

Town of Bridgewater, New Hampshire Hazard Mitigation Plan Update, 2015

Prepared by the:

Bridgewater Hazard Mitigation Update Committee



Newfound Lake, Bridgewater, NH

February 2015

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THE LAKES REGION PLANNING COMMISSION



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EXECUTIVE SUMMARY

The *Bridgewater Hazard Mitigation Plan Update* (the Plan) serves as a means 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 Chapter VI.

The Committee agreed that the hazards identified in the 2008 Plan continue today; earthquake, and epidemic were added to the list and radon and drought were removed. The Committee determined those natural and human-related hazards which pose at least a moderate risk, based on a ranking system detailed in Chapter III, and shown below:

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

There have been no changes to the list of Critical Facilities. The Committee identified numerous existing programs related to hazard mitigation including the following:

Existing Plans, Regulations and Practices Supporting Hazard Mitigation	
Hazard Mitigation Plan 2008	Subdivision Regulations
Code Enforcement	Site Plan Review Regulations
Zoning Ordinance	Master Plan
Flood Plain Ordinance	School Emergency Operation Plan
Emergency Power Generation	Emergency Response Training and Drills

Two-thirds of the Actions from the 2008 Plan have either been completed or are no longer pertinent. In its effort to further reduce the vulnerability of the town to future hazards, the committee developed a list of 24 general and hazard-specific mitigation actions. These actions were prioritized based on local criteria. Discussions were held regarding how implementation might occur over the next five years. The results of these discussions are summarized in Table 19: Implementation Schedule for Mitigation Actions.

CHAPTER I: PLANNING PROCESS

A. BACKGROUND

In order 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 or human hazard events, FEMA has required that all communities 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 communities with plan development and update. The plan development process generally followed the steps outlined in FEMA's *Local Mitigation Planning Handbook (2013)*.

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

The New Hampshire Department of Safety's Homeland Security and Emergency Management (NH HSEM) funded the Plan with matching 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 and human-related hazards. The Plan contains statements of policy as outlined in the [Implementation Schedule for Mitigation Actions](#) and in [Chapter 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.

E. SCOPE OF PLAN

The scope of this Plan includes the identification of natural hazards affecting the town of Bridgewater, as identified by the Committee. The hazards were initially reviewed under the following categories:

- I. **Flood, Wild Land Fire, Drought** (Flood, Dam Failure, Ice Jam, Wildfire, Drought)
- II. **Geological Hazards** (Earthquake, Radon, Landslide)
- III. **Severe Wind** (Tornado/Downburst, Hurricane, Thunderstorm/Lightning, Hail)
- IV. **Winter Weather** (Blizzard/Snow Storm, Ice Storm, Nor'easter, Avalanche).
- V. **Other Hazards** (Epidemic, Fire and Hazardous Materials, Terrorism)

During the update process New Hampshire's 2013 Update to the *Multi-Hazards Mitigation Plan* was adopted and approved. Where possible, an effort has been made to reflect the information of the 2013

Update without detracting from Committee discussions and local concerns and priorities. The list of hazards in New Hampshire's *Multi-Hazards Mitigation Plan Update, 2013* includes most of those listed above except for Ice Jam, Thunderstorm, and Hail. Blizzard/Snow Storm/Ice Storm/Nor'easter are now considered as Severe Winter Weather and Radiological was added to the list.

F. METHODOLOGY

The Lakes Region Planning Commission (LRPC) corresponded with the Bridgewater Selectmen in January 2013 to initiate the hazard mitigation update process in the town of Bridgewater. The Selectmen established the Bridgewater Hazard Mitigation Planning Update Committee in spring 2013 for the purpose of updating a long-range plan for hazard mitigation. The Committee consisted of representatives from the departments of Police, Fire, Emergency Medical Services (EMS), the H-B Refuse District, and Public Works, as well as the Board of Selectmen, the Planning Board Chair, and a member of the public. All meetings were open to the public.

Using FEMA's *Local Mitigation Plan Review Guide (2011)*, *Mitigation Planning Workshop materials (2012)*, and the *Local Mitigation Planning Handbook (2013)* as guidance, the Committee reviewed and updated various elements of the town's 2008 Hazard Mitigation Plan. The planner and the committee reviewed and referenced a variety of plans, studies, reports, and technical information during the development of this Plan Update; a list of these resources can be found in Appendix J. Data on property valuation was provided by the Selectmen.

The Committee held meetings from March through September, 2013 with an additional meeting in August 2014 in order to review the draft plan. The following timeline shows the dates and corresponding Committee actions. The committee reviewed each section of the plan and LRPC provided updated information on hazards in New Hampshire. Each section of the existing plan was revised and in some cases reformatted in order to develop a more comprehensive document. Meeting agendas were posted in Town Hall and at the LRPC web page and are included in Appendix D.

Committee Meetings

- May 28, 2013:** *Introductory Committee Meeting:*
Bridgewater Town Hall
 Overview of update process and objectives
 Discussion of Development Trends since 2008
 Locate critical facilities and hazards on map
 Identify Hazard Events since 2008
- June 25, 2013:** *Committee Meeting:*
Bridgewater Town Hall
 Existing Plans and Policies
 Status of 2008 Mitigation Actions
 Asset Assessment
- September 4, 2013:** *Committee Meeting:*
Bridgewater Town Hall
 Impact of Hazards
 Vulnerability
 Review of Community Goals

Mitigation Strategies

October 2, 2013: *Committee Meeting:*
Bridgewater Town Hall
 Prioritization of Mitigation Actions
 Implementation

August, 2014: *Committee Meeting:*
Bridgewater Town Hall
 Review of Draft Plan by Committee

Public Involvement

The Bridgewater Selectmen invited a variety of Hazard Mitigation Planning stakeholders to join the Hazard Mitigation Planning Committee. The Committee was well represented by municipal officials, including two members of the Board of Selectmen and a local resident. Specific opportunities for public input occurred at each meeting. Local businesses and members of the public were encouraged to attend all meetings through press releases and postings on the LRPC websites (Appendix C).

The neighboring towns were also notified of meetings. No comments were received from the public during the development of the plan update.

G. ACKNOWLEDGMENTS

Special thanks to those that assisted in the development of this Plan:

Hank Woolner	Bridgewater Selectman
Terry Murphy	Bridgewater Selectman
Arnold Cate	Bridgewater Road Agent
E.J. Thompson	Bridgewater Chief of Police
Jacob Fogarty	Bridgewater EMS Director/ Fire Lt.
Michael Capsalis	Bridgewater Planning Board Chair
Steven Berube	Bridgewater Highway Foreman/Fire Capt.
Kieren Murphy	H-B Refuse District, Facility Manager
Kathi Begor	Bridgewater Administrative Assistant, citizen

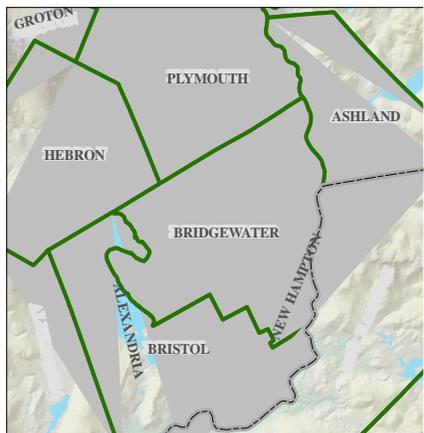
Paul Hatch	NH HSEM, Field Representative
David Jeffers	Lakes Region Planning Commission, Regional Planner

Additional information was provided by:

Jennifer Gilbert	<i>Floodplain Management Coordinator</i> , NH Office of Energy and Planning
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CHAPTER 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.¹ 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.² 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 totals average between 42 and 48 inches, where the distribution is slightly lower in the winter months when compared to summer months. Bridgewater averages about 70 inches of snow per year.³

C. PUBLIC SERVICES

A three-member Board of Selectmen governs the town of Bridgewater. The town has a 20 member on-call Fire Department and part-time Fire Chief. The Emergency Management Director is a position shared by the Police and Fire Chiefs. There are two police officers: one full-time and one part-time. The Police Chief, Fire Chief, and Public Safety Officer are all qualified to provide police, fire, and Emergency Medical Services (EMS). The town does have one full-time, and 8-10 part-time EMS personnel. The Road Agent directs a full-time staff of two who maintain 24 miles of town roads; this staff is also trained in EMS. Speare Memorial Hospital is located in Plymouth, eight miles to the north of Bridgewater, Franklin Regional Hospital is in Franklin, 17 miles to the south, and Lakes Region

¹ Lakes Region Planning Commission, 2007

² *New Hampshire Community Profiles*, NH Employment and Security Office, <http://www.nhes.state.nh.us/elmi/htmlprofiles/Bridgewater.html>, visited January 2013.

³ <http://www.city-data.com/city/Bridgewater-New-Hampshire.html>, visited June 19, 2007.

General Hospital is in Laconia, 22 miles southeast. 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. A network of local roads connect these two collector roads.

Residences and businesses rely on private wells and septic systems. The town is served by Public Service of New Hampshire on the western edge of town and NH Electric Cooperative throughout the remainder of town.

D. LAND USE AND DEVELOPMENT TRENDS

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 (Table 1). Population growth is projected to continue but at a much slower pace for the foreseeable future (Table 2). The median age of Bridgewater's residents has risen over the past several decades and remains higher than the statewide median age (Table 3). The Committee noted that school-age enrollments have been declining.

Table 1: Year-Round Population, 1980-2010

Year	1980	1990	2000	2010
Bridgewater Population	606	796	974	1,083
Bridgewater Change	---	31%	22%	11%
NH Change	---	20%	11%	7%

Table 2: Bridgewater, NH Projected Year-Round Population, 2020-2040⁴

Year	2010	2020	2030	2040
Population	1,083	1,135	1,169	1,180
Change	---	5%	3%	1%

Table 3: Median Age, 1980-2010

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

The 2010 Census reported 995 housing units in Bridgewater, an increase of 145 units since the 2000 Census. Most of that growth occurred prior to the recent economic downturn; between 2008 and 2011 fourteen residential permits were reported in Bridgewater⁵. The 2010 Census identified 502 of Bridgewater's housing units (50%) as seasonal. Because about half of Bridgewater's housing is seasonal, it is important to acknowledge that the actual number of people residing in town can fluctuate a bit. This development did not occur in high hazard areas nor did it increase the town's vulnerability to hazard events.

⁴ New Hampshire Office of Energy and Planning, March 2013 <http://www.nh.gov/oep/data-center/documents/2013-projections-municipalities.pdf>.

⁵ Development Activity in the Lakes Region, 2013 Annual Report, Lakes Region Planning Commission.

Table 4 indicates the Average Annual Daily Traffic (AADT) counts, measured in vehicles per day. While there is some variability over the years, the Traffic Volume Reports from the NH Department of Transportation indicate that there has been some minor increase in traffic on local roads but no dramatic changes in traffic volumes along the roadways in Bridgewater over the last several years. As this is a 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.

Table 4: Bridgewater Traffic Counts

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION
BUREAU OF TRAFFIC

06-Mar-14

Bureau of Planning, Traffic Section, Traffic Reports

STAT.	TYPE	LOCATION	FC	2006	2007	2008	2009	2010	2011	2012	2013
Town: BRIDGEWATER											
057050	82	NH 3A AT HEBRON TL	07	*	*	2600	*	*	2300	*	*
057051	82	DICK BROWN RD OVER CLAY BROOK	09	*	*	270	*	*	310	*	*
057052	82	BRIDGEWATER HILL RD OVER CLAY BROOK	09	*	*	140	*	*	290	*	*
057053	82	JOHN JENESS RD OVER CLAY BROOK	09	*	*	590	*	*	690	*	*

Location	AADT 2008	AADT 2011
NH 3A at Bristol/Bridgewater town line	4100	4300
River Road at the Bristol/Bridgewater Town line	500	600
River Road south of NUS3/NH 25 in Plymouth	600	650

Many of the challenges associated with demographic and development trends noted the 2008 plan continue today, especially as they pertain to hazard mitigation and response efforts. The number of seasonal residential units is indicative of people from varying origins spending a portion of their time in the community. The challenge this presents is in providing adequate information to all community members regarding the towns' rules and procedures, which can vary from those in seasonal residents' towns of origin. 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 typically most at risk from severe weather events are the elderly and young children. Given the increasing age of the population, the likelihood of having additional residents with special medical needs is high. Committee members noted that calls for emergency assistance for the elderly have increased. The budget for the Fire/Emergency Response has increased substantially.

Future Development

Much of Bridgewater remains undeveloped. The committee did note that there has been more and more pressure to develop along the roads crossing the steep central portion of town.

CHAPTER III: RISK ASSESSMENT

A. IDENTIFYING HAZARDS

The town of Bridgewater is prone to a variety of natural and man-made hazards. The *2013 Multi-Hazard Mitigation Plan*, developed by the New Hampshire Department of Safety's Division of Homeland Security and Emergency Management identified the following hazards as those posing a risk to Grafton County communities.⁶

Table 5: Grafton County Hazards

Flooding	Epidemic	Earthquake	Severe Winter Weather
Wildfire	Dam Failure	Hurricane	Tornado/Downburst
Lightning	Drought	Snow Avalanche	Landslide
Terrorism	Radon	Radiological	Fire & Hazardous Materials

The Committee reviewed all of the hazards identified in the 2008 Plan. This plan identified the following hazards events as the greatest threats to the town at that time (Table 6).

Table 6: Hazards identified in the 2008 Bridgewater Hazard Mitigation Plan

Hazard	Risk	Hazard	Risk
Flood	High	Drought	Moderate
Wildfire	High	Extreme Heat	Moderate
Ice Storm	High	Thunderstorm/Lightning	Moderate
		Blizzard/Snowstorm	Moderate
		Nor'easter	Moderate
		Motor Vehicle Accident w/ Hazardous Materials	Moderate
		Radon	Moderate
		Tornado/Downburst	Moderate
		Oil or Propane Spill	Moderate

The Committee also reviewed historical information from internet sources about past hazard events in and near Bridgewater since 2008. Through this review of state-wide hazards, past regional and local events, and with discussion, the committee identified the hazards listed in Table 7 as the hazards most likely to impact in the town of Bridgewater.

Table 7: Hazards of Concern: Bridgewater, NH

Hurricane	Severe Winter Weather (Snow)	Wildfire
Flood	Severe Winter Weather (Ice)	Lightning
Earthquake	Severe Wind (Tornado, Downburst, Thunderstorm)	Extreme Heat
	Veicular Accident involving Hazardous Materials	

⁶ <http://www.nh.gov/safety/divisions/hsem/HazardMitigation/documents/hazard-mitigation-plan.pdf>, visited December 2013.

