the Federal Emergency Management Agency (FEMA) for its Hazard Mitigation Plan Update 2022 under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held between February 24, 2023 and February 6, 2024 regarding the development and review of the Bridgewater, NH Hazard Mitigation Plan Update 2024; and

WHEREAS, the Plan specifically addresses hazard mitigation actions and Plan maintenance procedures for the Town of Bridgewater, NH, and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that could impact the Town of Bridgewater, NH, 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, NH eligible for funding to mitigate the impacts of future hazards; now therefore be it RESOLVED by the Board of Selectmen:

1. The Plan is hereby adopted as an official plan of the Town of Bridgewater, NH;
2. The respective officials identified in the mitigation actions 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 a part of this resolution for a period of five (5) years from the date of this resolution.
4. An annual report on the progress of the plan's mitigation action items shall be presented to the Selectboard by the Emergency Management Director.

IN WITNESS WHEREOF, the undersigned has affixed his/her signature and the town seal of the Town of Bridgewater this

Date: April 11, 2024 Seal:

TOWN OF BRIDGEWATER EST 1788

BRIDGEWATER, NH SELECTBOARD

(Signature) MAURICE A. JENNESS JR. (Printed)

(Signature) T. MURPHY (Printed)

(Signature) P. Wesley Morrill, Jr. (Printed)

ATTEST:

(Signature) Julie Converse (Printed)

APPENDIX A: TECHNICAL RESOURCES

NH Homeland Security and Emergency Management.....271-2231
http://www.nh.gov/safety/divisions/HSEM/
Hazard Mitigation Section.....271-2231
http://www.nh.gov/safety/divisions/hsem/HazardMitigation/index.html

Federal Emergency Management Agency..... (617) 223-4175
http://www.fema.gov/
FEMA, National Flood Insurance Program, Community Status Book
http://www.fema.gov/national-flood-insurance-program/national-flood-insurance-program-community-status-book

Lakes Region Regional Planning Commission 279-8171
http://www.lakesrpc.org/

NH Governor's Office of Energy and Planning 271-2155
http://www.nh.gov/oep/index.htm
New Hampshire Floodplain Management Program
http://www.nh.gov/oep/programs/floodplainmanagement/index.htm

NH Department of Transportation 271-3734
http://www.nh.gov/dot/index.htm

NH Department of Cultural Affairs 271-2540
http://www.nh.gov/nhculture/
Division of Historical Resources.....271-3483
http://www.nh.gov/nhdhr/

NH Department of Environmental Services 271-3503
http://www.des.state.nh.us/
Dam Bureau 271-63406
http://www.des.state.nh.us/organization/divisions/water/dam/index.htm

NH Municipal Association.....224-7447
http://www.nhmunicipal.org/LGCWebsite/index.asp

NH Fish and Game Department.....271-3421
http://www.wildlife.state.nh.us/

NH Department of Natural and Cultural Resources.....271-2411
https://www.dncr.nh.gov/
Division of Forests and Lands.....271-2214
http://www.nhdfl.org/
Natural Heritage Inventory 271-2215
http://www.nhdfl.org/about-forests-and-lands/bureaus/natural-heritage-bureau/
Division of Parks and Recreation 271-3255
http://www.nhstateparks.org/

NH Department of Health and Human Services.....271-9389
http://www.dhhs.state.nh.us/

Northeast States Emergency Consortium, Inc. (NESEC)..... (781) 224-9876
http://www.nesec.org/

US Department of Commerce..... (202) 482-2000
http://www.commerce.gov/
National Oceanic and Atmospheric Administration ..... (202) 482-6090
http://www.noaa.gov/
National Weather Service, Eastern Region Headquarters
http://www.erh.noaa.gov/
National Weather Service, Tauton, Massachusetts..... (508) 824-5116
http://www.erh.noaa.gov/er/box/
National Weather Service, Gray, Maine ..... (207) 688-3216
http://www.erh.noaa.gov/er/gyx/

US Department of the Interior
http://www.doi.gov/
US Fish and Wildlife Service.....225-1411
http://www.fws.gov/
US Geological Survey 225-4681
http://www.usgs.gov/
US Geological Survey Real Time Hydrologic Data
http://waterdata.usgs.gov/nwis/rt
US Army Corps of Engineers ..... (978) 318-8087
http://www.usace.army.mil/

US Department of Agriculture
http://www.usda.gov/wps/portal/usdahome
US Forest Service ..... (202) 205-8333
http://www.fs.fed.us/

Eversource ..... (800) 662-7764
http://www.eversource.com/

New Hampshire Electrical Cooperative..... (800) 698-2007
http://www.nhec.com/

Cold Region Research Laboratory.....646-4187
http://www.crrel.usace.army.mil/

National Emergency Management Association ..... (859) 244-8000
http://nemaweb.org

National Aeronautics and Space Administration
http://www.nasa.gov/
NASA Optical Transient Detector – Lightning and Atmospheric Research
http://thunder.msfc.nasa.gov/

National Lightning Safety Institute
http://lightningsafety.com/

The Tornado Project Online
http://www.tornadoproject.com/

National Severe Storms Laboratory
http://www.nssl.noaa.gov/

Plymouth State University Weather Center
http://vortex.plymouth.edu/

APPENDIX B: MITIGATION FUNDING RESOURCES

There are numerous potential sources of funding to assist with the implementation of mitigation efforts. Two lists of state and federal resources are provided below. Some of these may not apply or be appropriate for Bridgewater. The NH Homeland Security and Emergency Management Field Representative for Grafton County can provide some assistance.

404 Hazard Mitigation Grant Program (HMGP)..... NH Homeland Security and Emergency Management

406 Public Assistance and Hazard Mitigation ..... NH Homeland Security and Emergency Management

Community Development Block Grant (CDBG) ..... NH HSEM, NH OPD, also refer to LRPC

Dam Safety Program .....NH Department of Environmental Services

Emergency Watershed Protection (EWP) Program .....USDA, Natural Resources Conservation Service

Flood Mitigation Assistance Program (FMAP) ..... NH Homeland Security and Emergency Management

Highway Safety Improvement Program..... NH Department of Transportation

Mitigation Assistance Planning (MAP)..... NH Homeland Security and Emergency Management

NH Public Works Mutual Aid..... UNH Technology Transfer (T2)

National Flood Insurance Program (NFIP) ..... NH Office of Planning & Development

Project Impact..... NH Homeland Security and Emergency Management

Roadway Repair & Maintenance Program(s)..... NH Department of Transportation

Shoreland Protection Program .....NH Department of Environmental Services

Various Forest and Lands Program(s) ..... NH Department of Division of Forests and Land

Wetlands Programs.....NH Department of Environmental Services

State Aid Bridge Program for Municipalities .....NH Department of Transportation (and LRPC)

Contribution to Damage Losses (RSA 235:34) ..... NH Department of Transportation

FEMA's Public Assistance (PA) grant program is authorized through the Stafford Act to provide federal assistance to government organizations and certain Private Nonprofit (PNP) organizations following a Presidential Disaster Declaration. This funding is provided at a 75%/25% cost share to allow government and certain PNP entities to respond and recover from major disasters or emergencies. The Public Assistance program returns damages to their pre-disaster condition. Through the PA program, FEMA provides supplemental assistance in the following categories:

- Emergency Work
    - o Debris Removal
    - o Emergency Protective Measures
- Permanent Work
- Roads and Bridges

- Water Control Facilities
- Public Buildings and Contents
- Public Utilities
- Parks, Recreational, and other facilities

Section 406 of the Stafford Act provides FEMA with the authority to fund cost-effective mitigation measures to repair, restore, or replace eligible damaged facilities, and allows for those structures to be rebuilt or repaired to better than pre-disaster conditions to make them less vulnerable to future hazards. Unlike other hazard mitigation grant programs, Section 406 mitigation is only available in the counties declared in the presidential declaration and only for eligible damaged facilities.[14]

[14] NH State Hazard Mitigation Plan, 2023, p. 26.

Federal Emergency Management Agency (FEMA)

FEMA makes funds available for mitigation efforts to reduce future costs associated with hazard damage.

Mitigation Funding Sources Program	Details	Notes
Flood Mitigation Assistance Program (FMA)	Provides funding to implement measures to reduce or eliminate the long-term risk of flood damage http://www.fema.gov/government/grant/fma/index.shtm	States and localities
Hazard Mitigation Planning Grant (HMPG)	Provides grants to implement long-term hazard mitigation measures after a major disaster declaration http://www.fema.gov/government/grant/hmpg/index.shtm	Open
National Flood Insurance Program (NFIP)	Enables property owners to purchase insurance as a protection against flood losses in exchange for state and community floodplain management regulations that reduce future flood damages http://www.fema.gov/business/nfip/	States, localities, and individuals
Pre-Disaster Mitigation Program (PDM)	Provides funds for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event http://www.fema.gov/government/grant/pdm/index.shtm	States, localities, and tribal governments

Environmental Protection Agency (EPA)

The EPA makes funds available for water management and wetlands protection programs that help mitigate future costs associated with hazard damage.

Mitigation Funding Sources Program	Details	Notes
Clean Water Act Section 319 Grants	Grants for water source management programs including technical assistance, financial assistance, education, training, technology transfer, demonstration projects, and regulation. http://www.epa.gov/OWOW/NPS/cwact.html	Funds are provided only to designated state and tribal agencies
Clean Water State Revolving Funds	State grants to capitalize loan funds. States make loans to communities, individuals, and others for high-priority water-quality activities. http://www.epa.gov/owow/wetlands/initiative/srf.html	States and Puerto Rico

Wetland Program Development Grants	Funds for projects that promote research, investigations, experiments, training, demonstrations, surveys, and studies relating to the causes, effects, extent, prevention, reduction, and elimination of water pollution. http://www.epa.gov/owow/wetlands/initiative/#financial	See website

Floodplain, Wetland and Watershed Protection Programs

US Army Corps of Engineers (USACE) and the U.S. Fish and Wildlife Service offer funding and technical support for programs designed to protect floodplains, wetlands, and watersheds.

Mitigation Funding Sources Program	Details	Notes
USACE Planning Assistance to States (PAS)	Fund plans for the development and conservation of water resources, dam safety, flood damage reduction and floodplain management. http://www.lre.usace.army.mil/planning/assist.html	50 percent non-federal match
USACE Flood Plain Management Services (FPMS)	Technical support for effective floodplain management. http://www.lrl.usace.army.mil/p3md-o/article.asp?id=9&MyCategory=126	See website
USACE Environmental Laboratory	Guidance for implementing environmental programs such as ecosystem restoration and reuse of dredged materials. http://el.erdc.usace.army.mil/index.cfm	See website
U.S. Fish & Wildlife Service Coastal Wetlands Conservation Grant Program	Matching grants to states for acquisition, restoration, management or enhancement of coastal wetlands. http://ecos.fws.gov/coastal_grants/viewContent.do?viewPage=home	States only. 50 percent federal share
U.S. Fish & Wildlife Service Partners for Fish and Wildlife Program	Program that provides financial and technical assistance to private landowners interested in restoring degraded wildlife habitat. http://ecos.fws.gov/partners/viewContent.do?viewPage=home	Funding for volunteer-based programs

Bureau of Land Management

The Bureau of Land Management (BLM) has two technical assistance programs focused on fire mitigation strategies at the community level.

Mitigation Funding Sources Program	Details	Notes
Community Assistance and Protection Program	Focuses on mitigation/prevention, education, and outreach. National Fire Prevention and Education teams are sent to areas across the country at-risk for wildland fire to work with local residents. http://www.blm.gov/nifc/st/en/prog/fire/community_assistance.html	See website
Firewise Communities Program	Effort to involve homeowners, community leaders, planners, developers, and others in the effort to protect people, property, and natural resources from the risk of wildland fire before a fire starts. http://www.firewise.org/	See website

Housing and Urban Development

The Community Development Block Grants (CDBG) administered by HUD can be used to fund hazard mitigation projects.