This differs from the earlier version of the Plan by acknowledging the significance of hurricane, and earthquake as hazards that might impact Bridgewater and a distinction drawn between the wind impacts of thunderstorms and the separate impacts of the lightning often associated with such storms. Drought, radon, and oil/propane spills were removed from the list as the committee that the impacts and likelihood of these events in Bridgewater are quite limited.

B. PROFILING HAZARD EVENTS

The committee reviewed the various hazards that might occur in Bridgewater and assessed the Probability of such an event occurring in Bridgewater. This process began by taking the risk rating matrix from the previous plan, reviewing the hazards, past occurrences, specific areas of concern, and revising the Probability of Occurrence rating using the following categories:

- Unlikely: Less than 1% probability of occurrence in the next year or a recurrence interval of more than every 100 years.
- Occasional: 1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years.
- Likely: 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years
- Highly Likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.

For this update, lightning was treated as a hazard distinct from thunderstorm. Tornado, downburst, and thunderstorm were grouped as “High Wind Event” and similarly, blizzard, snowstorm, and nor’easter were grouped together. The resulting summary indicates that Severe Winter Weather, and Lightning are Highly Likely natural hazard occurrences with Flood, Wildfire, and High Winds as Likely natural events. Motor Vehicle accidents involving hazardous materials was also considered a Likely event.

Hazard Frequency Bridgewater	Geographic Area					Specific Areas of Concern	Probability of Occurrence
Hazard Type	Localized	Town-wide	Regional	State-wide	Other (explain)	Describe potential impact areas (critical facilities, floodplain, etc)	Unlikely, Occasional, Likely, Highly Likely
Flood, Drought, Extreme Heat & Wildfire							
Flood		X					Likely
Dam Failure	X					Dick Brown Road	Unlikely
Ice Jam	X						Unlikely
Drought			X			private wells town-wide	Occasional
Conflagration	X					Whittemore Point	Unlikely
Extreme Heat				X		the elderly	Likely
Wildfire	X						Likely
Geologic Hazards							
Earthquake				X			Occasional
Landslide	X						Unlikely
Severe Wind Hazards							
Lightning					X	Could occur anywhere, limited impact area.	Highly Likely
High Wind (Tornado/Downburst/Thunderstorm)					X	Very localized to regional.	Likely
Hurricane			X				Unlikely
Winter Weather Hazards							
Blizzard/Snow Storm			X				Highly Likely
Ice Storm			X				Highly Likely
Nor'easter			X				Highly Likely
Avalanche					X		Unlikely
Human-Related Events							
MV Accident involving Hazardous Materials	X						Likely
Oil Spills	X						Occasional
Other							

Probability of Future Events

- Unlikely: Less than 1% probability of occurrence in the next year or a recurrence interval of more than every 100 years.
- Occasional: 1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years.
- Likely: 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years
- Highly Likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.

Each of the hazards that the Committee identified as likely or highly likely to occur in Bridgewater is profiled below. The likely location of each hazard, the extent of the hazard, and the probability of an occurrence in Bridgewater is described below. The extent is a description of “how bad the hazard could get”. A list of events prior to 2008 is included in Appendix E. For more information on these hazards, please see Appendix G.

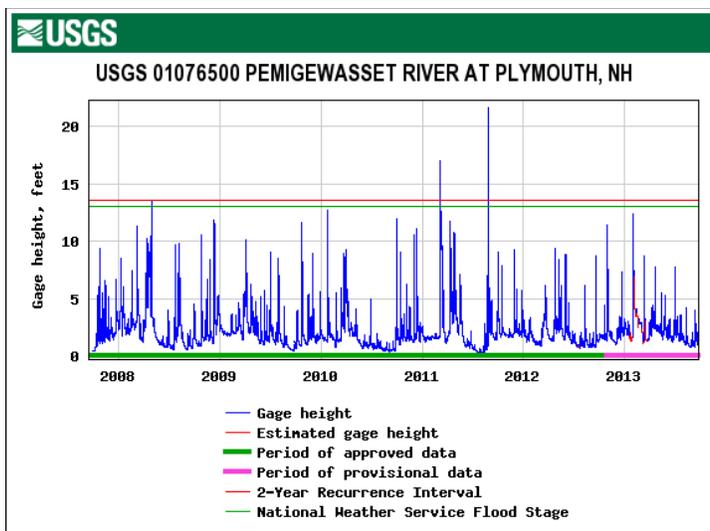
FLOODING

Location: The Bridgewater Flood Insurance Rate Maps (FIRM) show the flood boundaries in the event of a 100-year flood, defined as a having a one percent chance of flooding each year. These maps were initially developed in 1991 and updated in 2008. These maps identify floodplains along the Pemigewasset River 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 Whittimore Point Road.

Extent: 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 most commonly associated with structures and properties located within the 1% annual (or 100-year) floodplain. Areas in this floodplain have been identified as having a one percent chance of flooding any given year.

The US Geological Survey (USGS) stream gauge on the Pemigewasset River at the bridge in Plymouth indicates that the height of the river varies a great deal throughout the year from less than three feet to over ten feet.⁷ In several of the years since 2008 the river reached flood stage of more than 13 feet.⁸



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. There are five active dams in Bridgewater (Table 8); none are High or Significant Hazard dams, one Low Hazard, and four are Non-Menace Hazard dams. The committee reports that work is underway to Dick Brown Pond dam, which may further reduce its hazard classification.

Table 8: 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 (2013)

⁷ US Geological Survey, Current Water Data for New Hampshire <http://waterdata.usgs.gov/nh/nwis/rt>.

⁸ New Hampshire Union Leader, Irene Blog, August 29, 2011 <http://newhampshire.com/article/20110829/NEWS11/110829899/0/newhampshire>.

History:

Hazard	Date	Location	Remarks/Description	Source
Flood	7/24/2008- 8/14/2008	Grafton Co.	Damages of over \$3 million Declared Disaster DR-1787	NOAA
Flood	4/26-30 /2011	Grafton Co.	Damages of \$1.8 million Declared Disaster DR-4006	NOAA
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	NOAA
Flood	10/26 – 11/6/2012	Grafton County	Declared Disaster DR-4095 Remnants of Hurricane Sandy	NOAA

On August 4, 2008 rain events 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 as a result of this storm⁹.

The extended, heavy rains of Tropical Storm Irene resulted in hillside washouts and overwhelming of culverts in Bridgewater. There were several culverts along Dick Brown Road that required replacement; these were upgraded with FEMA assistance.

The NOAA database reports a total of 22 flooding events in Grafton County since June 2008, resulting in \$8.345 million in property damages.

Probability of Occurrence: Flooding – Likely, Dam Failure Unlikely

WILDLAND FIRE

Location: Bridgewater is heavily wooded; a fire could occur anywhere.

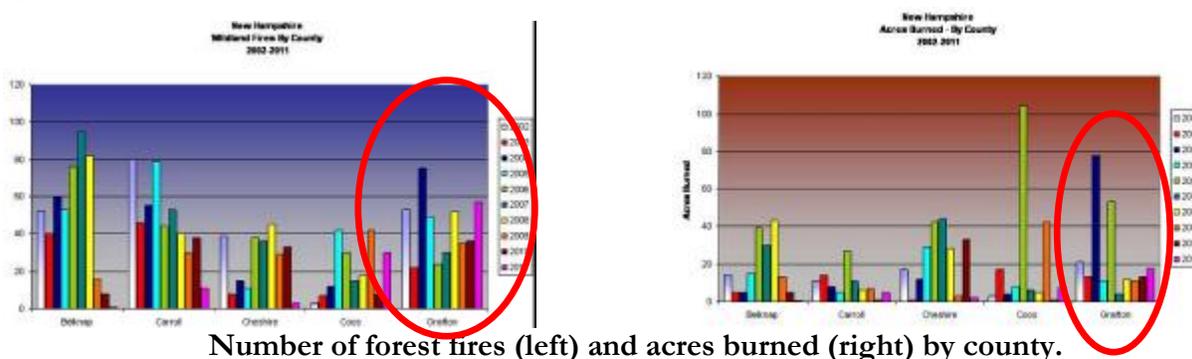
Extent: A wildfire is defined as a fire in wooded, potentially remote areas that may endanger lives. New Hampshire has about 500 wild land fires each year; most of these burn less than half an acre. Much of the Lakes Region is forested and susceptible to fire. The National Wildfire Coordinating Group (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 2002 to 2011 (most recent published data) the number of forest fires in Grafton County annually has ranged from 20 and 80 wildfires, but that number has been increasing. The charts below indicate that while the number of acres burned in the county has also been increasing, the total has rarely gone above 20 acres burned per year, indicating that wildfires in Grafton County burn an

⁹ USAToday http://usatoday30.usatoday.com/news/nation/2008-08-08-596728286_x.htm.

average of less than an acre of woodland.¹⁰ The committee noted that there have been several fires since 2008; one on Bridgewater Hill in Bristol, one along Poole Hill Road in 2009 that burned about an acre, and a small one in 2010 along Dick Brown Road. Also noted was the fact that there has been more and more recreational use of the various trails throughout town and that this could lead to more fires.



Number of forest fires (left) and acres burned (right) by county.

Probability of Occurrence: Likely

EARTHQUAKE

Location: An earthquake could affect all areas of Bridgewater. One of two major faults in New Hampshire runs through nearby Sanbornton.

Extent: 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. 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 Table 9.¹¹

Table 9: Richter Magnitude Scale

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 totally destroy communities near the epicenter.

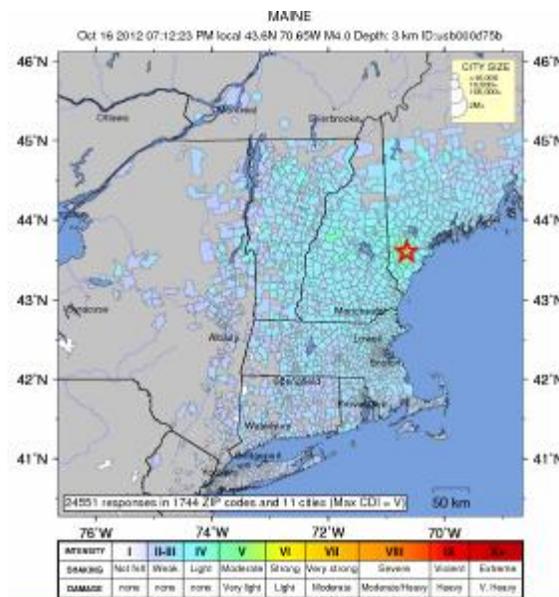
New Hampshire is considered to be in an area of moderate seismic activity with respect to other regions of the country. This means the state could experience large (6.5-7.0 magnitude) earthquakes, but they are not likely to occur as frequently as in a high hazard area like the Pacific coast. There is 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

¹⁰ NH Division of Forest and Lands, <http://www.nhdf.org/fire-control-and-law-enforcement/fire-statistics.aspx>, Accessed May 15, 2014.

¹¹ <http://pubs.usgs.gov/gip/earthq4/severitygip.html>, visited February 8, 2011.

damage.¹² 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. Moderate

History: On average, every other year the Lakes Region experiences an earthquake, though these earthquakes are mild and go mostly undetected by people. Sanbornton (Gaza) and Tamworth are identified as a major epicenters in the region.¹³ A search of the USGS National Earthquake Information Center database shows that since 1977 there have been 12 earthquakes with a magnitude of at least 3.0 within a 100 km (62 mi.) radius of Bridgewater; the largest was magnitude 4.5.¹⁴ Two such earthquakes have occurred since 2008; 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.¹⁵



Areas where the October 16, 2012 earthquake was felt

Probability of Occurrence: Occasional

LIGHTNING

Location: Thunderstorms occur mainly in the summertime; some can be anticipated and detected well in advance while others are “pop-up” storms that are limited in size and duration. Exactly where and when lightning will strike is unknown. Lightning can strike anywhere in town.

Extent: Thunderstorms have several threats associated with them including heavy rain, high wind, and lightning. The discharge of lightning causes an intense sudden heating of air. The air rapidly expands when heated then contracts as it cools, causing a shock wave that we hear as thunder. This shock wave is sometimes powerful enough to damage windows and structures. These giant sparks of electricity can result in fire or electrical damage to property or electrocution of people. Lightning damages cost the insurance industry more than \$5 billion annually in the United States.¹⁶

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.¹⁷

LAL 1	No thunderstorms
LAL 2	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent, 1

¹² <http://www.nh.gov/safety/divisions/hsem/NaturalHazards/index.html> visited February 8, 2011.
¹³ <http://des.nh.gov/organization/commissioner/pip/factsheets/geo/documents/geo-3.pdf>, pg. 3, visited January 25, 2011.
¹⁴ USGS. <http://earthquake.usgs.gov/earthquakes/eqarchives/epic/>, Accessed August 1, 2013
¹⁵ USGS, Earthquake Archive Search. <http://earthquake.usgs.gov/earthquakes/search/> accessed August 8, 2013
¹⁶ National Lightning Safety Institute webpage, http://www.lightningsafety.com/nlsi_lls/nlsi_annual_usa_losses.htm visited February 8, 2011.
¹⁷ NWS Definitions webpage, <http://graphical.weather.gov/definitions/defineLAL.html>. Accessed June 3, 2014.

	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:

While committee members noted half a dozen strikes over the past ten years, no major structural damage or deaths due to lightning were reported. However, the potential for damage or injury exist within any of the many thunderstorms that pass overhead each year, especially in the summertime.

Probability of Occurrence: Highly Likely

HIGH WINDS (THUNDERSTORM/TORNADO/DOWNBURST/HURRICANE)

Location: 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.

Extent: Bridgewater is at risk of several types of natural events associated with high winds; including hurricanes, microbursts, macrobursts, tornadoes, and nor'easters.

Hurricanes are large, cyclonic storms with sustained winds of at least 74 miles per hour. 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 – 36 hours are characteristic of tropical depressions and hurricanes. The strength of hurricanes are classified on a scale from 1 up to 5 based on factors such as wind speed and barometric pressure; details of this scale and the damage that can be caused at each level are provided in Appendix G.

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. TheFor full descriptions of hurricane and tornado classification systems, see Appendix E pages A-38 and A-39.

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.¹⁸ Downbursts fall into two categories based on their size:

- microbursts, which cover an area less than 2.5 miles in diameter, and
- macrobursts, which cover an area at least 2.5 miles in diameter.