Mitigation Funding Sources Program	Details	Notes
Community Development Block Grants (CDBG)	Grants to develop viable communities, principally for low and moderate income persons. CDBG funds available through Disaster Recovery Initiative. http://www.hud.gov/offices/cpd/communitydevelopment/programs/	Disaster funds contingent upon Presidential disaster declaration
Disaster Recovery Assistance	Disaster relief and recovery assistance in the form of special mortgage financing for rehabilitation of impacted homes. http://www.hud.gov/offices/cpd/communitydevelopment/programs/dri/assistance.cfm	Individuals
Neighborhood Stabilization Program	Funding for the purchase and rehabilitation of foreclosed and vacant property in order to renew neighborhoods devastated by the economic crisis. http://www.hud.gov/offices/cpd/communitydevelopment/programs/neighborhoodspg/	State and local governments and non-profits

U.S. Department of Agriculture

There are multiple mitigation funding and technical assistance opportunities available from the USDA and its various sub-agencies: the Farm Service Agency, Forest Service, and Natural Resources Conservation Service.

Mitigation Funding Sources Program	Details	Notes
USDA Smith-Lever Special Needs Funding	Grants to State Extension Services at 1862 Land-Grant Institutions to support education-based approaches to addressing emergency preparedness and disasters. http://www.csrees.usda.gov/funding/rfas/smith_lever.html	Population under 20,000
USDA Community Facilities Guaranteed Loan Program	This program provides an incentive for commercial lending that will develop essential community facilities, such as fire stations, police stations, and other public buildings. http://www.rurdev.usda.gov/rhs/cf/cp.htm	Population under 20,000
USDA Community Facilities Direct Loans	Loans for essential community facilities. http://www.rurdev.usda.gov/rhs/cf/cp.htm	Population of less than 20,000
USDA Community Facilities Direct Grants	Grants to develop essential community facilities. http://www.rurdev.usda.gov/rhs/cf/cp.htm	Population of less than 20,000
USDA Farm Service Agency Disaster Assistance Programs	Emergency funding and technical assistance for farmers and ranchers to rehabilitate farmland and livestock damaged by natural disasters. http://www.fsa.usda.gov/	Farmers and ranchers
USDA Forest Service National Fire Plan	Funding for organizing, training, and equipping fire districts through Volunteer, State and Rural Fire Assistance programs. Technical assistance for fire related mitigation. http://www.forestsandrangelands.gov/	See website
USDA Forest Service Economic Action Program	Funds for preparation of Fire Safe plans to reduce fire hazards and utilize byproducts of fuels management activities in a value-added fashion. http://www.fs.fed.us/spf/coop/programs/eap/	80% of total cost of project may be covered
USDA Natural Resources Conservation Service	Emergency Watershed Protection Support Services: Funds for implementing emergency measures in watersheds in order to relieve imminent hazards to life and property created by a natural disaster. http://www.nrcs.usda.gov/programs/ewp/	See website

USDA Natural Resources Conservation Service Watershed Protection and Flood Prevention	Funds for soil conservation; flood prevention; conservation, development, utilization and disposal of water; and conservation and proper utilization of land. http://www.nrcs.usda.gov/programs/watershed/index.html	See website

Health and Economic Agencies

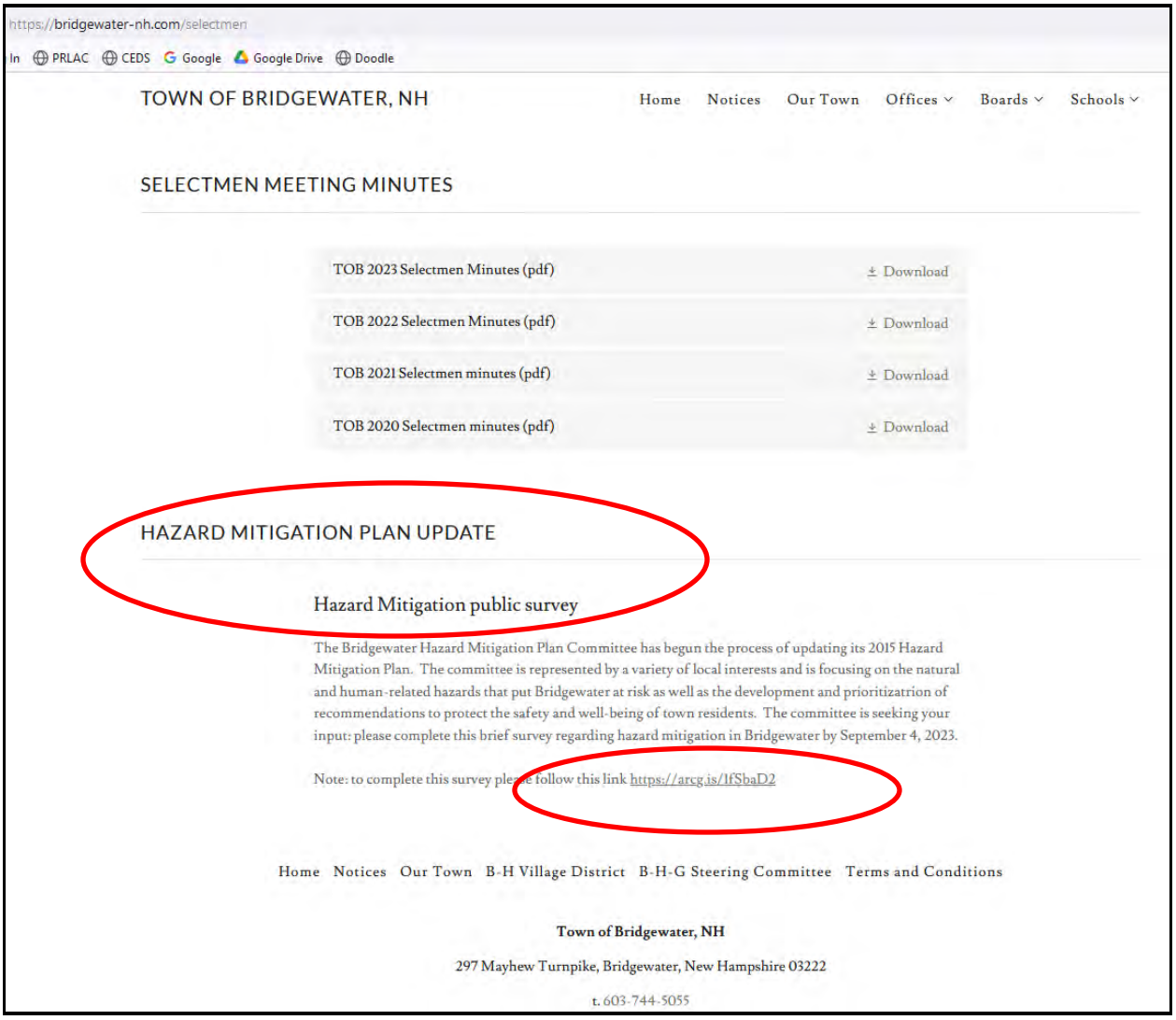
Alternative mitigation programs can be found through health and economic agencies that provide loans and grants aimed primarily at disaster relief.

Federal Loans and Grants for Disaster Relief

Mitigation Funding Sources Program	Details	Notes
Department of Health & Human Services Disaster Assistance for State Units on Aging (SUAs)	Provide disaster relief funds to those SUAs and tribal organizations who are currently receiving a grant under Title VI of the Older Americans Act. http://www.aoa.gov/doingbus/fundopp/fundopp.asp	Areas designated in a Disaster Declaration issued by the President
Economic Development Administration (EDA) Economic Development Administration Investment Programs	Grants that support public works, economic adjustment assistance, and planning. Certain funds allocated for locations recently hit by major disasters. http://www.eda.gov/AboutEDA/Programs.xml	The maximum investment rate shall not exceed 50 percent of the project cost
U.S. Small Business Administration Small Business Administration Loan Program	Low-interest, fixed rate loans to small businesses for the purpose of implementing mitigation measures. Also available for disaster damaged property. http://www.sba.gov/services/financialassistance/index.html	Must meet SBA approved credit rating

APPENDIX C: PUBLICITY AND INFORMATION

Committee meetings were announced on the town of Bridgewater and Lakes Region Planning Commission webpages. Press releases like the one below were sent to the weekly *Plymouth Record Enterprise* and *Newfound Landing* as well as the daily *Laconia Daily Sun* and statewide *Concord Monitor* prior to the Committee meetings. Several informational handouts and the 2015 Hazard Mitigation Plan were distributed to the committee and available at all meetings.



LAKES REGION PLANNING COMMISSION

103 Main Street, Suite #3
Meredith, NH 03253
tel (603) 279-8171
fax (603) 279-0200
www.lakesrpc.org

January 12, 2024

For Immediate Release

Contact: David Jeffers, 279-5341, djeffers@lakesrpc.org

Town of Bridgewater Hazard Mitigation Plan Meeting

The Bridgewater Hazard Mitigation Plan Committee is in the process of updating its 2015 Hazard Mitigation Plan (HMP). The committee is represented by a variety of local interests including the Fire, Police, and Highway departments, along with the Planning and Select Boards. Representatives from vulnerable community members have also been invited to participate. The group is reviewing the various natural hazards that put Bridgewater at risk as well as the development of recommendations to mitigate these hazards and protect the safety and wellbeing of town residents and resources.

The committee will meet on February 1 and again on February 6 at 1:00 PM at the Bridgewater Selectmen's Office 297 Mayhew Turnpike. There is an opportunity to join via Zoom (Info below). Residents of Bridgewater and representatives from neighboring communities are encouraged to attend and provide input. Another way to provide your input to the planning process is by completing the Bridgewater HMP survey at https://arcg.is/1fSbaD2.

Hazard Mitigation Planning is as important to reducing disaster losses as are appropriate regulations and land use ordinances. The most significant areas of concern for Bridgewater are being reviewed and evaluated through this process. The existing Bridgewater HMP can be found at http://www.lakesrpc.org/serviceshazards.asp.

With the update to the Hazard Mitigation Plan, town leaders are evaluating the status of current plans, policies, and actions then developing and prioritizing actions to reduce the impacts of these and other hazards. Community leaders want the town to be a disaster resistant community and believe that updating the Hazard Mitigation Plan will bring Bridgewater one step closer to that goal.

For more information, please contact the Bridgewater Selectmen's Office at 603.744.5055 or David Jeffers, Regional Planner, Lakes Region Planning Commission at 603.279-5341.

Time: February 1 and 6, 2021 01:00 PM Eastern Time
Join Zoom Meeting
https://us02web.zoom.us/j/84592449314
Phone: +1 929 205 6099 US (New York)
Meeting ID: 845 9244 9314 Passcode: 050860

Who To Call for Help:
If the meeting is not accessible, please call or email 603-279-5334
or admin3@lakesrpc.org.

Information

Local Hazard Mitigation Planning

Hazard Mitigation:

"Hazard Mitigation means any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards"

Questions to address:

- Where are potential hazards?
- What are the risks?
- What are we already doing?
- Where are the gaps?
- What actions can be taken?
- What actions are feasible?
- What are our priorities?
- How will these actions be implemented?
- How will the plan be monitored?

What is a Hazard Mitigation Plan?

In cooperation with the NH Bureau of Emergency Management (BEM), the Lakes Region Planning Commission (LRPC) is working with several of its member communities each year to develop local Hazard Mitigation Plans.

The Hazard Mitigation Plans are designed to address each particular community's vulnerability to natural and man-made hazards. The local plan serves as a means to reduce future losses from hazard events before they occur. This local initiative is guided by a community-based Hazard Mitigation Planning Committee, with the LRPC providing technical support. The structure for plan development is provided through the *Guide to Hazard Mitigation Planning for New Hampshire Communities* which ensures that the community has considered the content of the State of New Hampshire Hazard Mitigation (409) Plan.

MITIGATION PROCESS

- IDENTIFY HAZARDS
- PROFILE HAZARD EVENTS
- INVENTORY ASSETS
- ESTIMATE LOSSES
- PRIORITIZE ACTION STEPS
- ADOPT THE PLAN
- IMPLEMENTATION

Why create a plan?

Development of a local Hazard Mitigation Plan is a chance for the community to assess the hazards that have the potential to threaten residents and their property. It also gives the community an opportunity to identify at-risk populations as well as resources within the community that might be at risk. The committee can then explore a variety of steps that might be put into place to help the community reduce damage and loss.

Having a Hazard Mitigation Plan in place, enables many communities to allocate their resources more effectively. It can also be a useful tool for leveraging additional sources of funding in the event of a disaster.

Federal Emergency Management Agency (FEMA) Requirement:

In order for communities to be eligible for the full spectrum of mitigation program funding, local hazard mitigation plans must be approved by FEMA. The staff of LRPC attend semi-annual hazard mitigation meetings and training programs that are designed to expedite the approval process.

Lakes Region Planning Commission
103 N. Main St., Suite #3
Meredith, NH 03253

(603) 279-8171 - phone
(603) 279-0200 - fax

L · R · P · C

Frequently asked questions

- **What will a Hazard Mitigation Plan cost?**

Since this project is funded by the NH Bureau of Emergency Management, the only cost to the community is the dedication of committee members' time and energy.

- **How is a Hazard Mitigation Plan different from an Emergency Action Plan?**

Although there is some overlap, these are different plans, each serving a different function in helping a community to minimize the potential for damage and loss in a community.

Emergency Action Plans (EAP) identifies potential hazard events and the resources available to address them; it also addresses how a community responds to an emergency.

A Hazard Mitigation Plan (HMP) also identifies potential hazard events and community resources. However, an HMP looks at the situation in terms of prevention instead of response. Gaps in coverage, programs, and structural needs are analyzed and specific mitigation steps are recommended and potential funding sources are identified.

- **Is this a community plan, a state plan, or a federal plan?**

The state of New Hampshire does require that each community develop an HMP. Once a plan is approved by FEMA and adopted by the community, should there be a need for Federal Mitigation money, more funding would be available. However, local public involvement is required. The local Emergency Management Director or a committee of citizens should help in plan development; there should also be several public presentations where citizens can make recommendations, provide input, and participate in development of the plan. In the end, the Board of Selectmen need to approve the plan.

Alton dam breach, 1996

The Essentials

At a minimum, each local Hazard Mitigation Plan should contain the following sections:

- An evaluation of the potential hazards within the community
- A description and analysis of local, state, and federal hazard mitigation policies, programs, and capabilities to mitigate the identified hazards in the area
- Goals, objectives, strategies and actions to reduce long-term vulnerability to hazards
- An evaluation of the costs and benefits of the recommended mitigation projects.

State and Local Mitigation Planning

Building stronger and safer

Hazard mitigation planning is the process state, local and tribal governments use to identify risks and vulnerabilities associated with natural disasters and to develop long-term strategies for protecting people and property in future hazard events. The process results in a mitigation plan that offers a strategy for breaking the cycle of disaster damage, reconstruction and repeated damage and a framework for developing feasible and cost-effective mitigation projects. Under the Disaster Mitigation Act of 2000 (Public Law 106-390), State, local and Tribal governments are required to develop a hazard mitigation plan as a condition for receiving certain types of non-emergency disaster assistance.

Reducing risks through mitigation planning

A hazard mitigation plan is a long-term strategy for reducing disaster losses. The planning process promoted by the Disaster Mitigation Act of 2000 is as important as the resulting plan because it encourages jurisdictions to integrate mitigation with day-to-day decision-making regarding land-use planning, floodplain management, site design and other functions.

Mitigation planning elements

- Public involvement – In addition to government agencies involved in incident management, floodplain management and economic development, the planning process usually involves a range of stakeholders, including representatives of neighborhood groups, civic organizations, academia, environmental groups, the business community and individual citizens. Involving stakeholders is essential to determining the most vulnerable populations and facilities in the community and to assuring community wide support for the plan.
- Risk assessment – A risk assessment is the process of identifying natural hazards and risks associated with them, including threats to public health and safety, property damage and economic loss. The assessment answers the fundamental question, "What would happen if a natural disaster occurred?" and provides a factual basis for the mitigation activities proposed in the strategy. The assessment includes a description of the type, location and extent of natural hazards; the jurisdiction's vulnerability to the hazards; and the type and numbers of buildings, infrastructure and critical facilities located in identified hazard areas.
- Mitigation strategy – Based on the risk assessment, State, local and Tribal governments develop mitigation goals and objectives and a strategy for mitigating disaster losses. The strategy sets forth an approach for implementing activities that are cost-effective, technically feasible and environmentally sound.

Hazard mitigation plan required to receive HMGP Project Grants

Local jurisdictions are required by federal law to have a FEMA-approved hazard mitigation plan in order to receive Pre-Disaster Mitigation (PDM) or Hazard Mitigation Grant Program (HMGP) project grant funding. However, in extraordinary circumstances, HMGP funds can be awarded to communities that agree to develop a hazard mitigation plan within 12 months of receiving the project grant. Every State has a FEMA-approved hazard mitigation plan, though many local jurisdictions still do not.

Fact Sheet

State and Local Mitigation Planning

FEMA

Mitigation Examples

History shows that the physical, financial and emotional losses caused by disasters can be reduced significantly through mitigation planning. Mitigation focuses attention and resources on solving a particular problem (such as reducing repetitive flood losses) and thereby produces successive benefits over time. Through implementation of local floodplain ordinances, for example, it is estimated that $1.1 billion in flood damages are prevented annually.

Mitigation includes a broad range of activities designed to protect homes, schools, public buildings and critical facilities. Examples include the following types of projects:

- Adopting and enforcing more stringent building codes, flood-proofing requirements, seismic design standards, or wind-bracing requirements for new construction or the retrofit of existing buildings.
- Exceeding the National Flood Insurance Program (NFIP) floodplain management regulations by elevating structures above the base flood elevation (BFE) in high-risk areas.
- Adopting stricter development regulations and zoning ordinances that steer development away from areas subject to flooding, storm surge, or coastal erosion.
- Retrofitting public buildings, schools and critical facilities, such as police and fire stations, to withstand hurricane-strength winds or ground shaking from earthquakes.
- Using public funds to acquire damaged homes or businesses in flood-prone areas, demolish or relocate the structures and use the property for open space, wetlands, or recreational uses.
- Building community shelters and "safe rooms" to help protect people in public buildings and schools in hurricane- and tornado-prone areas.

Planning tool available for government agencies

FEMA has developed a number of planning tools to help government agencies develop mitigation plans. These include how-to guides, CD ROMs and online information about organizing a planning team, involving stakeholders, conducting risk assessments, evaluating potential mitigation measures, conducting benefit-cost analyses and other planning issues.

For more information

Please visit: http://www.fema.gov/plan/mitplanning/index.

For state name disaster recovery, visit www.fema.gov or your state Web-site.

FEMA

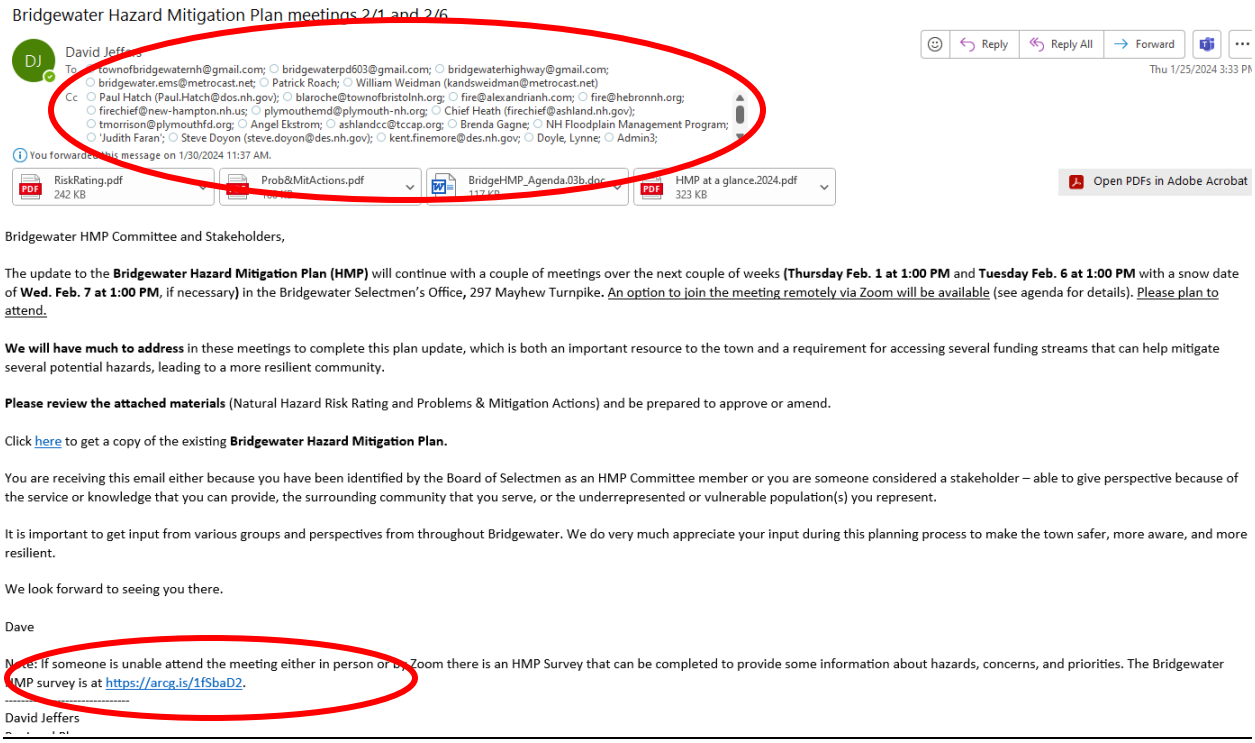
"FEMA's mission is to support our citizens and first responders to ensure that as a nation we work together to build, sustain, and improve our capability to prepare for, protect against, respond to, recover from, and mitigate all hazards."

APPENDIX D: MEETINGS, AGENDAS, PARTICIPATION, and SURVEY

Invitations to participate in meetings were sent to committee members, neighboring EMDs, various state agencies, and stakeholders including those who work with socially vulnerable communities.

This section also contains copies of the Committee meeting agendas and a summary of participation. All Committee meetings were held in the Bridgewater Town Hall and were open to the public. Agendas were developed by the LRPC planner who also facilitated the meetings. At each meeting there was an opportunity for public input.

Invitation



Bridgewater Hazard Mitigation Plan meetings 2/1 and 2/6

DJ David Jeffers

To: townofbridgewaternh@gmail.com; bridgewaterpd603@gmail.com; bridgewaterhighway@gmail.com; bridgewater.ems@metrocast.net; Patrick Roach; William Weidman (kandsweidman@metrocast.net)

Cc: Paul Hatch (Paul.Hatch@dos.nh.gov); blaroche@townofbristolnh.org; fire@alexandrianh.com; fire@hebronnh.org; firechief@new-hampton.nh.us; plymouthemd@plymouth-nh.org; Chief Heath (firechief@ashland.nh.gov); tmorrison@plymouthfd.org; Angel Ekstrom; ashlandcc@tccap.org; Brenda Gagne; NH Floodplain Management Program; 'Judith Faran'; Steve Doyon (steve.doyon@des.nh.gov); kent.finemore@des.nh.gov; Doyle, Lynne; Admin3;

Reply | Reply All | Forward

Thu 1/25/2024 3:33 PM

You forwarded this message on 1/30/2024 11:37 AM.

RiskRating.pdf 242 KB | Prob&MitActions.pdf | BridgeHMP_Agenda.03b.doc 117 KB | HMP at a glance.2024.pdf 323 KB

Open PDFs in Adobe Acrobat

Bridgewater HMP Committee and Stakeholders,

The update to the **Bridgewater Hazard Mitigation Plan (HMP)** will continue with a couple of meetings over the next couple of weeks **(Thursday Feb. 1 at 1:00 PM** and **Tuesday Feb. 6 at 1:00 PM** with a snow date of **Wed. Feb. 7 at 1:00 PM**, if necessary**)** in the Bridgewater Selectmen's Office**,** 297 Mayhew Turnpike**.** An option to join the meeting remotely via Zoom will be available (see agenda for details). Please plan to attend.

We will have much to address in these meetings to complete this plan update, which is both an important resource to the town and a requirement for accessing several funding streams that can help mitigate several potential hazards, leading to a more resilient community.

Please review the attached materials (Natural Hazard Risk Rating and Problems & Mitigation Actions) and be prepared to approve or amend.

Click here to get a copy of the existing **Bridgewater Hazard Mitigation Plan.**

You are receiving this email either because you have been identified by the Board of Selectmen as an HMP Committee member or you are someone considered a stakeholder – able to give perspective because of the service or knowledge that you can provide, the surrounding community that you serve, or the underrepresented or vulnerable population(s) you represent.