¹⁸ *Weather Glossary*. National Oceanic and Atmospheric Administration, <http://www.weather.gov/glossary/index.php?letter=d>, visited March 8, 2011.

History:

Hazard	Date	Location	Remarks/Description	Source
Tornado	7/24/2008	Southern Lakes Region	F2 Tornado 50-mile path Uprooted and snapped trees, damaged structures. Declared disaster DR-1782	NOAA
Tornado	8/21/2011	Grafton, Orange	F1 Tornado 2.7 miles long, 350 yds wide Damaged hundreds of trees and several buildings	NOAA
Tornado	7/17/2012	Bridgewater	F0 Waterspout on Newfound Lake No damages	NOAA
Microburst	10/31/2012	Franklin	Winds > 50 knots Downed numerous trees, destroying one house and damaging several others	NH Union Leader ¹⁹

NOAA reported twenty-seven thunderstorm/high wind events impacting southern Grafton County between 1/1/2008 and 6/30/2013; one injury was reported but no substantial damages.

Probability of Occurrence: Likely

SEVERE WINTER WEATHER (SNOW STORMS, NOR'EASTERS, ICE STORMS)

Location: Snow and Ice Storms can affect the entire town. Severe winter weather occurs frequently in the northeast and the possibility exists for residents to have to withstand several days without power. No one area of the town and region is at greater risk than another, but there are segments of the population that are more at risk. These include the elderly, people that are in need of 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.

Extent:

A heavy snowstorm can be defined as one which deposits four or more inches of snow in a twelve hour period. The region typically receives greater than 66" of snow annually.²⁰ The nearest airport weather station is ten miles to the southeast in Gilford, NH. Records there 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 ten inches have happened in each of these months and on several days in February the area has seen more than fifteen and even twenty inches of snow in one day.

In the winter months, the region may experience blizzard conditions. 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 reduce visibility to less than a quarter mile.²¹

¹⁹ <http://www.unionleader.com/article/20121031/NEWS11/121039788>

²⁰ *Northeast States Emergency Consortium*, <http://www.nesec.org/>, visited January 25, 2011.

²¹ "Winter storm terms," http://www.fema.gov/hazard/winter/wi_terms.shtm, visited February 8, 2011.

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 twelve hours to three days, while the duration of hurricanes ranges from six to twelve hours. A nor'easter also has the potential to sustain hurricane force winds, produce torrential rain, and create blizzard conditions in winter months.

Average and Record Snowfalls at Laconia Airport in Gilford, NH²²



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 – 90 year return period for an event with a uniform ice thickness of between 0.75 and 1.25 inches. Ten years later (2008), however, New Hampshire was struck again by another severe ice storm.

The Sperry-Piltz Ice Accumulation (SPIA) Index is being 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 5.²³ The SPIA Index was first used in the United States in 2009 and is now beginning to be utilized by the National Weather Service.

²² Weather Underground, Season Weather Averages
<http://www.wunderground.com/NORMS/DisplayNORMS.asp?AirportCode=KLCL&SafeCityName=Bridgewater&StateCode=NH&Units=none&IATA=LCL>.

²³ SPIA Northeast webpage, <http://www.spia-index.com/neIce.php>, June 3, 2014.

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

ICE DAMAGE INDEX	* AVERAGE NWS ICE AMOUNT (in inches) <small>*Revised-October, 2011</small>	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.)

History:

Hazard	Date	Location	Remarks/Description	Source
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.	NH HSEM NOAA
Nor'easters	Feb. 23 – March 3, 2010	Statewide	330,000 without power and \$2 million in damages. Disaster Declaration DR-1892	FEMA
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.	NOAA

Additionally, NOAA reported twenty-seven snow and winter storm events impacting southern Grafton County between 2008 and 2013.

Probability of Occurrence: Highly Likely

MOTOR VEHICLE ACCIDENT INVOLVING HAZARDOUS MATERIALS

Location: The committee noted that in addition to NH Route 3A which runs along the shores of Newfound Lake, more and more trucks are utilizing the local roads.

Extent: Oil spills along several of the routes in Bridgewater could result in the contamination of wells or waterbodies in the watershed. In addition to distributing fuel to central locations in the region, tankers travel throughout the area daily to deliver home heating fuel. Many oil tankers have the capacity to carry 10,000 gallons of home heating oil. The committee rated the extent as moderate.

History: No local incidents were identified; however the volume of traffic and proximity to state roads to vulnerable water bodies led the Committee to consider a spill of hazardous materials while in transport a concern.

Probability of Occurrence: Likely

Summary

It is cost prohibitive to make the built environment resistant to the most devastating natural hazards that could occur, though reasonable measures can be taken to minimize loss of life and property damage. Bridgewater may be affected by an unavoidable extraordinary circumstance such as a violent earthquake, but historically, events of this magnitude have been infrequent. Those natural events that are common to the northeast also have common elements of concern for public safety. These include the potential for long-term power outages, the potential need for short-term sheltering facilities, and the availability of equipment and trained personnel. Key to loss prevention in these relatively common event scenarios is pre-event planning that critically assesses communications within the community, mutual aid resources regionally, public awareness and education, and emergency response training.

Bridgewater	Location	Extent (Magnitude/Strength)	Probability of Occurrence	Hazard Significance
Hazard Type	Negligible (<10%), Limited (10-25%), Significant (25-75%), Extensive (>75%)	Weak, Moderate, Severe, Extreme	Unlikely, Occasional, Likely, Highly Likely	Low, Medium, High
Flood, Drought, Extreme				
Flood	Limited	Moderate	Likely	Medium
Ice Jam	Limited	Moderate	Unlikely	Low
Drought	Significant	Weak	Occasional	Low
Extreme Heat	Extensive	Weak	Likely	Medium
Wildfire	Significant	Moderate	Likely	Medium
Geologic Hazards				
Earthquake	Extensive	Moderate	Occasional	Medium
Landslide	Negligible	Moderate	Unlikely	Low
Radon	Significant	Weak	Unlikely	Low
Severe Wind Hazards				
Hurricane	Significant	Moderate	Unlikely	Medium
Hail	Negligible	Weak	Unlikely	Low
Severe Wind (Tornado/Downburst/Thunderstorm)	Significant	Moderate	Likely	Medium
Lightning	Limited	Moderate	Highly Likely	Medium
Winter Weather Hazards				
Blizzard/Snow Storm	Extensive	Moderate	Highly Likely	High
Ice Storm	Limited	Moderate	Highly Likely	Medium
Nor'easter	Extensive	Moderate	Highly Likely	High
Avalanche	Negligible	Weak	Unlikely	Low
Human-Related Events				
MV Accident involving Hazardous Materials	Limited	Moderate	Likely	Medium
Oil Spills	Limited	Moderate	Occasional	Low
Military Aircraft Accident	Negligible	Moderate	Unlikely	Low
Pandemic	Limited	Moderate	Unlikely	Low
Other				
Rabies	Limited	Weak	Unlikely	Low
Recreational Activities	Extensive	Weak	Highly Likely	Medium

Extent

- **Weak:** limited magnitude, slow onset, short duration, little damage.
- **Moderate:** moderate magnitude, moderate onset speed, moderate duration, some damage or 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.

Hazard Significance:

Low: At least two criteria fall in lower classifications or the event has a minimal impact on the area. This rating is sometimes used for hazards with a minimal or unknown record of occurrences or for hazards with minimal mitigation potential.

Medium: The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating. This rating is sometimes used for hazards with a high extent rating but very low probability rating.

High: The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area.

CHAPTER IV: VULNERABILITY ASSESSMENT

A. INVENTORY ASSETS

Shown below is the list of critical infrastructure for the town of Bridgewater (Table 10) with assessed values for the structures. The critical infrastructure list is divided into 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 Centers. The second contains the emergency shelters within the town. The third category is a list of facilities that have been identified by the Committee as facilities to protect in order to minimize additional risk to hazards. The fourth category contains special populations that may require additional attention in the event of a disaster.

Table 10: Critical Facilities

TYPE	NAME	VALUE
Emergency Shelter/Population	Elementary School/Shelter	\$7.5 M
Structures and Services/Hazardous Materials	Incinerator/Recycling Center	\$2.5 M
Essential Services	Public Safety - Building	1.2 M
Structures and Services	Town Clerk's Office	\$300,000
Essential Services	Town Highway Garage	\$500,000
Structures and Services	Town House	\$100,000
Emergency Shelter/Structures and Services	Town Offices	\$950,000

The *Critical Facilities and Potential Hazards Map* (Appendix F) identifies the location of the critical facilities in relation to mapped hazard areas.

B. IMPACT OF HAZARDS

The 2013 assessed value of the critical facilities identified in Section A are listed in Table 10, totaling \$13,050,000. This does not; however, include the contents of the building and does not necessarily reflect the cost of full replacement. Also not reflected in this assessment is the value of built infrastructure such as streets, bridges, drainage, and utility transmission lines. These values can also be used to determine potential loss estimates in the event that a natural or manmade hazard damages a part of or an entire facility. Many of the facilities listed here are privately owned but represent structures or service that the Committee considered to be essential in terms of mitigating vulnerability to hazards.

The 2013 assessed value of all of the structures in Bridgewater is \$188,801,600. The value of the residential structures in town totals \$160,884,100 (85% of the total). The value of the commercial/industrial structures in Bridgewater is \$7,514,900 and the value of the tax-exempt structures (including the structures such as the Public Safety Building and Town Hall) is \$9,882,200. An additional \$10,520,400 of structural value is classified as public utilities.

In Chapter II Community Profile it was pointed out that while the year-round population of Bridgewater in 2010 was 1,083 residents, the true number of people in the town in the summertime could be much more than that figure due to seasonal visitors.

The impact of a hazard is the potential degree of damage that could occur in Bridgewater. This incorporates the assessed value of each critical facility and the vulnerability of these facilities and various populations and places to protect. To rate the impact of a hazard, committee members considered the damages and consequences that might result from an event, as defined below:

- Low: limited structural damage, the town's ability to respond is not compromised, local 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 county assistance is needed to survive and/or recover
- Severe: substantial structural damage, the town's ability to respond is greatly compromised, state or federal assistance is necessary to survive and/or recover

Flooding

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.

The town of Bridgewater actively participates in the National Flood Insurance Program (NFIP) through the administration of its floodplain ordinance by the Code Enforcement Officer. This includes correspondence with the NH Floodplain Manager regarding specific issues and periodically updating the town's floodplain ordinance. By actively participating in the NFIP property owners are able to purchase flood insurance through the FEMA program.

The town has been in the program since September 5, 1975. Flood Insurance Rate Maps (FIRM) were published by FEMA on June 17, 1991 and were updated with Digital FIRMs on February 20, 2008 along with the Flood Insurance Study (FIS) for Grafton County (February 20, 2008).

The town's Floodplain Ordinance was revised in coordination with New Hampshire Office of Energy and Planning and adopted at Town Meeting. The Selectmen are 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 in an effort to maintain water quality and limit flooding and erosion. There are also sections of floodplain along 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 Whittimore Point Road.

There are currently 12 buildings with NFIP flood insurance policies in force. These are all residential properties and with an insurance value \$2,114,000 (average of \$176,166 per property). Since 1975 there have been three losses paid out for a total of \$17,610, with one repetitive loss (1986, 1987 – total of \$13,486), which was a residential structure.²⁴ Only one of the insured properties is in the A-Zone (1% chance of an annual flood), the other NFIP-insured properties are in the B, C, and X Zones (less than 1% chance of an annual flood - Moderate to Low Risk Areas).²⁵

The 2008 DFIRM maps are available at the Town Hall. In 2008 a Community Assistance Visit (CAV) was conducted with the town by the State Floodplain Coordinator and also received technical assistance from her in 2009. According to the State Floodplain Coordinator, the town is considered, “compliant with the requirements of the NFIP at this time”.

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.

Potential impact to the town due to flooding is moderate.

Wildfire

In the central mountainous sections of town firefighters have limited access to potential wildfire areas but fires in these areas 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. While there are some water resources, including dry hydrants, several more would improve the town’s firefighting capabilities. Due to the heavily wooded nature of the town, all properties in town have the potential to be impacted by a wildfire. The areas most susceptible are identified on the map in Appendix F. These areas tend to be rather remote and relatively few structures would be impacted. Assuming 1% town-wide damage to buildings, each year wildfire could result in \$1,888,016 in damages.

Potential impact to the town due to wildfire is moderate.

Earthquake

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. 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.

²⁴ NFIP State Coordinator, NH Office of Energy and Planning, August 2013.

²⁵ FEMA definitions, <https://msc.fema.gov/webapp/wcs/stores/servlet/info?storeId=10001&catalogId=10001&langId=-1&content=floodZones&title=FEMA%20Flood%20Zone%20Designations>.

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.²⁶

While all structures in Bridgewater are susceptible to damage by an earthquake, those that are taller, older, and constructed of masonry are most susceptible to damage; there are few masonry buildings or structures taller than three stories high in Bridgewater. A relatively large earthquake in all likelihood would impact the roads including the bridges, limiting the ability of emergency services to be rendered. The fire department would have some response problems if the bridges were impacted, although in most cases there are alternate options, requiring redeployment of apparatus and people or mutual aid assistance. The impact to the critical facilities was seen as low. The likely impact of an earthquake on the town would be low.

All structures in Bridgewater are susceptible to damage by an earthquake, although very few are constructed of masonry or have more than two stories. Assuming 1% town-wide damage to buildings, an earthquake could result in \$1,888,016 in damages any given year.

Lightning

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.

Power outages, whether associated with natural or man-made hazards have the potential to cause great disruption to residents and the functioning of the town. 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. The impact of lightning could be similar to either wildfire or conflagration.

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 \$1,888,016 in damages.

The potential impact to the town due to lightning is low.

High Winds (Tornado, Downburst, Hurricane)

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 as a result 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. 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 couple of days.

²⁶ USGS <http://earthquake.usgs.gov/earthquakes/eventpage/usb000d75b#pager>, accessed October 17, 2012.

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 \$1,888,016 to \$9,440,080 in damages.

The potential impact to the town due to high winds is high.

Winter Weather (Snow storms/Ice Storms)

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.

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. Assuming 1% to 5% town-wide damage to buildings, winter weather could result in \$1,888,016 to \$9,440,080 in damages annually. The potential for impact to the town from severe winter weather is seen as moderate.

Motor Vehicle – Hazardous Materials

The release of hazardous materials along one of the roadways in Bridgewater has the capacity to cause substantial damage in the town; there are many variables that could affect the degree of impact, including the nature of the material, the location of the accident and its proximity to surface and groundwater, as well as structures. A spill that gets into the surface water might impact the businesses associated with waterfront recreation.