It is important to get input from various groups and perspectives from throughout Bridgewater. We do very much appreciate your input during this planning process to make the town safer, more aware, and more resilient.

We look forward to seeing you there.

Dave

Note: If someone is unable attend the meeting either in person or by Zoom there is an HMP Survey that can be completed to provide some information about hazards, concerns, and priorities. The Bridgewater HMP survey is at https://arcg.is/1fSbaD2.

David Jeffers

Bridgewater Hazard Mitigation Plan Update Committee

February 1, 2024 at 1:00 PM
In-person Attendance
Bridgewater Selectmen's Office
297 Mayhew Turnpike (NH Route 3A), Bridgewater, NH

Online Access:
https://us02web.zoom.us/j/85061150216?pwd=RWJoNWV1WjZzdjExSjhxS0xlVGxFdz09
Meeting ID: 850 6115 0216 Passcode: 050860
Telephone only Access: Dial +1 929 205 6099
Anyone who has trouble accessing the meeting can call 603-279-5334 or email admin3@lakesrpc.org for assistance.

AGENDA

1. Introductions

2. Hazard Risk Assessment (Natural Hazards)
   a. Review updated Risk Rating sheet

3. Review of HMP Goals

4. Mitigation
   a. Review and approve list of Hazard Problems
   b. Review and approve list of Hazard Mitigation Actions (and estimated costs)
   c. Establish method of prioritizing Mitigation Actions

5. Public Input

6. Next Meeting – February 6 at 1:00 PM Bridgewater Selectmen's Office
   a. Cost-Benefit analysis of proposed Mitigation Actions
   b. Prioritize Implementation of new Mitigation Actions
   c. Plan Monitoring and Public Involvement

Scheduling note: Snow date is Feb. 7 at 1:00 PM, if necessary.

The focus of this process is **mitigation**, which is an action taken to reduce or eliminate long-term risk to hazards. **Mitigation is different from preparedness**, which is an action taken to improve emergency response or operational preparedness.

Bridgewater Hazard Mitigation Plan Update Committee

February 6, 2024 at 1:00 PM
In-person Attendance
Bridgewater Selectmen's Office
297 Mayhew Turnpike (NH Route 3A), Bridgewater, NH

Online Access:
https://us02web.zoom.us/j/85061150216?pwd=RWJoNWV1WjZzdjExSjhxS0xlVGxFdz09
Meeting ID: 850 6115 0216 Passcode: 050860
Telephone only Access: Dial +1 929 205 6099
Anyone who has trouble accessing the meeting can call 603-279-5334 or email admin3@lakesrpc.org for assistance.

AGENDA

1. Introductions
2. Cost-Benefit analysis of proposed Mitigation Actions
3. Prioritization of Mitigation Actions
4. Implementation of Mitigation Actions
5. Plan Monitoring and Public Involvement
6. Public Input
7. Next Steps
   a. Review of draft
   b. Submission for review – NH HSEM & FEMA
   c. FEMA APA
   d. Local adoption

Scheduling note: Snow date is Feb. 7 at 1:00 PM, if necessary.

The focus of this process is **mitigation**, which is an action taken to reduce or eliminate long-term risk to hazards. **Mitigation is different from preparedness**, which is an action taken to improve emergency response or operational preparedness.

Participants

	2/24/23	8/3/23	2/1/24	2/6/24				Contact Name(s)	Title
Purpose	Meeting #1	Meeting #2	Meeting #3	Meeting #4	Homework/ Correspond. (Previous Quarters)	Review & Comment	Adoption		
								Local Match	
Hours		X			X	X		Maurice (Skip) Jeness, Jr.	Bridgewater Selectman
	X	X	X	X	X	X		Terence Murphy	Bridgewater Selectman*
			X		X	X		P. Wesley Morrill, Jr.	Bridgewater Selectman
			X	X	X	X		Julie Converse	Bridgewater Administrative Assistant
			X	X	X	X		George Huckins	Bridgewater Police Chief
					X	X		Arnold Cate	Bridgewater DPW
			X	X	X	X		Donald Atwood	Bridgewater Fire Dept.
				X	X	X		Jacob Fogarty	Bridgewater EMS - Director
			X		X	X		Linda Fischer	Bridgewater EMS
				X	X	X		Bethany Marsinelli	Bridgewater EMS
					X	X		Patrick Roach	Bridgewater Planning Board (Chair)
				X	X	X		Kenneth Weidman	Bridgewater Planning Board (Vice-Chair)
								James Gickas	Bridgewater Code Enforcement
					X			Various (9 residents)	Survey Respondents
				X	X	X		Judith Faran	Bridgewater LRPC Commissioner
								Other Match	
			X	X	X	X		Angel Ekstrom	Public Health Emerg. Prep. Coord., CNH Public Health Network
					X			Lorene Pelino	Tri-County CAP (Community Action Program)
			X					Jamie Moulton	Town of Hebron - Fire Chief
			X					Arin Lucarelli	Town of Hebron - Asst. EMD
								Non-Match Participants/Contributors	
					X			Steve Doyon	NH DES Dam Bureau
					X			Katie Paight	NH Floodplain Management Dir., NH OPD
					X	X		Lynne Doyle	NH HSEM State Hazard Mitigation Planner
	X				X			Paul Hatch	NH HSEM Field Rep

Public Input - Survey

In addition to postings and press releases requesting public input at meetings, members of the public were also encouraged to complete an on-line survey to provide input to the hazard mitigation planning process. Nine responses were received and shared with the committee at meetings as local risk was considered and problems/mitigation actions discussed.

Hazards of Concern:

- High – High Wind events, Severe Winter Storms, Flooding
- Medium – Drought, Lightning, Extreme Temperatures, Wildfires

Effective means of reaching me

- Electronic newsletter, mailings, internet, town website

Priorities for mitigating hazards

- Protecting critical facilities (such as transportation networks, fire stations, medical facilities)
- Protecting and reducing damage to utilities
- Protecting historical and cultural landmarks
- Limiting development in hazard areas
- Protecting private property

Comments

- River Road is deteriorating again very quickly, especially as a result of the unusually heavy rains and the use of the road for the vehicles involved in transmission line construction in neighboring towns. Along River Road and other roads, failure to remove dead trees very close to roadway creates danger that road may be impassable during weather that causes other emergencies. Locations that do not have cell service and/or internet service pose problems, even as service becomes more widely available, since the expectation is that service is available everywhere. Several class 6 roads have recently become close to impassable due to careless users during mud season. Note that some of the ratings above reflect not my level of concern but my level of concern AND the likelihood that measures to mitigate would prove useful.
- Thank you for replacing the broken pavement and repaving on Bridgewater Hill Road.
- The town has a Steep Slope Ordinance. Steep Slopes: Any land area where the inclination of the land's surface from the horizontal is fifteen percent (15%) or greater. NOWHERE does this mention building adjacent to a steep slope. As a member of PRLAC, we see numerous instances where people build so near a slope that it causes erosion of that slope, pollution of the stream/river that is below, and this often causes the need for later mitigation or repair. This problem is quite evident in the new structure built at the corner of John Jenness Rd and River Road. This property should never have been allowed. I implore you to adopt a steep slope ordinance that includes restrictions for distance from a steep slope.
- Thank you for asking.
- There is quite a bit of erosion along the west bank of the Pemi river that is cutting into River Road. This is not only damaging the road but allowing debris and road contaminants to leach into the river and aquifer.
- River Road is a shambles. I know it is state maintained, but maybe the town can pressure the state to repair it.

APPENDIX E: HAZARD EVENTS PRIOR TO 2015

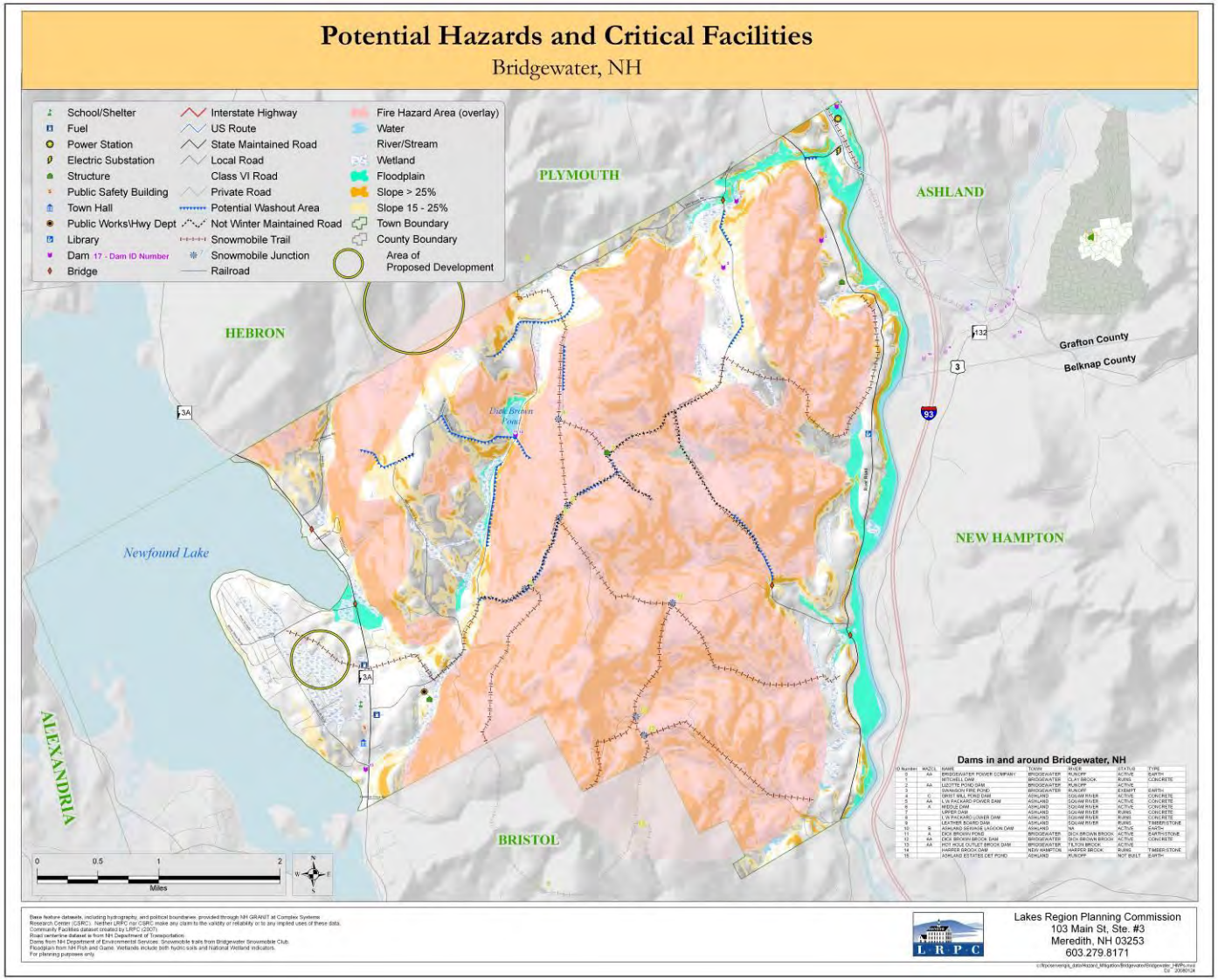
Hazard	Date	Location	Impacts/Assessment
Tornado	July 14, 1963	Grafton County	F1, $3,000 in damages
Tornado	June 27, 1964	Grafton County	F0, $25,000 in damages
Tornado	August 11, 1966	Grafton County	F2, $250,000 in damages
Tornado	August 25, 1969	Grafton County	F1, $25,000 in damages
Tornado	July 21, 1972	Grafton County	F1, $25,000 in damages
Tornado	July 21, 1972	Grafton County	F1, $25,000 in damages
Tornado	May 11, 1973	Grafton County	F2
Tornado	June 11, 1973	Grafton County	F0
Downburst	July 6, 1999	Grafton County, Merrimack and Hillsborough	
Tornado	7/24/2008	Southern Lakes Region	F2 Tornado 50-mile path Uprooted and snapped trees, damaged structures. Declared disaster DR-1782
Tornado	8/21/2011	Grafton, Orange	F1 Tornado 2.7 miles long, 350 yds wide Damaged hundreds of trees and several buildings
Tornado	7/17/2012	Bridgewater	F0 Waterspout on Newfound Lake No damages
Microburst	10/31/2012	Franklin	Winds > 50 knots Downed numerous trees, destroying one house and damaging several others
Drought	June 1, 1999	Statewide	Governor's Office declaration moderate drought for most of the state.
High Wind Events	2008-2015	S. Grafton Co.	27 High Wind events reported during this time.
Drought	Aug. – Dec. 2001	Statewide	Governor's Office declaration moderate drought for most of the state. Palmer Drought Severity Index was Moderate.
Earthquake	December 24, 1940	Carroll County	5.5 - felt over 400,000 square miles. Severe damage.
Flood	July 4, 1973	Grafton County	Fourteen bridges and many roadways were damaged which totaled $171,000.
Flood	July 1, 1986 - August 10, 1986	Statewide	Severe summer storms with heavy rains, flash flooding and severe high winds
Flood	August 7-11, 1990	Statewide	Wide spread flooding, a series of storm events with moderate to heavy rains
Flood	October 1, 1996	Grafton County	Heavy Rains
Flood	October - November 1995	Grafton County	Heavy Rains
Flood	June 1998	Bridgewater	Numerous road and culvert washouts. This led to the release of FEMA funding over the next two years for upgrades. 1 death.
Flood	Sept. 16-18, 1999	Grafton County	Remnants of Hurricane Floyd resulted in $570,500 of property damage. Power out to 10,000 customers.

Hazard	Date	Location	Impacts/Assessment
Flood	September 12, 2003	Statewide	Severe storms and flooding
Flood	June 9, 2005	Southern Grafton County	Flash flooding resulted in $1.0 M in property damages.
Flood	October 26, 2005	Statewide	Severe storms and flooding
Flood	May 14 – 16, 2006	Grafton County	Up to 12 inches of rain in three days.
Flood	May, 12 - June 30, 2006	Statewide	Severe storms and flooding
Flood	7/24/2008-8/14/2008	Grafton Co.	Damages of over $3 million Declared Disaster DR-1787
Flood	4/26-30 /2011	Grafton Co.	Damages of $1.8 million Declared Disaster DR-4006
Flood	8/28/2011	Grafton County, Holderness & Plymouth	Tropical Storm Irene caused the Pemigewasset River to crest at 21.7 feet in Plymouth, 8.7 feet above flood stage. Declared Disaster DR-2046
Flood	10/26 – 11/6/2012	Grafton County	Declared Disaster DR-4095 Remnants of Hurricane Sandy
Forest Fire	August 9, 2001	Grafton County	Fire caused by lightning burned 0.75 acres.
Forest Fire	Summer 2006	Bristol	Adjacent town – Bristol Peak had seven acre forest fire.
Lightning	April 12, 2001	Plymouth, Ashland	Separate fires in apartment building and house.
Lightning	Sept. 4, 2003	Bristol	Damage to home electrical system and equipment totaled $10,000.
Lightning	June 27, 2005	Plymouth	Three separate strikes caused a barn fire, damage to Town Hall and communications and electronics equipment were damaged, and one injury. Total damages were $110,000.
Hurricane	September 9, 1991	Statewide	Hurricane Bob, severe storms
Hurricane	September 18-19, 1999	Grafton County	Heavy Rains associated with tropical storms, Hurricane Floyd affected the area.
Blizzard	March 16, 1993	Statewide	High winds and record snowfall
Ice Storm	January 7, 1998	Statewide	In Grafton County there were moderate to severe conditions. 52 communities in the county were impacted, six injuries and one fatality; major roads closures, 67,586 without electricity, 2,310 without phone service, one communication tower, $17 million of damages. Some in Bridgewater were without power for six months.
Nor'easter	April 27, 2007	Statewide	Nor'easter caused flooding, damage in excess of $25 million s of August 2007.
Snow Storm	December 1, 1973	Grafton County	Two back-to-back snow storms
Snow Storm	February 6, 2001	Grafton County	Accumulation of 34 inches
Snow Storm	March 16, 1993	Statewide	
Snow Storm	March 30, 2005	Statewide	$6.5 million in public assistance. This storm had a heavy impact on Bridgewater.
Snow Storm	January 15, 2004	Statewide	

Hazard	Date	Location	Impacts/Assessment
Snow Storm	March 28, 2001	Statewide	
Ice Storm	12/11/2008	Statewide	State emergency declaration after major power and transportation disruption. Exceeding $15 million in damages. Over 400,000 without power, 2 fatalities due to carbon monoxide poisoning. Disaster Declaration DR-1812. In Southern Grafton County, damages were $225,000.
Nor'easters	Feb. 23 – March 3, 2010	Statewide	330,000 without power and $2 million in damages. Disaster Declaration DR-1892
Ice Storm	3/6/2011	Statewide	$700,000 plus numerous power outages. Ice jams along the Pemigewasset River in Plymouth. In Southern Grafton County, damages were $159,000.
Winter storms	2008-2015	S. Grafton Co.	27 storms

Table Sources:
http://www.tornadoproject.com
New Hampshire Homeland Security and Emergency Management (NH HSEM)
National Oceanic and Atmospheric Administration (NOAA)
National transportation Safety Board (NTSB)
Federal Emergency Management Agency (FEMA)
Northeast States Emergency Consortium (NESEC)
National Interagency Fire Center (NIFC)

APPENDIX F: CRITICAL FACILITIES & POTENTIAL HAZARDS MAP



APPENDIX G: HAZARDS – SUPPLEMENTARY INFORMATION (Hazards, Other Actions)

This section provides statewide or regional information regarding hazards. Some information is about hazards mentioned in the NH Hazard Mitigation Plan. Other information either provides context or extra detail which supplements the locally important information addressed in Section III.

I. FLOOD, WILDFIRE, DROUGHT

Flooding due to Dam Failure

Dam failure results in rapid loss of water that is normally held back by a dam. These types of floods can be extremely dangerous and pose a threat to both life and property. Dam classifications in New Hampshire are based on the degree of potential damages that a failure or disoperation of the dam is expected to cause. The classifications are designated as non-menace, low hazard, significant hazard, and high hazard and are summarized in greater detail in Table G-1.

The designations for these dams relate to damage that would occur if a dam were to break, not the structural integrity of the dam itself. In the Lakes Region, the Town of Alton was impacted by an earthen dam failure on March 12, 1996. Although listed in the NH Hazard Mitigation Plan as a significant hazard, it did result in the loss of one life.

Table G-1: New Hampshire Dam Classifications[15]

Classification	Description
Non-Menace	A dam that is not a menace because it is in a location and of a size that failure or misoperation of the dam would not result in probable loss of life or loss to property, provided the dam is: • Less than six feet in height if it has a storage capacity greater than 50 acre-feet; or • Less than 25 feet in height if it has a storage capacity of 15 to 50 acre-feet.
Low Hazard	A dam that has a low hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in any of the following: • No possible loss of life. • Low economic loss to structures or property. • Structural damage to a town or city road or private road accessing property other than the dam owner's that could render the road impassable or otherwise interrupt public safety services. • The release of liquid industrial, agricultural, or commercial wastes, septage, or contaminated sediment if the storage capacity is less than two-acre-feet and is located more than 250 feet from a water body or water course. • Reversible environmental losses to environmentally-sensitive sites.
Significant Hazard	A dam that has a significant hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in any of the following: • No probable loss of lives. • Major economic loss to structures or property. • Structural damage to a Class I or Class II road that could render the road impassable or otherwise interrupt public safety services. • Major environmental or public health losses, including one or more of the following:

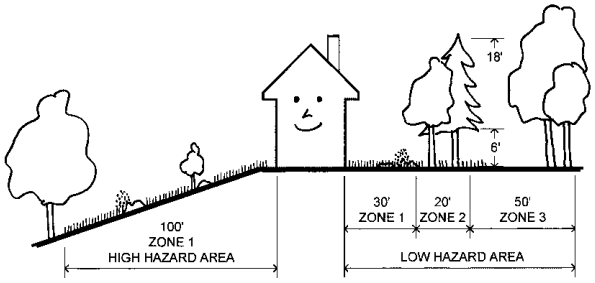
[15] NH DES Fact Sheet WD-DB-15 "Classification of Dams in New Hampshire", http://des.nh.gov/organization/commissioner/pip/factsheets/db/documents/db-15.pdf. Accessed October 1, 2012.

	• Damage to a public water system, as defined by RSA 485:1-a, XV, which will take longer than 48 hours to repair. • The release of liquid industrial, agricultural, or commercial wastes, septage, sewage, or contaminated sediments if the storage capacity is 2 acre-feet or more. • Damage to an environmentally-sensitive site that does not meet the definition of reversible environmental losses.
High Hazard	A dam that has a high hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in probable loss of human life as a result of: • Water levels and velocities causing the structural failure of a foundation of a habitable residential structure or commercial or industrial structure, which is occupied under normal conditions. • Water levels rising above the first floor elevation of a habitable residential structure or a commercial or industrial structure, which is occupied under normal conditions when the rise due to dam failure is greater than one foot. • Structural damage to an interstate highway, which could render the roadway impassable or otherwise interrupt public safety services. • The release of a quantity and concentration of material, which qualify as "hazardous waste" as defined by RSA 147-A:2 VII. • Any other circumstance that would more likely than not cause one or more deaths.

Wildfire

Several areas in the region are relatively remote in terms of access and firefighting abilities. Of greatest concern are those areas characterized by steep slopes and vast woodlands, with limited vehicular access. These areas include the Ossipee, Squam, Belknap, and Sandwich Mountain Ranges. As these once remote areas begin to see more development (the urban wildfire interface), care should be taken to ensure that adequate fire protection and buffers are established. Techniques include increased buffers between wooded areas and residential buildings, requirements for cisterns or fire ponds, a restriction on the types of allowable building materials such as shake roofs, and special considerations for landscaping. While historically massive wildfires have been western phenomena, each year hundreds of woodland acres burn in New Hampshire.

The greatest risk exists in the spring when the snow has melted and before the tree canopy has developed, and in the late summer – early fall. Appropriate planning can significantly reduce a community's vulnerability to wildfires. There are four-zone suggestions from the Firewise community program that could be potentially helpful for Bridgewater's homeowners.[16]



FIREZONES

ZONE 4 is a natural zone of native or naturalized vegetation. In this area, use selective thinning to reduce the volume of fuel. Removing highly flammable plant species offers further protection while maintaining a natural appearance.

[16] http://www.firewise.org accessed September 21, 2012.

ZONE 3 is a low fuel volume zone. Here selected plantings of mostly low-growing and fire-resistant plants provide a decreased fuel volume area. A few well-spaced, fire resistant trees in this zone can further retard a fire's progress.

ZONE 2 establishes a vegetation area consisting of plants that are fire resistant and low growing. An irrigation system will help keep this protection zone green and healthy.

ZONE 1 is the protection area immediately surrounding the house. Here vegetation should be especially fire resistant, well irrigated and carefully spaced to minimize the threat from intense flames and sparks.

Conflagration

Conflagration is an extensive, destructive fire in a populated area that endangers lives and affects multiple buildings. Historically, many New Hampshire towns were settled in areas along waterways in order to power the mills. Often the town centers were at a low point in the topography, resulting in dense residential development on the steeper surrounding hillsides. Hillsides provide a natural updraft that makes firefighting more difficult. In particular, structural fires spread more readily in hillside developments because burning buildings pre-heat the structures that are situated above them.

Alton Bay Christian Conference Center, 2009

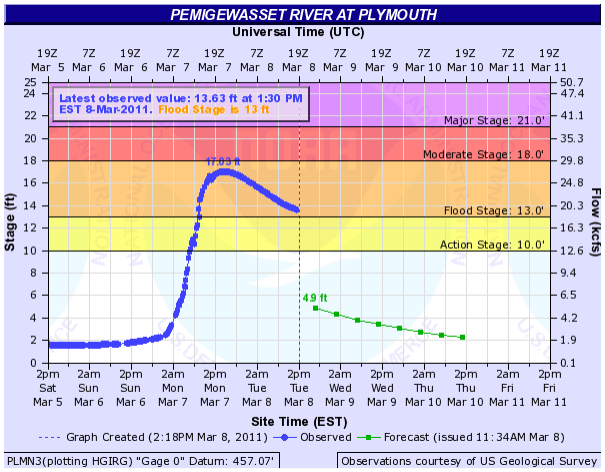
Within the Lakes Region the city of Laconia was the site of one of the most devastating structural fires to occur in the state of New Hampshire. The 1903 Great Lakeport Fire consumed more than 100 homes; two churches, two factories, a large mill, a power plant, and a fire station. Wolfeboro's history includes a significant fire in the winter of 1956. This event is recognized as the last block fire in town and is considered a small conflagration. On April 12, 2009 the Alton Bay Christian Conference Center complex caught fire, resulting in an 11-alarm fire and destroying more than 40 structures.