The critical facilities most impacted would be US Route 3A, River Road, Dick Brown Road, Bridgewater Power, and Fuller Oil Company. A hazardous materials accident would not likely impact structures; rather the impact would be environmental. The NH Lakes Association notes that a reduction in water quality could lead to \$25 million of lost income to the 30 communities of the Lakes Region. The potential for impact to Bridgewater from a hazardous materials motor vehicle incident is seen as moderate.

Vulnerability of Critical Facilities Matrix: Bridgewater	Thunder Storm/ Lightning	Blizzard/ Snow Storm	Nor'easter	Ice Storm	Tornado/ Downburst	Hurricane	Flood	Wildfire	Extreme Heat	MV Accident with HazMat	Drought	Earthquake	Oil Spill	Radon	Ice Jam	Radon	Hail	Landslide	Avalanche	Military Aircraft	Pandemic	Rabies	Recreational	Total
Elementary School/Shelter	2	1	2	1	3	2	1	1	2	1	2	1	2	1	1	1	1	1	1	1	1	1	1	31
Incinerator/Recycling Center	3	1	2	1	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	29
Public Safety - Building	2	1	2	1	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	28
Town Clerk's Office	2	1	2	2	3	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	30
Town Highway Garage	2	1	2	1	3	2	1	2	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	30
Town House	2	3	3	3	3	2	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	36
Town Offices	2	1	2	1	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	28
Dick Brown Road	3	3	3	3	3	2	3	3	1	3	1	1	2	1	1	1	1	1	1	1	1	1	1	41
Dick Brown Pond Dam (Class A)	1	1	2	1	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	26
Dick Brown Brook Dam (Class AA)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	23
Drews Pond Dam (Class AA)	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	24
Tilton Brook Dam (Class AA)	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	24
NH Route 3A	2	2	3	2	2	1	2	2	1	3	1	1	3	1	1	1	1	1	1	1	1	1	1	35
River Road	2	2	3	2	2	1	2	2	1	3	1	1	3	1	1	1	1	1	1	1	1	1	1	35
Fuller Oil Company	2	2	3	2	2	1	2	2	1	3	1	1	3	1	1	1	1	1	1	1	1	1	1	35
Bridgewater Power Company	2	2	3	2	2	1	2	2	1	3	1	1	3	1	1	1	1	1	1	1	1	1	1	35
Bridgewater Power Company Dam (AA)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	23
Power Substation	2	2	3	2	2	1	2	2	1	3	1	1	3	1	1	1	1	1	1	1	1	1	1	35
Total	33	27	39	28	39	26	30	29	19	30	19	18	31	18	18	18	18							

*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.

Impact of Hazard on Bridgewater Critical Facilities	Lightning	Blizzard/Snow Storm	Nor'easter	Ice Storm	Severe Wind (Tornado/Downburst / Thunderstorm)	Flood	Wildfire	Extreme Heat	MV Accident involving Hazardous Materials	Drought	Earthquake	Oil Spills	Ice Jam	Radon	Hurricane	Hail	Landslide	Avalanche	Military Aircraft Accident	Pandemic	Rabies	Recreational Activities	Total	
	Elementary School/Shelter	1	1	1	1	3	2	1	1	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1
Incinerator/Recycling Center	3	1	1	1	3	2	1	1	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	29
Public Safety - Building	1	1	1	1	3	2	1	1	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	27
Town Clerk's Office	1	1	1	1	3	2	3	1	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	29
Town Highway Garage	1	1	1	1	3	2	1	1	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	27
Town House	1	1	1	1	3	2	3	1	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	29
Town Offices	1	1	1	1	3	2	1	1	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	27
Dick Brown Road	1	3	3	3	1	3	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	32
Dick Brown Pond Dam	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	22
Dick Brown Brook Dam	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	22
Bridgeater Power Co. Dam	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	22
Drews Pond Dam (Class	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	22
Tilton Brook Dam (Class	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	22
NH Route 3A	1	3	3	3	1	3	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	32
River Road	1	3	3	3	1	3	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	32
Fuller Oil Company	1	1	1	1	2	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	24
Bridgewater Power Company	1	1	1	1	2	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	24
Power Substation	1	1	1	1	2	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	24
Total	20	24	24	24	35	31	22	18	24	18	18	18	18	18	35	18	18	18	18	18	18	18	18	

Consider the type of damage, the extent of damage, the need for emergency services, the need for excavators, and the post-disaster capabilities of fuel suppliers, utilities, transportation infrastructure, government facilities, and commercial & financial

C. SUMMARY OF RISK

Taking into account 1) the potential extent of the hazard, 2) the likelihood of occurrence of an event, and 3) the potential impact of a particular hazard event, the risk of the various hazards that might occur in Bridgewater was determined (Table 13). Level of risk was determined by using these definitions:

Low: Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area. This rating is sometimes used for hazards with a minimal or unknown record of occurrences or for hazards with minimal mitigation potential.

Medium: The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is sometimes used for hazards with a high extent rating but very low probability rating.

High: The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area.

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.

Definitions associated with Table 13:

Extent

- **Weak:** limited magnitude, slow onset, short duration, little damage.
- **Moderate:** moderate magnitude, moderate onset speed, moderate duration, some damage or 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.

Hazard Significance:

Low: At least two criteria fall in lower classifications or the event has a minimal impact on the area. This rating is sometimes used for hazards with a minimal or unknown record of occurrences or for hazards with minimal mitigation potential.

Medium: The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is sometimes used for hazards with a high extent rating but very low probability rating.

High: The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area.

Table 13: Risk Assessment

Bridgewater	Location	Extent (Magnitude/Strength)	Probability of Occurrence	Hazard Significance
Hazard Type	Negligible (<10%), Limited (10-25%), Significant (25-75%), Extensive (>75%)	Weak, Moderate, Severe, Extreme	Unlikely, Occasional, Likely, Highly Likely	Low, Medium, High
Flood, Drought, Extreme Heat & Wildfire				
Flood	Limited	Moderate	Likely	Medium
Ice Jam	Limited	Moderate	Unlikely	Low
Drought	Significant	Weak	Occasional	Low
Extreme Heat	Extensive	Weak	Likely	Medium
Wildfire	Significant	Moderate	Likely	Medium
Geologic Hazards				
Earthquake	Extensive	Moderate	Occasional	Medium
Landslide	Negligible	Moderate	Unlikely	Low
Radon	Significant	Weak	Unlikely	Low
Severe Wind Hazards				
Hurricane	Significant	Moderate	Unlikely	Medium
Hail	Negligible	Weak	Unlikely	Low
Severe Wind (Tornado/Downburst/ Thunderstorm)	Significant	Moderate	Likely	Medium
Lightning	Limited	Moderate	Highly Likely	Medium
Winter Weather Hazards				
Blizzard/Snow Storm	Extensive	Moderate	Highly Likely	High
Ice Storm	Limited	Moderate	Highly Likely	Medium
Nor'easter	Extensive	Moderate	Highly Likely	High
Avalanche	Negligible	Weak	Unlikely	Low
Human-Related Events				
MV Accident involving Hazardous Materials	Limited	Moderate	Likely	Medium
Oil Spills	Limited	Moderate	Occasional	Low
Military Aircraft Accident	Negligible	Moderate	Unlikely	Low
Pandemic	Limited	Moderate	Unlikely	Low
Other				
Rabies	Limited	Weak	Unlikely	Low
Recreational Activities	Extensive	Weak	Highly Likely	Medium

CHAPTER 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 2008 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 14: Existing Protections and Policies

Existing Protection	Description	Area Covered	Responsible Party	Comments	How Effective	Improvements/ Changes
Zoning Ordinance (2005)	▪ Floodplain Development Ordinance (2009)	Town	Selectmen	Restricts development in the floodplain, reducing the likelihood of damage.	Good	No changes needed.
	▪ FIRM maps (2007)			Digital format	Good	No changes needed.
	▪ No subdivision on slopes > 15%				Good	No changes needed.
	▪ CSPA standards on both the lake and the river			These standards are stronger than the current state standards.	Good	No changes needed.
	▪ Wetland Overlay			Protects natural resources	Good	No changes needed.
Subdivision Regulations (2002)	▪ Cistern or dry hydrant is required for subdivision of seven or more lots	Town	Selectmen	Policy ensures that water resources will be available for fire fighting.	Good	No changes needed.

Existing Protection	Description	Area Covered	Responsible Party	Comments	How Effective	Improvements/ Changes
Site Plan Regulations (1985)	<ul style="list-style-type: none"> Conversion Permit Required 	Town	Selectmen	Ensures that adequate protections are in place for homes being utilized year-round.	Good	No changes needed.
	<ul style="list-style-type: none"> Driveways must be less than 12% 			Limits erosion and increases accessibility by EMS.	Good	No changes needed.
	Any change of use requires Site Plan Review			Ensures opportunity for review by Planning Board and FD.	Good	No changes needed.
Sewer/Water Service	<ul style="list-style-type: none"> All structures on wells and septic systems 	Town	Selectmen Health Officer		Good	No changes needed.
Radio Communications	<ul style="list-style-type: none"> Lakes Region Dispatch & Plymouth Police Dispatch 	Region – partial coverage due to mountains	Emergency Management Directors (EMDs)	New repeaters have improved coverage	Good	Another repeater could improve coverage in the northern part of town.
Fire Department/ Public Safety	<ul style="list-style-type: none"> Part-time FD Chief 	Town/Region	Fire Chief	Paid	Good	No changes needed.
	<ul style="list-style-type: none"> 20 On Call Fire Fighters 			FD and Selectmen are NIMS-trained	Good	No changes needed.
	<ul style="list-style-type: none"> Inspection/Maintenance Plan for equipment 				Good	No changes needed.
	<ul style="list-style-type: none"> Class VI roads are mapped and cleared regularly 			These now serve as Fire Lanes.	Good	Do require maintenance for emergency use.
	<ul style="list-style-type: none"> Equipment purchased are bonded 				Good	No changes needed.

Existing Protection	Description	Area Covered	Responsible Party	Comments	How Effective	Improvements/ Changes
	<ul style="list-style-type: none"> Elementary School has an Emergency Plan and conducts drills 			Have greatly increased security and emergency communications at the school.	Excellent	No changes needed.
	<ul style="list-style-type: none"> Participate in Lakes Region Mutual Aid 			Pooling of resources from nearby communities to assist in an emergency.	Good	No changes needed.
Police Department/	<ul style="list-style-type: none"> Full-time PD Chief, 1 part-time staff 	Town	Police Chief		Good	No changes needed.
Public Safety	<ul style="list-style-type: none"> Rely on State Police for assistance with special operations 			New policy	Good	No changes needed.
	<ul style="list-style-type: none"> Have a regular schedule for Equipment Inspection and Maintenance 				Good	No changes needed.
Public Safety/EMS	<ul style="list-style-type: none"> 1 Full-time, 9 part time staff 	Town	Selectmen	Changed staffing from 1 part-time and 6-8 volunteers to nine part-time staff.	Good	No changes needed.
	<ul style="list-style-type: none"> Transport Ambulance 			Changed from Rescue Vehicle	Good	No changes needed.
Highway Department	<ul style="list-style-type: none"> Full-time Road Agent 	Town	Road Agent		Good	No changes needed.
	<ul style="list-style-type: none"> Two additional full-time staff 				Good	No changes needed.
	<ul style="list-style-type: none"> Equipment purchases are bonded 				Good	No changes needed.
	<ul style="list-style-type: none"> Several members in the Public Safety/EMS 				Good	No changes needed.
	<ul style="list-style-type: none"> Town maintenance plan which is incorporated into the Master Plan 				Good	No changes needed.
	<ul style="list-style-type: none"> Member of NH Public Works Mutual Aid 				Good	No changes needed.

Existing Protection	Description	Area Covered	Responsible Party	Comments	How Effective	Improvements/ Changes
Emergency Operations Plan	<ul style="list-style-type: none"> EOP – updated in 2006 	Town	Emergency Management Directors	Should be updated every five years.	Fair	Update the town's EOP.
Building Codes and Inspector	<ul style="list-style-type: none"> Uses state code system [No town building codes] 	Town	Building Inspector	ICC/NFPA International Code Council/National Fire Protection Association	Good	No changes needed.
	<ul style="list-style-type: none"> Have part-time Building Inspector 			Inspection required prior to a Building Permit.	Good	No changes needed.
Dry Hydrants	<ul style="list-style-type: none"> Have 14 in Bridgewater 	Town	Fire Chief	Have been mapped through E911.	Good	Update as new water sources are added.
Back-up power	<ul style="list-style-type: none"> Generators 	Highway Dept.	N/A		Good	No changes needed.
		Elementary School			Good	No changes needed.
		Public Safety Building			Good	No changes needed.
		Town Hall			Good	No changes needed.
		Town Clerk’s Office			Good	No changes needed.
		Refuse District			Good	No changes needed.
H-B Refuse District	<ul style="list-style-type: none"> 1 full-time, 2 part-time staff 	Town	H-B Refuse District Commissioners	Hebron no longer participates in this facility.	Good	No changes needed.
Shelters	<ul style="list-style-type: none"> Primary - Bridgewater-Hebron Village District School 	Town, shared with Hebron	EMDs and Village District Directors	Has large generator	Good	No changes needed.
	<ul style="list-style-type: none"> Secondary - Town Hall - limited 		EMDs		Good	No changes needed.
Town Administration	<ul style="list-style-type: none"> Three servers that back up town data 	Town files	Selectmen		Good	No changes needed.
	<ul style="list-style-type: none"> Fireproof walk-in safe 				Good	No changes needed.

B. STATUS OF 2008 ACTIONS

The 2008 HMP contained 23 recommended actions; some were mitigation actions (M), others enhanced local preparedness or response (R). The status of the mitigation actions recommended in the 2008 plan is indicated in Table 15 as either, Completed, Deleted, or Deferred. Some of the deleted Actions are now listed above as “Current Plans, Policies, and Regulations” (Table 14). A review of the status of these actions reveals that thirteen have been completed and five others are no longer considered pertinent. Deferred Actions (or deferred portions of Actions) were carried forward to be considered as new Mitigation Actions (Table 16). Effectiveness of each action was rated using the same scale as in Table 14. Also noted is whether the Action was designed to mitigate a hazard (M) or whether it primarily addresses preparedness and response (R).