II. GEOLOGICAL HAZARDS

ICE JAM

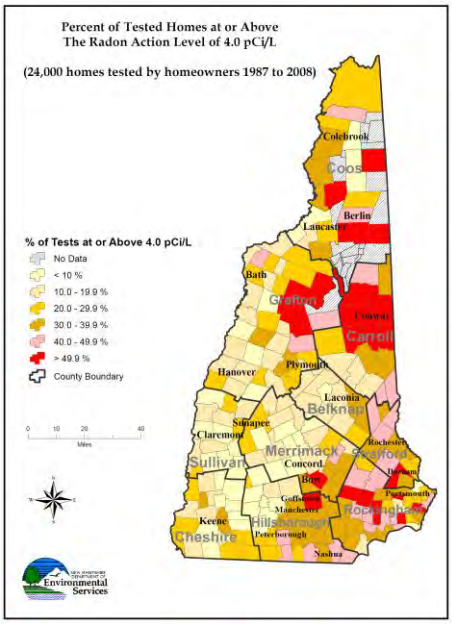
Ice forming in riverbeds and against structures often presents significant hazardous conditions for communities. Meltwater or stormwater may encounter these ice formations and apply lateral and/or vertical force upon structures. Moving ice may scour abutments and riverbanks. Ice may also create temporary dams. These dams can create flood hazard conditions where none previously existed. As indicated by the stream gauge record (below right), ice jams can lead to very rapid changes in river levels (in this case a fifteen foot increase in twelve hours).

March 2011 Ice Jam at NH Route 175A bridge across the Pemigewasset River



Stream gauge at bridge indicating change in river level in early March 2011.

Between 1835 and 2008 there were 42 ice jams reported in the Holderness/Plymouth area of the Pemigewasset. According to the Corps of Engineers Cold Regions Research and Engineering Laboratory (CRREL), 43% of New Hampshire ice jams have occurred in March and April during the ice breakup on the rivers, while 47% of ice jams occurred in January and February during either ice freeze up or ice break up periods.[17]



RADON

Radon is a naturally occurring colorless, odorless radioactive gas usually associated with granite rock formations. The gas can seep into basements through the air. It can also be transported via water and is released once the water is aerated, such as during a shower. Extended exposure to radon can lead to higher rates of cancer in humans. Radon is not a singular event – it can take years or decades to see the effects. The NH Office of Community and Public Health's Bureau of Radiological Health indicates that one third of homes in New Hampshire have indoor radon levels that exceed the US Environmental Protection Agency's "action level" of 4 pCi/l.[18] The map at the right indicates that 20-29.9% of the homes in Bridgewater exceeded the recommended limit of 4.0 pCi/l in state-wide testing conducted over the past twenty years.[19]

HAIL

[17] "Ice Jams in New Hampshire," CRREL, http://icejams.crrel.usace.army.mil/tectran/IERD26.pdf Visited July 25, 2013

[18] http://www.nh.gov/safety/divisions/hsem/NaturalHazards/index.html visited February 8, 2011.

[19] NH DES Radon Program http://des.nh.gov/organization/divisions/air/pehb/ehs/radon/index.htm, accessed October 9, 2012.

Hail can cause damage to crops and structural damage to vehicles. Hail is measured by the TORRO intensity scale, shown in Table G-5. Although hailstorms are not particularly common in the Lakes Region, which averages fewer than two hailstorms per year, several have occurred in New Hampshire in the last decade. In 2007 and 2008 nearby Laconia experienced hail storms with no resulting damage, though reported hail sizes were as large as 1.25 inches (H4).

Table G-5: TORRO Hailstorm Intensity Scale

Code	Diameter	Description	Typical Damage
H0	5-9 mm*	Pea	No damage
H1	10-15 mm	Mothball	Slight damage to plants, crops
H2	16-20 mm	Marble, grape	Significant damage to fruit, crops, vegetation
H3	21-30 mm	Walnut	Severe damage to fruit/crops, damage to glass/plastic structures, paint & wood scored
H4	31-40 mm	Pigeon's egg	Widespread glass damage, vehicle bodywork damage
H5	41-50 mm	Golf ball	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	51-60 mm	Hen's egg	Aircraft bodywork dented, brick walls pitted
H7	61-75 mm	Tennis ball	Severe roof damage, risk of serious injuries
H8	76-90 mm	Large orange	Severe damage to aircraft bodywork
H9	91-100 mm	Grapefruit	Extensive structural damage. Risk of severe or fatal injuries to exposed persons
H10	>100 mm	Melon	Extensive structural damage. Risk of severe or fatal injuries to exposed persons

***mm** = millimeters (Approximate range since other factors (e.g. number, density of hailstones, hail fall speed, surface wind speed) affect severity
Source: http://www.torro.org.uk/torro/severeweather/hailscale.php

Preparation or Response Actions

Hazard	ID	Action	Anticipated Cost ($/Hours)	Comment
All		Purchase cots and MREs for the emergency shelter and identify storage space.	$5,000	Still a need.
All		Update the Emergency Operations Plan. Coordinate with NHHSEM regarding guidance, support, and funding.	<$5,000	The EOP guides emergency response and is for consistent coordination and continuity of operations.
Fire		Maintain Class VI roads and Trails for Emergency Access (limited access) to homes and recreation areas that are difficult to reach.	<$10,000	Being done. Also have designated Private Roads for Emergency Access.

APPENDIX H: PRIORITIZATION DETAILS

As the Committee began the process of prioritizing these actions, the group utilized the standard STAPLEE project prioritization. The committee reviewed each mitigation action in the standard STAPLEE categories (**Social**, **Technical**, **Administrative**, **Political**, **Environmental**, and **Economic**). Below is the STAPLEE Criteria Sheet used by the Committee. It was noted that the 'Economic' category could include the cost of the project, potential outside funding sources, and the potential impacts on the local economy. Detailed project scores follow.

STAPLEE Criteria

Committee members are asked to consider both the costs and benefits of implementing identified mitigation actions. The starting point is to consider all actions as positive steps towards making the community a safer place. Any of the STAPLEE criteria that would hinder the action from moving to implementation should be noted. When evaluating the mitigation actions, the following questions are designed to help identify potential obstacles to implementation for each criterion.

Social

- ☐ Will the action unfairly affect any one segment of the population?
- ☐ Will it disrupt established neighborhoods or adversely affect cultural resources?
- ☐ Is it compatible with present and future community values?

Technical

- ☐ Is the proposed action technically feasible?
- ☐ Will it reduce losses in the long term with minimal secondary impacts?

Administrative

- ☐ Does the community have the capability to implement the action? (staff, technical expertise, funding)
- ☐ Can the community provide the necessary maintenance?
- ☐ Can it be accomplished in a timely manner?

Political

- ☐ Is there local/regional support for this sort of mitigation activities or program?

Legal

- ☐ Does the community have the authority to implement the action?
- ☐ Is enabling legislation necessary? (ordinance, resolution, etc.)

Environmental

- ☐ Are there likely to be positive or negative impacts to the environment if this action is implemented?
- ☐ Does the action comply with local, state, and federal environmental regulations?
- ☐ Is it consistent with community environmental goals?

Economic

- ☐ Can the cost of this action be managed by the community? (operating budget or capital improvements)
- ☐ Are state/federal grant programs applicable?
- ☐ Will this reduce costs, for example improving insurance ratings?
- ☐ How does this action fit in with existing economic development plans?
- ☐ Is it likely that this action will result in economic benefits for the community?

Note: Some HMP Committees choose not to use the "Political" category for rating. Some committees choose to combine the "Economic" and "Costs" categories.

This table shows the detailed scoring of the Mitigation Actions by the Bridgewater Hazard Mitigation Committee. For each action, the benefits and costs of implementing the action (under each of the seven categories) were considered and scored 3, 2, 1 with a 'one' indicating that the costs outweighed the benefits in a particular category, a 'three' meant that the benefits were greater that the costs, and a 'two' meant that the while there are costs associated with the project, they are balanced out by the benefits. The seven category scores were summed for an overall project total. The maximum total score is 21, the minimum is 7. Actual results ranged from 18 to 7. These ratings were arrived at through committee discussion and group consensus.

Scoring: 3 = Highly effective or feasible, 2 = Neutral, 1 = Ineffective or not feasible

Hazard	ID	Problem	Action	Social	Technical	Administrative	Political	Legal	Environmental	Economics/ Cost	STAPLEE Total
Flood/ Erosion	FE 2a	Work was done on Hammond Hill. Still on NH DOT's Municipal Red List - concern about wooden stringers and laid rock. It is an expensive job.	Phase I. Develop a plan to identify and pursue funding to repair and improve the Hammond Hill bridge..	3	2	2	3	2	3	3	**18**
Flood/ Erosion	FE 3a	The bridge at Bridgewater Hill near Dick Brown Road needs repair. It is an expensive job.	Develop a plan to identify and pursue funding to repair and improve the Bridgewater Hill bridge. Consider breaking the project into phases.	3	2	2	3	2	3	3	**18**
All Hazards	AH 2	The town Master Plan (2006) is due for an update. This document is the foundation for the ordinances and regulations that guide land use and development in town.	Update the town's Master Plan.	2	3	3	2	3	2	2	**17**
Extreme Temps	ET 2	Warmer, wetter climate is resulting in later and later ice cover on the lake. This is impacting the ecosystem.	Work with NHDES Dam Bureau to adjust lake levels to mitigate some of the ecosystem impact.	3	3	2	2	2	3	2	**17**
Flood/ Erosion	FE 1	Washouts occur on Poole Hill Road and Dick Brown Road near the intersection of the two roads.	Upgrade the culvert near the intersection of Poole Hill Road and Dick Brown Road.	3	2	2	3	2	2	3	**17**
Flood/ Erosion	FE 2b	Work was done on Hammond Hill. Still on NH DOT's Municipal Red List - concern about wooden stringers and laid rock.	Raise and widen the red-listed Hammond Hill bridge	3	2	2	3	2	3	2	**17**
Flood/ Erosion	FE 2c	Work was done on Hammond Hill. Still on NH DOT's Municipal Red List - concern about wooden stringers and laid rock.	Complete reconstruction & rechanneling at the red-listed Hammond Hill bridge.	3	2	2	3	2	3	1	**16**

Hazard	ID	Problem	Action	Social	Technical	Administrative	Political	Legal	Environmental	Economics/ Cost	STAPLEE Total
Flood/ Erosion	FE 3b	The bridge at Bridgewater Hill near Dick Brown Road needs repair.	Replace one abutment and the concrete deck at the bridge at Bridgewater Hill and Dick Brown Road.	3	2	2	3	2	3	1	**16**
Infectious Disease	ID 1	Elderly housing, schools, and areas where many congregate are places where communicable diseases could spread quickly.	Work with Central NH Public Health Network to post information and target areas to conduct outreach regarding prevention.	3	2	2	2	2	2	2	**15**
Wildfire	Wf 2	Large bonfires or setting off fireworks can start fires. While there have not been recent instances of wildfire damage, there are steps that homeowners can take to reduce the likelihood of a wildfire to their property.	Distribute information about state and local regulations and best management practices regarding outdoor burning and use of fireworks to residents and visitors.	2	2	2	2	2	3	2	**15**
Flood/ Erosion	FE 4	Homes along the shores of Newfound Lake have experienced flooding. This is linked to increased rainfall and insufficient releases at the dam.	Work with NHDES Dam Bureau to adjust lake levels to better accommodate the changing levels of rainfall.	2	2	2	2	2	2	3	**15**
All Hazards	AH 1	Getting information out to residents and visitors can reduce confusion during an emergency event, reducing the likelihood of injury.	Continue to utilize the town's website as a resource area for citizens, visitors, and businesses. Add information for homeowners about fire prevention, severe winter weather, and emergency preparedness.	2	2	2	2	2	2	2	**14**
Drought	D 1	NH experienced drought conditions in 2017 & 2020, Grafton Co. was in Moderate Drought (D1). This can reduce agricultural production, lead to increased irrigation, and increase the chance of wildfires.	Post resources to the town website for homeowners regarding drought status and actions that can be taken to reduce the impacts of drought.	2	2	2	2	2	2	2	**14**
Extreme Temps	ET 1	There are times when either extreme heat or cold make it difficult for some people to keep cool or stay warm.	Distribute information (electronic & hard copies) on improving weatherproofing homes as well as accessing cooling/heating centers.	2	2	2	2	2	2	2	**14**
High Wind Events	HW 1	Strong winds can take down trees and limbs, damaging properties, bringing down power lines and blocking roads.	Provide information to landowners regarding tree maintenance	2	2	2	2	2	2	2	**14**
Lightning	Li 1	Some people are not aware of how to reduce the likelihood of being struck by lightning (person or structure).	Post fire and lightning prevention materials on the town website and refer homeowners and residents to the information.	2	2	2	2	2	2	2	**14**

Hazard	ID	Problem	Action	Social	Technical	Administrative	Political	Legal	Environmental	Economics/ Cost	STAPLEE Total
Tropical & Post-Tropical Cyclones	TC 1	Warmer, wetter climate may result in more tropical storms impacting the town with extended periods of wind & intense rain. This can put pressure on Highway Dept. and limited local resources.	Establish and annually update agreements with public and/or private partners to assist with damages to trees, roads, culverts, and wires.	2	2	2	2	2	2	2	**14**
Wildfire	Wf 1	More homes are being developed in more remote areas of town. While there have not been recent instances of wildfire damage, there are steps that homeowners can take to reduce the impact of a wildfire to their property.	Make information about the FireWise program (or similar programs) available to residents in these areas.	2	2	2	2	2	2	2	**14**
Winter Weather	WW 1	Several higher elevation roads (especially Clements Rd.) get icy and dangerous.	Ensure that vegetation is cut back, allowing greater solar exposure, and melting along higher elevation roads.	2	2	2	2	2	2	2	**14**
Winter Weather	WW 2	Several higher elevation roads (especially Clements Rd.) get icy and dangerous.	Ensure that extra attention is given to clearing snow and ice from higher elevation roads.	2	2	2	2	2	2	2	**14**
High Wind Events	HW 2	Strong winds can take down trees and limbs, damaging properties, bringing down power lines and blocking roads.	Work with Eversource and NHECoop to ensure that trees around wires are trimmed back on a regular basis.	2	2	2	2	2	2	2	**14**
Infectious Disease	ID 2	The town's incinerator has been offline for nearly a year. With Solid Waste disposal options limited, the possibility of spreading contamination or disease is heightened.	Work with NHDES in order to re-establish reliable waste disposal options for the town.	2	2	1	3	2	2	2	**14**
Solar Storm & Space Weather	SW 1	Solar storms and Space weather can impact electronic communications.	Regularly monitor NH HSEM for alerts regarding anticipated events and appropriate responses to limit the impact on communications.	2	1	1	2	2	2	2	**12**
Earthquake > 4.0	EQ 1	While Bridgewater has not been directly impacted by an earthquake recently, the town is in one of the most active seismic areas in New Hampshire.	Compile, distribute and promote outreach materials to residents and business owners regarding the risks posed by earthquakes and steps that building owners can take to mitigate those risks.	1	1	1	1	1	1	1	**7**

Hazard mitigation is defined as "any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards". 44 CFR 201.2 Definitions - Code of Federal Regulations

APPENDIX I: EXISTING PLANS, STUDIES, REPORTS, AND TECHNICAL INFORMATION

Bridgewater Hazard Mitigation Plan, 2015
Bridgewater Master Plan, 2006
Bridgewater Zoning Ordinance, 2015
Bridgewater Subdivision Regulations, 2007
Bridgewater Site Plan Regulations, 2016
Census 2020 and American Community Survey
FEMA Community Information System
Bridgewater MS-1, 2022 – local structural valuation
Homeland Security & Emergency Management, New Hampshire Department of Safety - *New Hampshire State Hazard Mitigation Plan, 2023 Update*
NH Department of Transportation Traffic Volume (TDMS), https://nhdot.public.ms2soft.com/tcds/tsearch.asp?loc=Nhdot&mod=TCDS
FEMA Flood Map Service Center - https://msc.fema.gov/portal/home
National Flood Insurance Program through NH Office of Planning and Development https://www.nh.gov/osi/planning/programs/fmp/index.htm
FEMA's Map Changes Viewer
National Oceanic and Atmospheric Administration website, http://www.ncdc.noaa.gov/
NH Division of Forests and Lands, https://www.nh.gov/nhdfl/
NH Department of Transportation Traffic Volume Reports, https://nhdot.public.ms2soft.com/tcds/tsearch.asp?loc=Nhdot&mod=TCDS

APPENDIX J: FEMA WEBLIOGRAPHY

DISASTERS AND NATURAL HAZARDS INFORMATION

FEMA-How to deal with specific hazards	http://www.ready.gov/natural-disasters
Natural Hazards Center at the University of Colorado	http://www.colorado.edu/hazards
National Oceanic and Atmospheric Administration (NOAA): Information on various projects and research on climate and weather.	http://www.websites.noaa.gov
National Climatic Data Center active archive of weather data.	http://lwf.ncdc.noaa.gov/oa/ncdc.html
Northeast Snowfall Impact Scale	http://www.erh.noaa.gov/rnk/Newsletter/Fall%202007/NESIS.htm
Weekend Snowstorm Strikes The Northeast Corridor Classified As A Category 3"Major"Storm	http://www.publicaffairs.noaa.gov/releases2006/feb06/noaa06-023.html

FLOOD RELATED HAZARDS

FEMA Coastal Flood Hazard Analysis & Mapping	http://www.fema.gov/national-flood-insurance-program-0/fema-coastal-flood-hazard-analyses-and-mapping-1
Floodsmart	http://www.floodsmart.gov/floodsmart/
National Flood Insurance Program (NFIP)	http://www.fema.gov/nfip
Digital quality Level 3 Flood Maps	http://msc.fema.gov/MSC/statemap.htm
Flood Map Modernization	http://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/map-modernization
Reducing Damage from Localized Flooding: A Guide for Communities, 2005 FEMA 511	http://www.fema.gov/library/viewRecord.do?id=1448

FIRE RELATED HAZARDS

Firewise	http://www.firewise.org
NOAA Fire Event Satellite Photos	http://www.osei.noaa.gov/Events/Fires
U.S. Forest Service, USDA	http://www.fs.fed.us/land/wfas/welcome.htm
Wildfire Hazards - A National Threat	http://pubs.usgs.gov/fs/2006/3015/2006-3015.pdf

GEOLOGIC RELATED HAZARDS

USGS Topographic Maps	http://topomaps.usgs.gov/
Building Seismic Safety Council	http://www.nibs.org/?page=bssc
Earthquake hazard history by state	http://earthquake.usgs.gov/earthquakes/states/
USGS data on earthquakes	http://earthquake.usgs.gov/monitoring/deformation/data/download/
USGS Earthquake homepage	http://quake.wr.usgs.gov
National Cooperative Geologic Mapping Program (NCGMP)	http://ncgmp.usgs.gov/

Landslide Overview Map of the Conterminous United States	http://landslides.usgs.gov/learning/nationalmap/
Kafka, Alan L. 2008. Why Does the Earth Quake in New England? Boston College, Weston Observatory, Department of Geology and Geophysics	http://www2.bc.edu/~kafka/Why_Quakes/why_quakes.html
Map and Geographic Information Center, 2010, "Connecticut GIS Data", University of Connecticut	http://magic.lib.uconn.edu/connecticut_data.html
2012 Maine earthquake	http://www.huffingtonpost.com/2012/10/17/maine-earthquake-2012-new-england_n_1972555.html

WIND-RELATED HAZARDS

ATC Wind Speed Web Site	http://www.atcouncil.org/windspeed/index.php
U.S. Wind Zone Maps	http://www.fema.gov/safe-rooms/wind-zones-united-states
Tornado Project Online	http://www.tornadoproject.com/
National Hurricane Center	http://www.nhc.noaa.gov
Community Hurricane Preparedness Tutorial	http://meted.ucar.edu/hurrican/chp/hp.htm
National Severe Storms Laboratory, 2009, "Tornado Basics"	http://www.nssl.noaa.gov/primer/tornado/tor_basics.html

GEOGRAPHIC INFORMATION SYSTEMS (GIS) AND MAPPING

The National Spatial Data Infrastructure & Clearinghouse (NSDI) and Federal Geographic Data Committee (FGDC) Source for information on producing and sharing geographic data	http://www.fgdc.gov
The OpenGIS Consortium Industry source for developing standards and specifications for GIS data	http://www.opengis.org
Northeast States Emergency Consortium (NESEC): Provides information on various hazards, funding resources, and other information	http://www.nesec.org
US Dept of the Interior Geospatial Emergency Management System (IGEMS) provides the public with both an overview and more specific information on current natural hazard events. It is supported by the Department of the Interior Office of Emergency Management.	http://igems.doi.gov/
FEMA GeoPlatform: Geospatial data and analytics in support of emergency management	http://fema.maps.arcgis.com/home/index.html

DETERMINING RISK AND VULNERABILITY

HAZUS	http://www.hazus.org
FEMA Hazus Average Annualized Loss Viewer	http://fema.maps.arcgis.com/home/webmap/viewer.html?webmap=cb8228309e9d405ca6b4db6027df36d9&extent=-139.0898,7.6266,-48.2109,62.6754
Vulnerability Assessment Tutorial: On-line tutorial	http://www.csc.noaa.gov/products/nchaz/htm/

for local risk and vulnerability assessment	mitigate.htm
Case Study: an example of a completed risk and vulnerability assessment	http://www.csc.noaa.gov/products/nchaz/htm/case.htm

DATA GATHERING

National Information Sharing Consortium (NISC): brings together data owners, custodians, and users in the fields of homeland security, public safety, and emergency management and response. Members leverage efforts related to the governance, development, and sharing of situational awareness and incident management resources, tools, and best practices	http://nisconsortium.org/
The Hydrologic Engineering Center (HEC), an organization within the Institute for Water Resources, is the designated Center of Expertise for the US Army Corps of Engineers	http://www.hec.usace.army.mil/
National Water & Climate Center	http://www.wcc.nrcs.usda.gov/
WinTR-55 Watershed Hydrology	http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/water/?&cid=stelprdb1042901
USACE Hydrologic Engineering Center (HEC)	http://www.hec.usace.army.mil/software/
Stormwater Manager's Resource Center SMRC	http://www.stormwatercenter.net
USGS Current Water Data for the Nation	http://waterdata.usgs.gov/nwis/rt
USGS Water Data for the Nation	http://waterdata.usgs.gov/nwis /
Topography Maps and Aerial photos	http://www.terraserver.com/view.asp?tid=142
National Register of Historic Places	http://www.nps.gov/nr/about.htm
National Wetlands Inventory	http://www.fws.gov/wetlands/
ICLUS Data for Northeast Region	http://www.epa.gov/ncea/global/iclus/inclus_nca_northeast.htm