Table 15: Status of Mitigation and Response Actions from the 2008 Hazard Mitigation Plan

POTENTIAL HAZARDS	PROPOSED MITIGATION ACTION	M/R	STATUS	Comment	How Effective	Changes/ Improvements
---	The District Commissioners shall work with NH DES and contract with engineers to properly close all landfills on the existing site.	M	Completed	none	Good	No changes needed.
---	The District Commissioners shall work with NH DES and contract with specialists to evaluate the incineration facility for continued compliance with NH DES and US EPA air quality regulations.	M	Completed	none	Good	No changes needed.
Ice/Blizzard/Nor'east	Purchase a Rescue Sled for use with town snowmobile.	R	Completed	none	Good	No changes needed.
Wildfire/Ice/Blizzard/Nor'east	The town will map all Class VI roads in Bridgewater.	R	Completed	none	Good	No changes needed.
Wildfire/Ice/Blizzard/Nor'east	The town shall maintain all Class VI for Emergency Purposes.	R	Completed	none	Good	No changes needed.
Wildfire/Thund-Light.	Purchase the appropriate transportation equipment (one ATV, one TUV) to provide access to mountainous areas for rescue/fire suppression.	R	Completed	none	Good	No changes needed.
MV with HazMat/Oil Spill	Purchase containment equipment for containing Hazardous Materials.	R	Completed	none	Good	No changes needed.

POTENTIAL HAZARDS	PROPOSED MITIGATION ACTION	M/R	STATUS	Comment	How Effective	Changes/ Improvements
All Hazards (except radon)	The town shall purchase additional generator capacity for the Bridgewater town buildings (Town Hall Public Works, Town Clerk's Office), enabling them to serve as more reliable shelters.	R	Completed	none	Good	No changes needed.
MV with HazMat/Oil Spill	Train Public Safety staff in initial containment of Hazardous Materials.	R	Completed	Now a policy as an EMT responsibility.	Good	No changes needed.
All Hazards (except radon)	Purchase digital radios for Highway Department vehicles.	R	Completed	none	Good	No changes needed.
All Hazards (except radon)	The town will develop more equitable mutual aid agreements with adjacent communities.	R	Completed	none	Good	No changes needed.
Ice/Blizzard/Nor'east/Flood	Train staff for near shore winter water rescues.	R	Completed	Now part of policy.	Good	No changes needed.
Ice/Blizzard/Nor'east/Flood	Purchase the appropriate equipment to conduct near shore winter water rescues.	R	Completed	Equipment will need to be replenished/replaced from time to time.	Good	No changes needed.
Flood/Thunderstorm/Hurricane/Nor'easter	Require all work on steep slopes (25%) to have a bond posted for erosion control regarding tree removal.	M	Deleted	Town has changed slope requirements.	Untested	No changes needed.
All Hazards (except radon)	The town shall increase wireless communication.	R	Deleted	This is improving (see below).	Good	No changes needed.
All Hazards (except radon)	The town shall arrange for Voice Over Internet Protocol (VOIP) service for residents.	R	Deleted	Now available through MetroCast.	Good	No changes needed.
All Hazards (except radon)	The town will work for adoption of legislation such as SB 236 in the NH State Legislature granting much easier coverage of statewide police mutual aid.	R	Deleted	No longer an issue.	Good	No changes needed.

POTENTIAL HAZARDS	PROPOSED MITIGATION ACTION	M/R	STATUS	Comment	How Effective	Changes/ Improvements
Wildfire/Ice/Blizzard/ Nor'east	The town will obtain landowner permission for Emergency Use of private roads where other access is limited.	R	Deleted	Utilizing a different approach to reach this outcome.	Untested	Working to change Class VI roads to trails.
Ice/Blizzard/ Nor'east	The town shall construct a shed for containment of the sand pile, maintaining the town's resources.	M	Deferred	Insufficient funding.	Untested	Explore water quality grant funds from either NH DES or NH DOT.
Flood/Hurricane	Contract with engineers to reconfigure the bridges along Bridgewater Hill and Hammond Hill Roads to avoid future washouts.	M	Deferred	Report is complete. Funding needed for construction.	Poor	Establish a Capital Reserve fund for local match and seek HSEM and DOT funds.
All Hazards (except radon)	Planning Board shall communicate regularly with adjacent communities regarding upcoming plans.	M	Deferred	This is linked to the Action below.	Fair	Should become a policy.
All Hazards (except radon)	The Planning Board shall request that proposals be identified as "Development of Regional Impact" where appropriate.	M	Deferred	See above.	Poor	Subdivision application could be revised to include this. Then discuss with PBs in adjacent communities.
All Hazards (except radon)	All designated shelters shall meet Red Cross requirements, including maintaining an updated inventory of supplies on hand. This may entail the purchase of cots, and blankets.	R	Deferred	Funding and storage have been obstacles	Fair	Consider working with Central NH Regional Health Network.

The primary planning mechanism in Bridgewater addressing land use development is the master plan. Bridgewater's Master Plan has not been revised since 2006 but will be due for an update in a couple of years. The town's Zoning Ordinance (2011) and Subdivision (2007) and Site Plan Review Regulations (2005) are the tools for implementing the vision and goals of the master plan (which may include hazard mitigation goals). NH RSA 674:2(e) does allow for the inclusion of a natural hazards chapter in a local master plan. The town should consider adopting this Hazard Mitigation Plan as part of the master plan by reference.

How the town appropriates its funds is another form of planning, indicating local priorities. In Bridgewater the Budget Committee and 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 a number of mitigation and response expenses identified in the hazard mitigation plan.

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. 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.

While the various planning documents are generally responsible for promoting the health, safety, and welfare of the community, there have not been changes to these documents incorporating specific elements of the 2009 hazard mitigation plan.

C. MITIGATION GOALS AND TYPES OF ACTIONS

In the 2008 Plan, the committee affirmed its support for the goals stated in the State HMP at the time. While the overall goals of the town of Bridgewater have not changed substantially since then, the form in which they are stated has. The general goals below are similar to the goals in the earlier plan while the hazard-specific goals address specific local concerns.

General Goals:

1. Improve upon the protection of the residents of Bridgewater and its visitors from all hazards, raise general awareness, and reduce the liability to the town from hazard events.
2. Reduce the potential impact of hazard events on Bridgewater's critical support services, facilities, and infrastructure.
3. Improve emergency preparedness.
4. Improve the response and recovery capability of Bridgewater to hazard events.
5. Reduce the potential impact of hazard events on private and public property, the natural environment, and economic resources.

Hazard Specific

Flooding

6. Minimize the impact that a flood would have on life, property, and infrastructure along the Pemigewasset River, Newfound Lake, the associated floodplains, along with various streams of the town of Bridgewater.

Fire

7. Reduce the risk of loss of life, and damage to property and infrastructure due to structural or wildfires.
8. Minimize the impact to life, property, and the environment during a hazardous materials spill.
9. Reduce the impact on life, structures, and infrastructure (especially communications infrastructure) as a result of a lightning strike.

Winter Weather

10. Minimize the impact of severe winter weather on people living in or visiting Bridgewater along with structures and infrastructure.

Severe Wind

11. Reduce the likelihood of damage or loss of life due to high wind events.

There are a number of types of actions that communities may take to reduce the likelihood that a hazard might impact the community. These include:

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 - Property Protection

- 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 - Public education and awareness

- 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 protect natural resources

- 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 (long-term continuity)

- 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 – Structural projects

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

G. Actions that will improve response - Response

D. POTENTIAL ACTIONS

Through a review of the risk assessment and local vulnerabilities, a number of Problem Statements were identified and refined by the Committee. Multiple brainstorming sessions yielded an updated list of mitigation strategies to address these current problems.

Table 16: Problem Statements and Potential Actions

ID	Problem Statements	Possible Mitigation Strategies
1	There have been several small wildland fires in the Bridgewater Hill, Dick Brown Rd., and Poole Hill Rd. areas. There is more recreation in this area. There number of homes in these areas is increasing.. These areas can be difficult for Emergency Services to access.	Maintain Class VI roads and Trails for Emergency Access
2	There have been several small wildland fires in the Bridgewater Hill, Dick Brown Rd., and Poole Hill Rd. areas. There is more recreation in this area. There number of homes in these areas is increasing.. These areas can be difficult for Emergency Services to access.	Purchase track vehicles for better access.
3	There have been several small wildland fires in the Bridgewater Hill, Dick Brown Rd., and Poole Hill Rd. areas. There is more recreation in this area. There number of homes in these areas is increasing.. These areas can be difficult for Emergency Services to access.	Identify or create more water sources near the top of Bridgewater Hill.
4	There have been several small wildland fires in the Bridgewater Hill, Dick Brown Rd., and Poole Hill Rd. areas. There is more recreation in this area. There number of homes in these areas is increasing.. These areas can be difficult for Emergency Services to access.	Encourage the Planning Board to consider reducing the threshold for an on-site water supply for residential units by amending the Subdivision and Site Plan Regulations.
5	Lightning strikes are a frequent occurrence throughout town. Structures as well as equipment such as pumps and electronic equipment and data can be destroyed.	Install lightning protection on all critical facilities
6	Lightning strikes are a frequent occurrence throughout town. Structures as well as equipment such as pumps and electronic equipment and data can be destroyed.	Encourage homeowners to protect their properties against lightning strikes.
7	Strong winds can take down trees and limbs, damaging properties, bringing down power lines and blocking roads.	Work with PSNH to ensure that trees around wires are trimmed back on a regular basis.
8	Strong winds can take down trees and limbs, damaging properties, bringing down power lines and blocking roads.	Develop a town policy for regular tree maintenance.
9	Strong winds can take down trees and limbs, damaging properties, bringing down power lines and blocking roads.	Implement a town policy for regular tree maintenance, including funding.
10	Strong winds can take down trees and limbs, damaging properties, bringing down power lines and blocking roads.	Provide information to landowners regarding tree maintenance
11	Several higher elevation roads (especially Clements Rd.) get icy and dangerous.	Ensure that extra attention is given to clearing snow and ice from these roads.

ID	Problem Statements	Possible Mitigation Strategies
12	Several higher elevation roads (especially Clements Rd.) get icy and dangerous.	Ensure that vegetation is cut back, allowing greater solar exposure and melting along these roads.
13	Hazardous materials are being transported along many of the roads through Bridgewater (NH Rte. 3A, River Rd., Dick Brown Rd., and NH Rte. 3). Steep sections of road and proximity of the roads to waterbodies raises the likelihood of an accident and spill that could contaminate natural resources.	Improve signage and policing along these roads to reduce the likelihood of an accident.
14	Hazardous materials are being transported along many of the roads through Bridgewater (NH Rte. 3A, River Rd., Dick Brown Rd., and NH Rte. 3). Steep sections of road and proximity of the roads to waterbodies raises the likelihood of an accident and spill that could contaminate natural resources.	Ensure that local personnel maintain training and have the appropriate equipment in initial spill response.
15	There are gaps in the communications network for Emergency Services (northern section of NH Rte 3A and NH Rte. 3).	Negotiate for more space on a tower in the area to provide better coverage.
16	There are gaps in the communications network for Emergency Services (northern section of NH Rte 3A and NH Rte. 3).	Set up a repeater for the Highway and Police Departments.
17	The Emergency Shelter does not have a sufficient supply of cots and food supplies.	Purchase cots and MREs and identify storage space.
18	The Emergency Shelter does not have a sufficient supply of cots and food supplies.	Make arrangements for utilizing regional supplies with the Red Cross.
19	Washouts occur on Poole Hill Road and Dick Brown Road near the intersection of the two roads.	Enlarge the culvert in this area.
20	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 new website as a resource area for citizens, visitors, and businesses. Add information for homeowners about fire prevention, severe winter weather, and emergency preparedness.
21	Getting information out to residents and visitors can reduce confusion during an emergency event, reducing the likelihood of injury.	Consider adopting a community notification system such as Reverse 911 or Code Red.
22	Work was done on Hammond Hill. Still on NH DOT's Municipal Red List - concern about wooden stringers and laid rock.	Complete reconstruction & rechanneling
23	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 bridge

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 17 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. ID letters with similar colored highlighting address similar problem statements. Note: the goals and their numbers are listed in Section C.

Table 17: Actions indicating Hazard, Cost, Structure, Goal, and Type of Action

Hazard	ID	Mitigation Actions	Anticipated Cost	Comments	M/P&R	E/N	Goal	Type
Fire	1	Maintain Class VI roads and Trails for Emergency Access to homes and recreation areas that are difficult to reach.	<\$10,000	There are a growing number of seasonal and year-round homes (currently about 15) in this area and more and more recreation.	P&R	E	1, 2, 3, 4, 5, 7	Response
Fire	2	Purchase a track vehicle for better access to homes and recreation areas that are difficult to reach.	\$20,000	There are a growing number of seasonal and year-round homes (currently about 15) in this area and more and more recreation.	P&R	E	1, 2, 3, 4, 5, 7	Response
Fire	3	Identify more water sources near the top of Bridgewater Hill for firefighting.	20 Staff hours	There are a growing number of seasonal and year-round homes (currently about 15) in this area and more and more recreation.	P&R	E	1, 2, 3, 4, 5, 7	Response
Fire	4	Create more water sources for firefighting near the top of Bridgewater Hill.	\$50,000	There are a growing number of seasonal and year-round homes (currently about 15) in this area and more and more recreation.	P&R	E	1, 2, 3, 4, 5, 7	Response
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.	10 Staff hours	Ensure there is review by Fire Chief. Ensure that local conditions are considered by the PB. Ensure that the fire suppression structure deemed best by the Fire Chief is utilized.	P&R	N	1, 2, 4, 5, 7	Response
Fire	6	Install lightning protection on all critical facilities	\$10,000 - \$50,000	The new buildings are grounded.	M	E	1, 2, 5, 7, 9	Prop.Prot.

Hazard	ID	Mitigation Actions	Anticipated Cost	Comments	M/P&R	E/N	Goal	Type
Fire	7	Encourage homeowners to protect their properties against lightning strikes.	20 Staff hours	Provide information with building Permits, make pamphlets available, information on website	M	N	1, 2, 5, 7, 9	Prop.Prot.
All	8	Work with PSNH and NHECoop to ensure that trees around wires are trimmed back on a regular basis.	10 Staff hours	Cooperation on prevention can reduce the need for response due to damage or blocked roads.	M	E	1, 2, 5, 7, 10, 11	Prop.Prot.
All	9	Develop a town policy for regular tree maintenance along roads and utilities.	10 Staff hours	Ensures consistency and continuity	M	E	1, 2, 5, 7, 10, 11	Prop.Prot.
All	10	Implement a town policy for regular tree maintenance, including funding.	\$1,000/yr	A policy of regular maintenance can reduce the costs of response down the road.	M	E	1, 2, 5, 7, 10, 11	Prop.Prot.
All	11	Provide information to landowners regarding tree maintenance	20 Staff hours	A policy of regular maintenance can reduce the costs of response down the road.	M	E	1, 2, 5, 7, 10, 11	PublicEdu
Winter Weather	12	Ensure that extra attention is given to clearing snow and ice from higher elevation roads (especially Clements Rd.).	10 Staff hours/ year	Only one year-round house on the road	M	E	1, 2, 3, 5, 10	Continuity
Winter Weather	13	Ensure that vegetation is cut back, allowing greater solar exposure and melting along higher elevation roads (especially Clements Rd.).	\$1,000/ year	Only one year-round house on the road	M	E	1, 2, 3, 5, 10, 11	Continuity
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.	\$1,000 total plus 40 Staff hours/ year	Oil trucks are the biggest concerns	M	E	1, 5	Prevention
MV with HazMat	15	Ensure that local personnel maintain training and have the appropriate equipment in initial spill response.	50 Staff hours plus \$1,500/ year	Oil trucks are the biggest concerns	P&R	E	1, 3, 4, 5	Response

Hazard	ID	Mitigation Actions	Anticipated Cost	Comments	M/P&R	E/N	Goal	Type
All	17	Set up a repeater to improve communication capability in the northern section of town for the Highway, Police, and Fire Departments.	\$25,000	Matching funds may be required	P&R	E	1, 4	Response
All	18	Purchase cots and MREs for the emergency shelter and identify storage space.	\$5,000	Preparedness	P&R	E	1, 2, 3, 4	Response
All	19	Make arrangements (MOU) for utilizing regional supplies with the Red Cross.	20 Staff hours	Preparedness	P&R	E	1, 2, 3, 4	Response
Flood/ Erosion	20	Upgrade the culvert near the intersection of Poole Hill Road and Dick Brown Road.	\$75,000	This is one of the most travelled local roads in town.	M	E	1, 2, 5, 6	Structural
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.	20 Staff hours	A good method for reaching many residents and owners of seasonal property.	M	E	1, 2, 3, 4	PublicEdu
All	22	Consider adopting a community notification system such as Reverse 911 or Code Red.	varies depending on system	Code Red is available through Grafton Co. at no cost.	P&R	E	1, 2, 3, 4	Response
Flood/ Erosion	23	Complete reconstruction & rechanneling at the red-listed Hammond Hill bridge.	>\$1,000,000	This is a long-term fix. Permitting may be an obstacle. Matching funds would be needed.	M	E	1, 2, 5, 6	Structural
Flood/ Erosion	24	Raise and widen the red-listed Hammond Hill bridge	\$150,000	Currently there are half a dozen people living on the road, there is the potential for further development.	M	E	1, 2, 5, 6	Structural
Flood/ Erosion	25	Replace one abutment and the concrete deck at the bridge at Bridgewater Hill and Dick Brown Road.	\$600,000	Currently there are a small number of homes on the road (mostly seasonal), there is the potential development of about a dozen homes.	M	N	1, 2, 5, 6	Structural

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 adapt the standard prioritization tool to better reflect the concerns of the community. The tool that came out of this process asks the committee to consider eleven separate aspects for each Action including the Costs. There was much discussion during this prioritization process and the final scores were arrived at by group consensus. Table 18 shows the Actions and their scores. Total scores range from a high of 4 to a low of 0. See Appendix H for further details regarding prioritization.

Table 18: Recommended Actions in Ranked Order

Only score in those categories that you feel are pertinent and those that you feel comfortable giving input.			Total
Scoring: 1 = Highly effective of feasible, 0 = Neutral, -1 = Ineffective or not feasible			
Hazard	ID	Bridgewater: Proposed Mitigation Actions	
Fire	3	Identify more water sources near the top of Bridgewater Hill for firefighting.	4
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.	4
Fire	1	Maintain Class VI roads and Trails for Emergency Access to homes and recreation areas that are difficult to reach.	3
Fire	7	Encourage homeowners to protect their properties against lightning strikes.	3
Fire	4	Create more water sources for firefighting near the top of Bridgewater Hill.	3
MV with HazMat	15	Ensure that local personnel maintain training and have the appropriate equipment in initial spill response.	3
Flood/Erosion	20	Upgrade the culvert near the intersection of Poole Hill Road and Dick Brown Road.	3
All	19	Make arrangements (MOU) for utilizing regional supplies with the Red Cross.	2
Fire	2	Purchase a track vehicle for better access to homes and recreation areas that are difficult to reach.	2
Fire	6	Install lightning protection on all critical facilities	2
All	17	Set up a repeater to improve communication capability in the northern section of town for the Highway, Police, and Fire Departments.	2
Flood/Erosion	24	Raise and widen the red-listed Hammond Hill bridge	2
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.	1
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.	1
All	22	Consider adopting a community notification system such as Reverse 911 or Code Red.	1
All	18	Purchase cots and MREs for the emergency shelter and identify storage space.	1

All	8	Work with PSNH and NHECoop to ensure that trees around wires are trimmed back on a regular basis.	0
All	9	Develop a town policy for regular tree maintenance along roads and utilities.	0
All	10	Implement a town policy for regular tree maintenance, including funding.	0
All	11	Provide information to landowners regarding tree maintenance	0
Winter Weather	12	Ensure that extra attention is given to clearing snow and ice from higher elevation roads (especially Clements Rd.).	0
Winter Weather	13	Ensure that vegetation is cut back, allowing greater solar exposure and melting along higher elevation roads (especially Clements Rd.).	0
Flood/ Erosion	23	Complete reconstruction & rechanneling at the red-listed Hammond Hill bridge.	0

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 19) indicating the estimated cost of implementation, potential funding sources, the parties responsible for bringing about these actions, and implementation time frame. 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 progress documented in Appendix K. Note: Action #26 was added after prioritization had taken place.

Table 19: Implementation Schedule for Mitigation Actions by Time Frame

Hazard	ID	Mitigation Actions	Anticipated Cost (in dollars or Staff/ Volunteer Hours)	Potential Funding	Responsible Party	Time Frame
Fire	3	Identify more water sources near the top of Bridgewater Hill for firefighting.	20 Staff hours	Town Operating Budget	Fire Chief	July 2015
Fire	7	Encourage homeowners to protect their properties against lightning strikes.	20 Staff hours	Fire Department	Fire Chief	July 2015
All	19	Make arrangements (MOU) for utilizing regional supplies with the Red Cross.	20 Staff hours	Operating Budget	BoS	July 2015
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.	\$1,000 total plus 40 Staff hours/ year	NH DOT, Highway and Police Department Budgets	Road Agent, Police Chief, BoS	July 2015-2019
Winter Weather	13	Ensure that vegetation is cut back, allowing greater solar exposure and melting along higher elevation roads (especially Clements Rd.).	\$1,000/ year	NHElecCoop	Road Agent	Sept. 2015-2019

Hazard	ID	Mitigation Actions	Anticipated Cost (in dollars or Staff/ Volunteer Hours)	Potential Funding	Responsible Party	Time Frame
Fire	1	Maintain Class VI roads and Trails for Emergency Access to homes and recreation areas that are difficult to reach.	<\$10,000	Fire Dept & Highway Dept. Budgets, Snowmobile Clubs	Fire Chief & Road Agent	Sept. 2015-2019
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.	10 Staff hours	Town Operating Budget	Fire Chief	Sept. 2015-2019
Winter Weather	12	Ensure that extra attention is given to clearing snow and ice from higher elevation roads (especially Clements Rd.).	10 Staff hours/year	Highway Department Budget	Road Agent	Dec. 2015-2019
All	11	Provide information to landowners regarding tree maintenance	20 Staff hours	Highway Department Budget	Road Agent	Dec. 2015-2019
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.	20 Staff hours	Operating Budget	BoS	Dec. 2015-2019
MV with HazMat	15	Ensure that local personnel maintain training and have the appropriate equipment in initial spill response.	50 Staff hours plus \$1,500/ year	Fire and Highway Department Budgets	Fire Chief & BoS	Dec. 2015-2019
All	22	Consider adopting a community notification system such as Reverse 911 or Code Red.	varies depending on system	Grafton Co., Town Operating Budget	BoS	July 2015
All	18	Purchase cots and MREs for the emergency shelter and identify storage space.	\$5,000	grants, Operating Budget	BoS	July 2016
Fire	2	Purchase a track vehicle for better access to homes and recreation areas that are difficult to reach.	\$20,000	Town Operating Budget	Fire Chief	July 2016
Fire	4	Create more water sources for firefighting near the top of Bridgewater Hill.	\$50,000	Fire Dept. Budget	Fire Chief	Sept. 2016
Flood/Erosion	20	Upgrade the culvert near the intersection of Poole Hill Road and Dick Brown Road.	\$75,000	FEMA HMPGrant, Highway Dept.	Road Agent	Sept. 2016
All	8	Work with PSNH and NHECoop to ensure that trees around wires are trimmed back on a regular basis.	10 Staff hours	Highway Department Budget	Road Agent	July 2018
All	9	Develop a town policy for regular tree maintenance along roads and utilities.	10 Staff hours	Highway Department Budget	Road Agent	July 2018
All	10	Implement a town policy for regular tree maintenance, including funding.	\$1,000/year	Town Operating Budget	BoS	July 2018

Hazard	ID	Mitigation Actions	Anticipated Cost (in dollars or Staff/ Volunteer Hours)	Potential Funding	Responsible Party	Time Frame
Fire	6	Install lightning protection on all critical facilities	\$10,000 - \$50,000	Operational Budget, FEMA	BoS	July 2018
All	17	Set up a repeater to improve communication capability in the northern section of town for the Highway, Police, and Fire Departments.	\$25,000	FEMA grants	BoS	Dec. 2018
Flood/ Erosion	24	Raise and widen the red-listed Hammond Hill bridge	\$150,000	FEMA HMPGrant, NH DOT, Highway Dept., Warrant Article	Road Agent	Dec. 2018
Flood/ Erosion	25	Replace one abutment and the concrete deck at the bridge at Bridgewater Hill and Dick Brown Road.	\$600,000	FEMA HMPGrant, Highway Dept., Warrant Article	Road Agent	Dec. 2018
Flood/ Erosion	23	Complete reconstruction & rechanneling at the red-listed Hammond Hill bridge.	>\$1,000,000	FEMA HMPGrant, NH DOT, Highway Dept., Warrant Article	Road Agent	Dec. 2018

CHAPTER VI: PLAN ADOPTION AND MONITORING

A. IMPLEMENTATION

The Bridgewater Hazard Mitigation Plan Update Committee, established by the EMD and Board of Selectmen, 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 and other sources such as those listed in Appendix B and Appendix J. The Emergency Management Directors will coordinate with the department heads and Selectmen 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 either revisions to the Subdivision 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 2015 update to the Hazard Mitigation Plan, an attempt will be made to have hazard mitigation strategies integrated into these existing mechanisms and into all other ongoing town planning activities.

B. PLAN MAINTENANCE & PUBLIC INVOLVEMENT

The Bridgewater Hazard Mitigation Planning Committee and the Selectboard, in order to track progress and update the mitigation strategies identified in Chapter V - D & E, will review the Bridgewater Hazard Mitigation Plan every year or after a hazard event. Town of Bridgewater Emergency Management Directors are responsible for initiating this review and needs to consult with members of the Committee identified in this Plan. Changes will be made to the Plan to accommodate projects that have failed, are no longer consistent with the timeframe identified, are no longer consistent with the community's priorities, or lack funding resources. Priorities that were not ranked high, but identified as potential mitigation strategies, will be reviewed during the monitoring and update of this Plan to determine feasibility of future implementation. In keeping with the process of adopting the Plan, a public hearing will be held to receive public comment on the Plan.

Maintenance and updating will be held during the annual review period and the final product adopted by the Selectboard. The Committee will meet annually as part of this plan maintenance.

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-2018 to begin updating this plan before it expires.

On behalf of the Bridgewater Hazard Mitigation Committee, the Emergency Management Directors, under direction of the Selectboard, will be responsible for ensuring that town's departments and the public have adequate opportunity to participate in the planning process during the Plan's annual review and during any Hazard Mitigation Committee meetings. Administrative staff may be utilized to assist with the public involvement process.

For each committee meeting, and the annual update process, techniques that will be utilized for public involvement include:

- ❖ Provide invitations to municipal department heads;
- ❖ Post notices of meetings at the Town Office, Library, and on the town website;
- ❖ Submit press releases for publication in the *Plymouth Record Enterprise*, *Laconia Daily Sun*, and other appropriate newspapers or media outlets.

Entities to invite to future Hazard Mitigation plan updates include the Emergency Management Directors of the neighboring communities of Ashland, New Hampton, Bristol, Hebron, and Plymouth.