SUSTAINABILTY/ADAPTATION/CLIMATE CHANGE

Planning for a Sustainable Future: the Link Between Hazard Mitigation and Livability	http://www.fema.gov/media-library-data/20130726-1454-20490-3505/fema364.pdf
Why the Emergency Management Community Should be Concerned about Climate Change: A discussion of the impact of climate change on selected natural hazards	http://www.cna.org/sites/default/files/research/WEB%2007%2029%2010.1%20Climate%20Change%20and%20the%20Emergency%20Management%20Community.pdf
NOAA RISA for the Northeast (Regional Integrated Sciences and Assessments)	http://ccrun.org/home
Resilient Sustainable Communities: Integrating Hazard Mitigation& Sustainability into Land Use	http://www.earth.columbia.edu/sitefiles/file/education/documents/2013/Resilient-Sustainable-Communities-Report.pdf
U.S. EPA	http://www.epa.gov/climatechange/
NOAA National Ocean Service (NOS)	http://oceanservice.noaa.gov/
The Northeast Climate Research Center (NRCC) folks were heavily involved in climate data in the NCA,	http://www.nrcc.cornell.edu/

below. They have a wealth of historic climate data and weather information, trends, etc.	
Community and Regional Resilience: Perspectives from hazards, disasters, and emergency management	http://www.resilientus.org/library/FINAL_CUTTER_9-25-08_1223482309.pdf
National Fish, Wildlife and Plants Climate Adaptation Strategy	www.wildlifeadaptationstrategy.gov
ICLEI Local Governments for Sustainability	http://www.icleiusa.org/
Kresge Foundation Survey	http://www.kresge.org/news/survey-finds-communities-northeast-are-trying-plan-for-changes-climate-need-help-0
New England's Sustainable Knowledge Corridor	http://www.sustainableknowledgecorridor.org/site/
The Strategic Foresight Initiative (SFI)	http://www.fema.gov/pdf/about/programs/oppa/findings_051111.pdf
Northeast Climate Choices	http://www.climatechoices.org/ne/resources_ne/nereport.html
Northeast Climate Impacts Assessment	http://www.northeastclimateimpacts.org/
Draft National Climate Assessment Northeast Chapter released early 2013	http://ncadac.globalchange.gov/
Northeast Chapter of the National Climate Assessment of 2009:	http://www.globalchange.gov/images/cir/pdf/northeast.pdf
NEclimateUS.org	http://www.neclimateus.org
ClimateNE	www.climatenortheast.com
Scenarios for Climate Assessment and Adaptation	http://scenarios.globalchange.gov/
Northeast Climate Science Center	http://necsc.umass.edu/
FEMA Climate Change Adaptation and Emergency Management	https://www.llis.dhs.gov/content/climate-change-adaptation-and-emergency-management-0
Climate Central	http://www.climatecentral.org
EPA State and Local Climate and Energy Program	http://www.epa.gov/statelocalclimate/index.html

PLANNING

American Planning Association	http://www.planning.org
PlannersWeb - Provides city and regional planning resources	http://www.plannersweb.com

OTHER FEDERAL RESOURCES

U.S. Army Corps of Engineers: Provides funding for floodplain management planning and technical assistance and other water resources issues.	www.nae.usace.army.mil
Natural Resources Conservation Service: Technical assistance to individual land owners, groups of landowners, communities, and soil and water conservation districts.	www.nrcs.usda.gov
NOAA Coastal Services Center	http://www.csc.noaa.gov/

Rural Economic and Community Development: Technical assistance to rural areas and smaller communities in rural areas on financing public works projects.	www.rurdev.usda.gov
Farm Service Agency: Manages the Wetlands Reserve Program (useful in open space or acquisition projects by purchasing easements on wetlands properties) and farmland set aside programs	www.fsa.usda.gov
National Weather Service: Prepares and issues flood, severe weather and coastal storm warnings. Staff hydrologists can work with communities on flood warning issues; can give technical assistance in preparing flood-warning plans.	www.weather.gov
Economic Development Administration (EDA): Assists communities with technical assistance for economic development planning	www.osec.doc.gov/eda/default.htm
National Park Service: Technical assistance with open space preservation planning; can help facilitate meetings and identify non-structural options for floodplain redevelopment.	www.nps.gov
Fish and Wildlife Services: Can provide technical and financial assistance to restore wetlands and riparian habitats.	www.fws.gov
Department of Housing & Urban Development	www.hud.gov
Small Business Administration: SBA can provide additional low-interest funds (up to 20% above what an eligible applicant would qualify for) to install mitigation measures. They can also loan the cost of bringing a damaged property up to state or local code requirements.	www.sba.gov/disaster
Environmental Protection Agency	www.epa.gov

OTHER RESOURCES

New England States Emergency Consortium (NESEC): NESEC conducts public awareness and education programs on natural disaster and emergency management activities throughout New England. Resources are available on earthquake preparedness, mitigation, and hurricane safety.	www.nesec.org
Association of State Floodplain Managers (ASFPM): ASFPM has developed a series of technical and topical research papers, and a series of Proceedings from their annual conferences.	www.floods.org
National Voluntary Organizations Active in Disaster (VOAD) is a non-profit, nonpartisan membership organization that serves as the forum where	http://www.nvoad.org

organizations share knowledge and resources throughout the disaster cycle—preparation, response, recovery and mitigation.	

FEMA RESOURCES

Federal Emergency Management Agency (FEMA)	www.fema.gov
National Mitigation Framework	http://www.fema.gov/national-mitigation-framework
Federal Insurance and Mitigation Administration (FIMA)	http://www.fema.gov/fima
Community Rating System (CRS)	http://www.fema.gov/national-flood-insurance-program/national-flood-insurance-program-community-rating-system
FEMA Building Science	http://www.fema.gov/building-science
National Flood Insurance Program (NFIP)	http://www.fema.gov/national-flood-insurance-program
Floodplain Management & Community Assistance Program	http://www.fema.gov/floodplain-management
Increased Cost of Compliance (ICC): ICC coverage provides up to $30,000 for elevation and design requirements to repeatedly or substantially damaged property.	http://www.fema.gov/national-flood-insurance-program-2/increased-cost-compliance-coverage
National Disaster Recovery Framework	http://www.fema.gov/national-disaster-recovery-framework
Computer Sciences Corporation: contracted by FIMA as the NFIP Statistical Agent, CSC provides information and assistance on flood insurance to lenders, insurance agents and communities	www.csc.com
Integrating the Local Natural Hazard Mitigation Plan into a Community's Comprehensive Plan: A Guidebook for Local Governments	https://www.fema.gov/ar/media-library/assets/documents/89725
Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning	http://www.fema.gov/media-library/assets/documents/4317

Mitigation Best Practices Portfolio http://www.fema.gov/mitigation-best-practices-portfolio

FEMA Multi-Hazard Mitigation Planning Website	http://www.fema.gov/multi-hazard-mitigation-planning
FEMA Resources Page	http://www.fema.gov/plan/mitplanning/resources.shtm
Local Mitigation Plan Review Guide	http://www.fema.gov/library/viewRecord.do?id=4859
Local Mitigation Planning Handbook complements and liberally references the Local Mitigation Plan Review Guide above	http://www.fema.gov/library/viewRecord.do?id=7209
HAZUS	http://www.fema.gov/protecting-our-communities/hazus
Mitigation Ideas: A Resource for Reducing Risk to	http://www.fema.gov/library/viewRecord.do?id=

Natural Hazards	6938
Integrating Hazard Mitigation Into Local Planning: Case Studies and Tools for Community Officials	http://www.fema.gov/library/viewRecord.do?id=7130
IS-318 Mitigation Planning for Local and Tribal Communities Independent Study Course	http://training.fema.gov/EMIWeb/IS/is318.asp

APPENDIX K: MONITOR, EVALUATE, & UPDATE

Table A: Periodic Hazard Mitigation Plan Review Record (Assessing overall plan effectiveness: Poor, Fair, Good, Excellent)

Meeting Schedule (dates)	Tasks Accomplished	How well is plan achieving stated purpose and goals?	Lead Parties	Public Involvement (citizens, neighboring communities)
April, 2025	□ Documentation □ Track implementation □ Assess effectiveness □ Other			
April, 2026	□ Documentation □ Track implementation □ Assess effectiveness □ Other			
April, 2027	□ Documentation □ Track implementation □ Assess effectiveness □ Other			
April, 2028	□ Documentation □ Track implementation □ Assess effectiveness □ Other			

Table B: Project Implementation Checklist (Action Status: C-Completed, X – Delete, D – Deferred)

Hazard	ID	Action	Potential Funding	Responsible Party	Time Frame S:1 yr, M: 2-3 yr, L: 4-5 yr	Status April 2025	Status April 2025	Status April 2025	Status April 2025
All Hazards	AH 1	Continue to utilize the town's website as a resource area for citizens, visitors, and businesses. Add information for homeowners about fire prevention, severe winter weather, and emergency preparedness.	Operating Budget	Selectboard	Short				
Drought	D 1	Post resources to the town website for homeowners regarding drought status and actions that can be taken to reduce the impacts of drought.	Operational Budget	Selectboard	Short				
Extreme Temps	ET 1	Distribute information (electronic & hard copies) on improving weatherproofing homes as well as accessing cooling/heating centers.	Operational Budget	Selectboard	Short				
Flood/ Erosion	FE 2a	Phase I. Develop a plan to identify and pursue funding to repair and improve the Hammond Hill bridge.	Highway Dept., Warrant Article	Road Agent	Short				
Flood/ Erosion	FE 3a	Develop a plan to identify and pursue funding to repair and improve the Bridgewater Hill bridge. Consider breaking the project into phases.	FEMA HMPGrant, NH DOT, Highway Dept., Warrant Article	Road Agent	Short				
High Wind Events	HW 1	Provide information to landowners regarding tree maintenance	Operating Budget	Road Agent	Short				
Infectious Disease	ID 1	Work with Central NH Public Health Network to post information and target areas to conduct outreach regarding infectious disease prevention.	Operating Budget	Selectboard	Short				
Lightning	Li 1	Post fire and lightning prevention materials on the town website and refer homeowners and residents to the information.	Operating Budget	Selectboard	Short				

Hazard	ID	Action	Potential Funding	Responsible Party	Time Frame S:1 yr, M: 2-3 yr, L: 4-5 yr	Status April 2025	Status April 2025	Status April 2025	Status April 2025
Solar Storm & Space Weather	SW 1	Regularly monitor NH HSEM for alerts regarding anticipated events and appropriate responses to limit the impact on communications.	Operating Budget	Police Chief	Short				
Tropical & Post-Tropical Cyclones	TC 1	Establish and annually update agreements with public and/or private partners to assist with damages to trees, roads, culverts, and wires.	Operating Budget	Selectboard	Short				
Wildfire	Wf 1	Make information about the FireWise program (or similar programs) available to residents in these areas.	Operating Budget	Fire Warden	Short				
Wildfire	Wf 2	Distribute information about state and local regulations and best management practices regarding outdoor burning and use of fireworks to residents and visitors.	Operating Budget	Fire Warden	Short				
Winter Weather	WW 1	Ensure that vegetation is cut back, allowing greater solar exposure and melting along higher elevation roads.	NHElecCoop	Road Agent	Short				
Winter Weather	WW 2	Ensure that extra attention is given to clearing snow and ice from higher elevation roads.	Highway Department Budget	Road Agent	Short				
All Hazards	AH 2	Update the town's Master Plan.	Operational Budget/ Warrant article	Planning Board	Medium				
Earthquake > 4.0	EQ 1	Compile, distribute and promote outreach materials to residents and business owners regarding the risks posed by earthquakes and steps that building owners can take to mitigate those risks.	Operational Budget	Selectboard	Medium				

Hazard	ID	Action	Potential Funding	Responsible Party	Time Frame S:1 yr, M: 2-3 yr, L: 4-5 yr	Status April 2025	Status April 2025	Status April 2025	Status April 2025
Extreme Temps	ET 2	Work with NHDES Dam Bureau to adjust lake levels to mitigate some of the ecosystem impact.	Operational Budget	Selectboard	Medium				
Flood/ Erosion	FE 4	Work with NHDES Dam Bureau to adjust lake levels to better accommodate the changing levels of rainfall.	Operating Budget	Selectboard	Medium				
High Wind Events	HW 2	Work with Eversource and NHECoop to ensure that trees around wires are trimmed back on a regular basis.	Operating Budget	Road Agent	Medium				
Infectious Disease	ID 2	Work with NHDES to re-establish reliable waste disposal options for the town.	Operating Budget	HB Refuse District	Medium				
Flood/ Erosion	FE 1	Upgrade the culvert near the intersection of Poole Hill Road and Dick Brown Road.	FEMA HMPGrant, Highway Dept.	Road Agent	Long				
Flood/ Erosion	FE 2b	Raise and widen the red-listed Hammond Hill bridge	NH DOT(10YR Plan), FEMA HMPGrant, Highway Dept., Warrant Article	Road Agent	Long				
Flood/ Erosion	FE 2c	Complete reconstruction & rechanneling at the red-listed Hammond Hill bridge.	NH DOT(10YR Plan), FEMA HMPGrant, Highway Dept., Warrant Article	Road Agent	Long				
Flood/ Erosion	FE 3b	Replace one abutment and the concrete deck at the bridge at Bridgewater Hill and Dick Brown Road.	Highway Dept., Warrant Article	Road Agent	Long				