C. **SIGNED CERTIFICATE OF ADOPTION**

Town of Bridgewater, NH Board of Selectmen
**A RESOLUTION ADOPTING THE BRIDGEWATER, NH
HAZARD MITIGATION PLAN UPDATE 2015**

WHEREAS, the town of Bridgewater, NH has historically experienced severe damage from natural hazards and it continues to be vulnerable to the effects of flooding, high winds, snow and ice storms, earthquakes, and fire 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 conditional approval from the Federal Emergency Management Agency (FEMA) for its Hazard Mitigation Plan Update 2015 under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held between January 2013 and August 2014 regarding the development and review of the Hazard Mitigation Plan Update 2015; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedure for the town of Bridgewater; and

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

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

RESOLVED by the Board of Selectmen:

1. The Plan is hereby adopted as an official plan of the town of Bridgewater;
2. The respective officials identified in the mitigation strategy 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 implementation elements of the Plan shall be presented to the Board of Selectmen by the Emergency Management Director
5. IN WITNESS WHEREOF, the undersigned has affixed his/her signature and the corporate seal of the Town Seal or Notary _____ Date: This 15 day of January, 2015

Terence Murphy, Chairman [Signature]

Maurice Jeuness, Jr., Selectman [Signature]

Henry Woolner, Selectman [Signature]

[Signature]
Comm exp 7-28-16



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>

NH Regional Planning Commissions:

Central NH Regional Planning Commission 796-2129
<http://www.cnhrpc.org/>

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

Nashua Regional Planning Commission 883-0366
<http://www.nashuarpc.org/>

North Country Council..... 444-6303
<http://www.nccouncil.org/>

Rockingham Regional Planning Commission 778-0885
<http://www.rpc-nh.org/>

Southern New Hampshire Regional Planning Commission..... 669-4664
<http://www.snhpc.org/>

Southwest Regional Planning Commission 357-0557
<http://www.swrpc.org/>

Strafford Regional Planning Commission..... 742-2523
<http://www.trafford.org/>

Upper Valley Lake Sunapee Regional Planning Commission..... 448-1680
<http://www.uvlsrc.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 Resources and Economic Development 271-2411
<http://www.dred.state.nh.us/>

Division of Forests and Lands..... 271-2214
<http://www.nhdfi.org/>

Natural Heritage Inventory 271-2215
<http://www.nhdfi.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/>

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. ADD CONTACTS FROM BRIGITTE

- 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 OEP, also refer to RPC
- 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
- Mutual Aid for Public Works.....NH Municipal Association
- National Flood Insurance Program (NFIP)NH Office of Energy & Planning
- Project Impact NH Homeland Security and Emergency Management
- Roadway Repair & Maintenance Program(s)NH Department of Transportation
- Shoreline Protection Program NH Department of Environmental Services
- Various Forest and Lands Program(s)..... NH Department of Resources & Economic Development
- Wetlands Programs NH Department of Environmental Services
- State Aid Bridge Program for CommunitiesNH Department of Transportation
- Contribution to Damage Losses (RSA 235:34).....NH Department of Transportation

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.shtml	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.shtml	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.shtml	States, localities, and tribal governments

Environmental Protection Agency (EPA)

The EPA makes funds available for water management and wetlands protection programs that help mitigate against 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.erd.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 Agency 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	Emergency funding and technical assistance for farmers and ranchers to rehabilitate farmland and	Farmers and ranchers

Assistance Programs	livestock damaged by natural disasters. http://www.fsa.usda.gov/	
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

	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

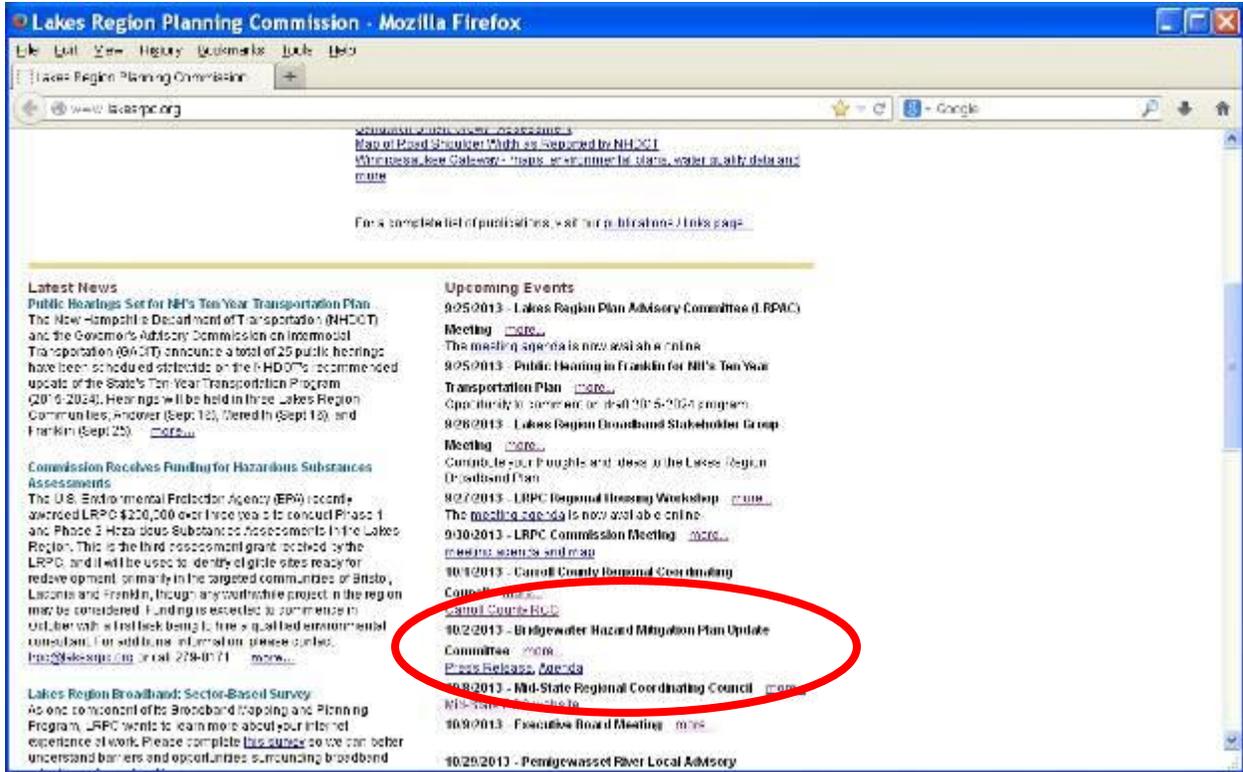
Committee meetings were announced on the town of Lakes Region Planning Commission webpage calendar. Press releases similar to the one below were sent to the weekly *Plymouth Record Enterprise* and the local daily papers *Laconia Citizen* and *Laconia Daily Sun* prior to the Committee meetings. Several informational handouts and the 2008 Hazard Mitigation Plan were distributed to the committee and available at all meetings.

A screenshot of a web browser interface. At the top, there is a back button and a search icon followed by the URL www.lakesrpc.org/print_entry.asp?counter=558. Below the address bar is a horizontal menu with several items: a magnifying glass icon, "Most Visited", a square icon, "Getting Started", a square icon, "Free Hotmail", a square icon, "Suggested Sites", a square icon, and "Web Slice Gallery". At the bottom of the screenshot are two buttons: "Print this Page" and "Close and return to events".

Lakes Region Planning Commission Event Calendar

Date: 6/25/2013
Time: 10:00 AM -
Title: Bridgewater Hazard Mitigation Plan Meeting
Contact: Dave Jeffers, 279-8171, djeffers@lakesrpc.org,
Location: Bridgewater Town Hall
 297 Mayhew Turnpike
 Bridgewater, NH
Description: The Bridgewater Hazard Mitigation Plan Committee will begin the process of updating its 2008 Hazard Mitigation Plan. For more information please see the full [Press Release](#) and [Meeting Agenda](#).

www.lakesrpc.org 603-279-8171



Lakes Region Planning Commis... x Lakes Region Planning Commis... x +

www.lakesrpc.org/print_entry.asp?counter=597

Most Visited Getting Started Free Hotmail Suggested Sites Web Slice Gallery

Print this Page Close and return to events

Lakes Region Planning Commission Event Calendar

Date: 10/2/2013
Time: 10:00 AM -
Title: Bridgewater Hazard Mitigation Plan Update Committee
Contact: Dave Jeffers: djeffers@lakesrpc.org, (603) 279-8171,
Location: Bridgewater Municipal Building NH Route 3A Bridgewater
Description: [Press Release](#), [Agenda](#)

www.lakesrpc.org 603-279-8171

Bridgewater, NH

Hazard Mitigation Plan Update, 2015

LAKES REGION PLANNING COMMISSION

August 26, 2013

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



For Immediate Release

Contact: David Jeffers, 279-8171, djeffers@lakesrpc.org

Town of Bridgewater Hazard Mitigation Plan Meeting

The Bridgewater Hazard Mitigation Plan Committee is in the process of updating its 2008 Hazard Mitigation Plan. The committee, which is represented by the Board of Selectmen, Planning Board, Police and Emergency Services, the Road Agent, and the Hebron-Bridgewater Refuse Facility is considering the natural and manmade hazards that put Bridgewater at risk as well as developing of recommendations to protect the safety and well being of town residents. The committee will hold its second meeting on September 4, 2013 at the Bridgewater Town Hall (297 Mayhew Turnpike – NH Route 3) starting at 10:00 AM. Residents of Bridgewater and representatives from neighboring communities are encouraged to attend and provide input.

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 will be determined as a result of this process. With the update to the Hazard Mitigation Plan, community leaders will be able to prioritize 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 call the Selectmen at 744-5055 or David Jeffers, Regional Planner, Lakes Region Planning Commission at 279-8171.

LAKES REGION PLANNING COMMISSION

September 23, 2013

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

**For Immediate Release**

Contact: David Jeffers, 279-8171, djeffers@lakesrpc.org

Town of Bridgewater Hazard Mitigation Plan Meeting

The Bridgewater Hazard Mitigation Plan Committee is updating its 2008 Hazard Mitigation Plan. The committee, which is represented by the Board of Selectmen, Planning Board, Police and Emergency Services, the Road Agent, and the Hebron-Bridgewater Refuse Facility, has considered the natural and manmade hazards that put Bridgewater at risk. The committee is developing recommendations to protect the safety and well being of town residents. The committee will hold its fourth meeting on October 2, 2013 at Bridgewater Town Hall (297 Mayhew Turnpike – NH Route 3) starting at 10:00 AM. Residents of Bridgewater and representatives from neighboring communities are encouraged to attend and provide input.

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 will be determined as a result of this process. With the update to the Hazard Mitigation Plan, community leaders will be able to prioritize 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 call the Selectmen at 744-5055 or David Jeffers, Regional Planner, Lakes Region Planning Commission at 279-8171.

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



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.



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

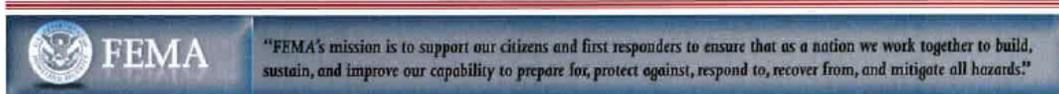
- Public involvement – In addition to government agencies involved in incident management, floodplain management and economic development, the planning process usually involves a range of stakeholders, including representatives of neighborhood groups, civic organizations, academia, environmental groups, 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



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’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: MEETING AGENDAS and PARTICIPATION

This section 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 opportunity for public input.

Bridgewater Hazard Mitigation Plan Update Committee

May 28, 2013 – 10:00 AM
Town Hall
297 Mayhew Turnpike (NH Route 3A)
Bridgewater, NH

AGENDA

1. Introductions
2. What is Hazard Mitigation Planning?
 - a. The need for a plan update
 - b. Mitigation planning vs. emergency response planning
 - c. The planning process – meetings, public input, timeline
 - d. Roles and responsibilities
 - e. Resources
3. Review all natural hazards (past – especially since 2008 & potential) in Bridgewater and mark on map
 - a. History
 - b. Location
 - c. Extent – potential severity
 - d. Probability
4. Discussion of Development Trends
5. Update the Critical Facilities list and locations
6. Set schedule for future meetings
7. Public Input

Goals for next meeting:

- a. Risk Assessment, including data collection
- b. Man-made hazards
- c. Impact of hazards



FEMA



Bridgewater Hazard Mitigation Plan Update Committee

June 25, 2013 – 10:00 AM
Town Hall
297 Mayhew Turnpike (NH Route 3A)
Bridgewater, NH

AGENDA

1. Introductions
2. What is Hazard Mitigation Planning?
 - a. The need for a plan update
 - b. Mitigation planning vs. emergency response planning
 - c. The planning process – meetings, public input, timeline
 - d. Roles and responsibilities
 - e. Resources
3. Review all natural hazards (past – especially since 2008 & potential) in Bridgewater and mark on map
 - a. History
 - b. Location
 - c. Extent – potential severity
 - d. Probability
4. Discussion of Development Trends
5. Update the Critical Facilities list and locations
6. Set schedule for future meetings
7. Public Input

Goals for next meeting:

- a. Risk Assessment, including data collection
- b. Man-made hazards
- c. Impact of hazards



FEMA



Bridgewater Hazard Mitigation Plan Update Committee

September 4, 2013 – 10:00 AM
Town Hall
297 Mayhew Turnpike (NH Route 3A)
Bridgewater, NH

AGENDA

1. Introductions
2. Risk Assessment
 - a. Review Asset Inventory
 - b. Impact of Hazards
3. Gaps – Problem Statements
 - a. What are the problems?
 - b. What are the potential impacts?
4. Set schedule for future meetings
5. Public Input

Goals for next meeting:

- a. Mitigation Strategies

Bridgewater Hazard Mitigation Plan Update Committee

October 2, 2013 – 10:00 AM
Town Hall
297 Mayhew Turnpike (NH Route 3A)
Bridgewater, NH

AGENDA

1. Introductions
2. Review of Problem Statements and Potential Mitigation Actions
3. Prioritization of Potential Mitigation Actions
4. Implementation
5. Next Steps
6. Public Input

Goals for next meeting:

- d. Review of Draft

Committee Member	Position	1/10/13	5/28/13	6/25/13	9/4/13	10/2/13	
Arnold Cate	Bridgewater Road Agent			X	X	X	
Terrance Murphy	Bridgewater Selectman	X	X	X	X	X	
Hank Wilmer	Bridgewater Selectman	X	X	X	X	X	
Jacob Fogarty	Bridgewater EMS Dir./Lt. FD			X	X	X	
Steve Berube	Bridgewater Highway Foreman/Fire Capt.			X	X		
Kieren Murphy	H-B Refuse			X		X	
Mike Capsalis	Bridgewater Planning Board Chair			X			
E.J. Thompson	Bridgewater Police Chief			X	X	X	
Kathi Begor-Lovett	Bridgewater Administrative Secretary				X	X	
Paul Hatch	NH HSEM Field Representative	X	X	X	X	X	
David Jeffers	Lakes Region Planning Commission						

APPENDIX E: HAZARD EVENTS PRIOR TO 2008

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	
Drought	1929-1936	Statewide	Regional
Drought	1939-1944	Statewide	Sever in Southeast
Drought	1947-1950	Statewide	Moderate
Drought	1960-1969	Statewide	Longest record continuous period of below normal precipitation.
Drought	June 1, 1999	Statewide	Governor's Office declaration moderate drought for most of the state.
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.
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

Hazard	Date	Location	Impacts/Assessment
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	
Snow Storm	March 28, 2001	Statewide	

Table Sources:

<http://www.tornadoproject.com>

New Hampshire Homeland Security and Emergency Management (NH HSEM)

National Oceanic and Atmospheric Administration (NOAA)

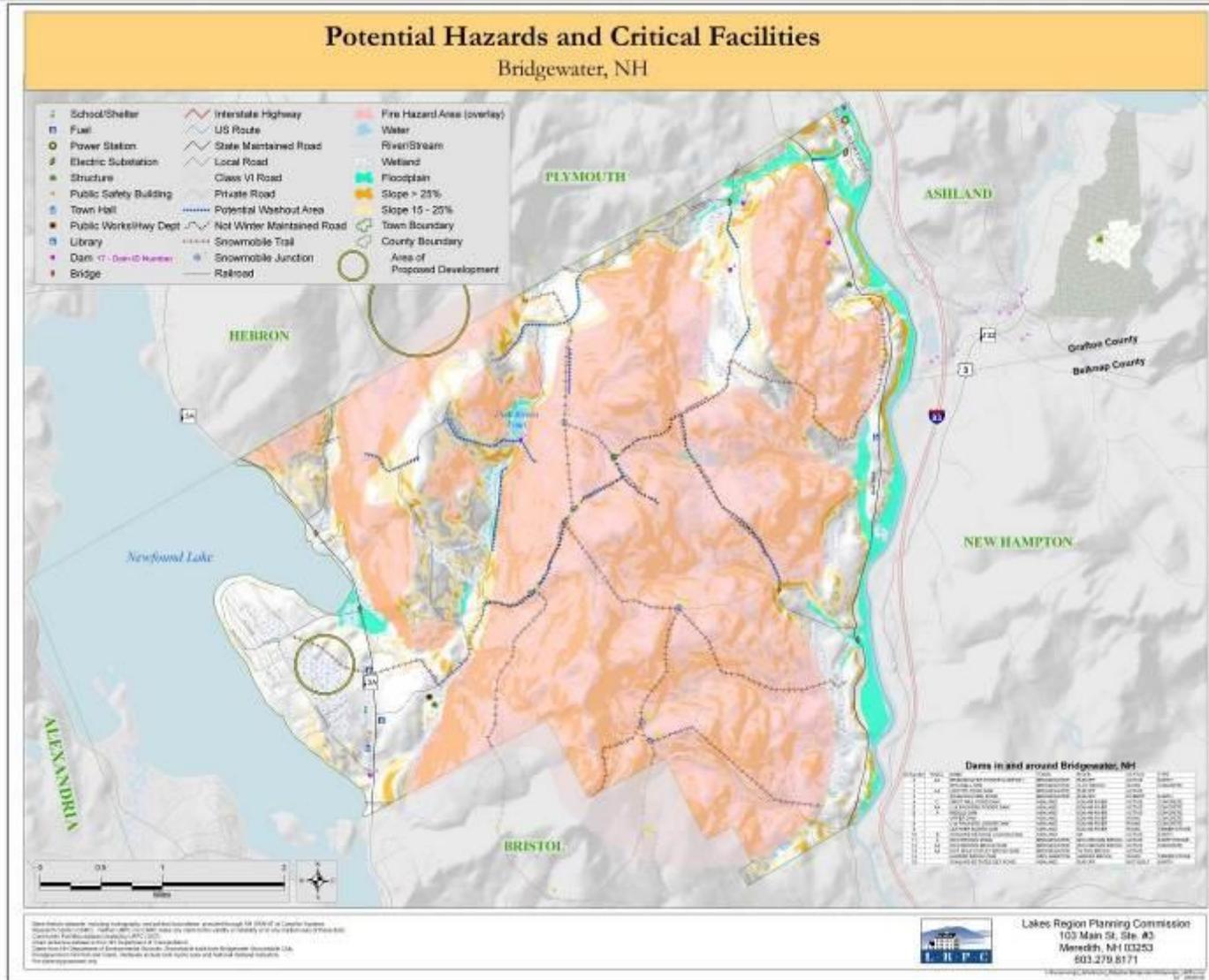
National transportation Safety Board (NTSB)

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 HAZARD INFORMATION

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 Chapter III.

I. FLOOD, WILDFIRE, DROUGHT

Flooding

Historically, the state's two largest floods occurred in 1936 and 1938. The 1936 flood was associated with snow melt 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 '60s. They continue to be operated by the US Army Corps of Engineers.²⁷

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.

Flooding in the Lakes Region is most commonly associated with structures and properties located within a floodplain. There are numerous rivers and streams within the region and significant changes in elevation, leading to some fast-moving water. The region also has a great deal of shoreline, making it exposed to rising water levels as well. Although historically, there have not been many instances of shoreline flooding, the potential always exists for a major flood event to occur.

Recent rain events have proven this is becoming an increasing concern as additional development is contributing to flood hazards. As areas are covered with impervious surfaces, less water is allowed to infiltrate, evaporate, or be transpired by vegetative growth and more of it runs off directly into surface drainages and water bodies. This increases the likelihood of flash floods and substantial overland flow. Of greatest concern are the waterfront properties on the lakes, ponds, and associated tributaries.

Culvert improvements and roadwork have been conducted throughout the region as a result of localized flooding events. Of particular concern in the region are areas of steep slopes and soils with limited capacity to accept rapid volumes of rainwater. Roads and culverts in close proximity to these conditions are most at risk of localized flooding.

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

²⁷ <http://www.nh.gov/safety/divisions/hsem/NaturalHazards/index.html> date visited: January 18, 2011

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 Classifications²⁸

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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: • 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: <ul style="list-style-type: none"> • 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

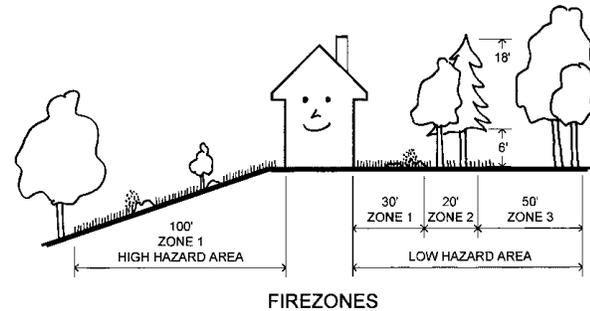
Several areas in the region are relatively remote in terms of access and firefighting abilities. Of greatest concern are those areas characterized by steep slopes and vast woodlands, with limited vehicular access. These areas include the Ossipee, Squam, Belknap, and Sandwich Mountain Ranges.

²⁸ 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.

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.²⁹

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.



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

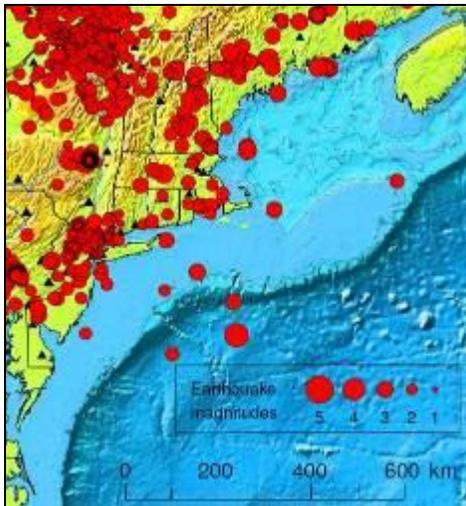
Within the Lakes Region the city of Laconia was the site of one of the most devastating structural fires to occur in the state of New Hampshire. The 1903 Great Lakeport Fire consumed more than 100 homes; two churches, two factories, a large mill, a power plant, and a fire station. Wolfeboro's history includes a

²⁹ <http://www.firewise.org> accessed September 21, 2012.

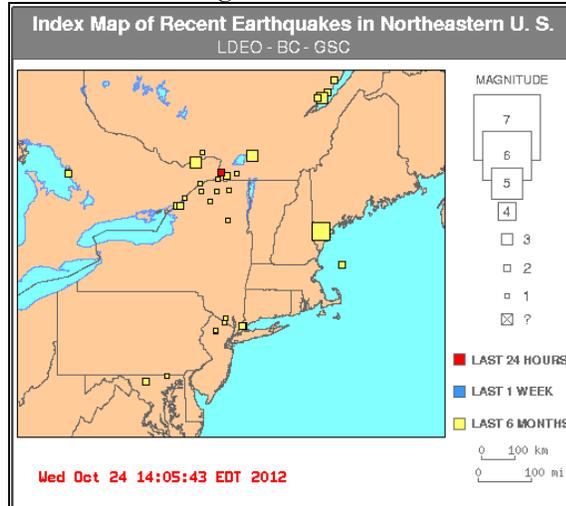
Location	Date	MMIntensity	Magnitude
Off Hampton	July 23, 1823	4	4.1
15km SE of Berlin	April 6, 1989	-	4.1
5km NE of Berlin	October 20, 1988	-	4
W. of Laconia	January 19, 1982	-	4.7
Central NH	June 11, 1638	-	6.5

Earthquakes in the Northeast³³

1990 – 2010



During the last six months



Damage from an earthquake generally falls into two types; Structural and Nonstructural.

- **Structural Damage** is considered any damage to the load bearing components of a building or other structure.
- **Nonstructural Damage** is considered any portion not connected to the superstructure. This includes anything added after the frame is complete.

According to the NH Division of Homeland Security and Emergency Management, some of the issues likely to be encountered after a damaging earthquake could be:

- Total or partial collapse of buildings, especially un-reinforced masonry structures and those not built to seismic codes.
- Damage to roads and bridges from ground settlement and structural damage.
- Mass Casualties.
- Loss of electric power.
- Loss of telecommunication systems.
- Fires from gas line ruptures and chimney failures.
- Total or partial loss of potable and fire fighting water systems from pipe ruptures.
- Hazardous Material incidences.
- Loss of critical capabilities from structural and nonstructural damages.
- Lack of mutual aid support.

³³ Lamont-Doherty Cooperative Seismic Network <http://www.ldeo.columbia.edu/LCSN/index.php>, accessed October 24, 2012

The NH HSEM also notes that a “cascade of disasters” typically occurs after a damaging earthquake. For example:

- Damage to gas lines and chimneys result in fires that are difficult to extinguish due to damage to the road, water systems, fire and police stations.
- Structural and Nonstructural damage cause many injuries, but because of damage to health care facilities and emergency response facilities, there is a slow or nonexistent response.
- Responders are slowed in their response because of Hazardous Material incidents.
- Flooding due to dam failures.

Landslide

A landslide is the downward or outward movement of slope-forming materials reacting to the force of gravity, including mudflows, mudslides, debris flows, rockslides, debris avalanches, debris slides and earth flows. Landslides may be formed when a layer of soil atop a slope becomes saturated by significant precipitation and slides along a more cohesive layer of soil or rock. Seismic activity may play a role in the mass movement of landforms also. 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 and 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 must 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.³⁴ Also, during the 2007 Nor'easter a landslide occurred in Milton, NH resulting in the temporary closure of NH Route 101.

III. Severe Wind

The Lakes Region is at risk of several types of natural events associated with high winds, including nor'easters, downbursts, hurricanes and tornadoes. The northeast is located in a zone that should be built to withstand 160 mile an hour wind gusts. A large portion of the northeast, including the Lakes Region, is in a designated hurricane susceptible region.

Tornado/Downburst

Although tornadoes are locally produced, damage paths can be in excess of one mile wide and 50 miles long.³⁵ The Fujita Scale is used to measure the intensity of a tornado (or downburst) by examining the damage caused in the aftermath, shown in Table G-3.³⁶ An F2 tornado ripped through a 50-mile section of

³⁴ <http://www.nh.gov/safety/divisions/hsem/NaturalHazards/index.html> visited February 8, 2011.

³⁵ FEMA Hazards: Tornadoes <http://www.fema.gov/business/guide/section3e.shtm>, visited February 8, 2011.

³⁶ <http://www.tornadoproject.com/fscale/fscale.htm> visited March 8, 2011.

central NH in July of 2008 from Epsom to Ossipee leading to requests for federal disaster declarations in several counties.³⁷

Table G-3: The Fujita Scale

F-Scale #	Intensity Phrase	Wind Speed	Type of Damage
F0	Gale tornado	40-72 mph	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.
F1	Moderate tornado	73-112 mph	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	Significant tornado	113-157 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
F3	Severe tornado	158-206 mph	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
F4	Devastating tornado	207-260 mph	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	Incredible tornado	261-318 mph	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel reinforced concrete structures badly damaged.
F6	Inconceivable tornado	319-379 mph	These winds are very unlikely. The small area of damage they might produce would probably not be recognizable along with the mess produced by F4 and F5 wind that would surround the F6 winds. Missiles, such as cars and refrigerators would do serious secondary damage that could not be directly identified as F6 damage. If this level is ever achieved, evidence for it might only be found in some manner of ground swirl pattern, for it may never be identifiable through engineering studies.

Source: <http://www.tornadoproject.com/fscale/fscale.htm>

The major damage from downbursts come from falling trees, which may take down power lines, block roads, or damage structures and vehicles. New Hampshire experienced three such events in the 1990s. One event occurred in Moultonborough on July 26, 1994 and was classified as a macroburst. It affected an area one-half mile wide by 4-6 miles in length.

The tornado/downburst risk for an individual community in New Hampshire is relatively low compared to many other parts of the country. Though the danger that these storms present may be high, the frequency of these storms is relatively low to moderate.

Hurricane

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.³⁸ 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 (Table G-4). The scale is used to give an estimate of the potential property damage and flooding expected from a hurricane landfall.

³⁷ <http://www.fema.gov/news/newsrelease.fema?id=45525> visited March 8, 2011.

³⁸ http://www.fema.gov/hazard/hurricane/hu_about.shtm, visited January 25, 2011.

Table G-4: 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>

According to NOAA, 2010 was one of the busiest hurricane seasons on record.³⁹ However, the position of the jet stream kept the northeastern Atlantic region dry as a barrier to the storms. New Hampshire has not experienced a severe hurricane since 1938. 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.⁴⁰ 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.⁴¹

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

³⁹ http://www.noaa.gov/news/stories/2010/20101129_hurricane_season.html visited January 25, 2011.

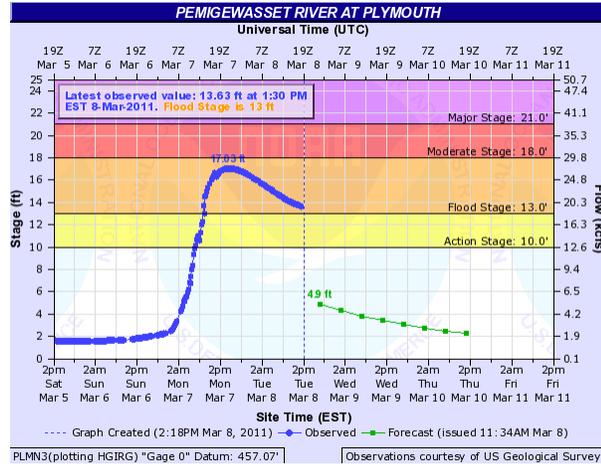
⁴⁰ <http://www.nh.gov/safety/divisions/hsem/NaturalHazards/index.html>, visited January 25, 2011.

⁴¹ <http://www.fema.gov/news/event.fema?id=2118> visited January 25, 2011

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

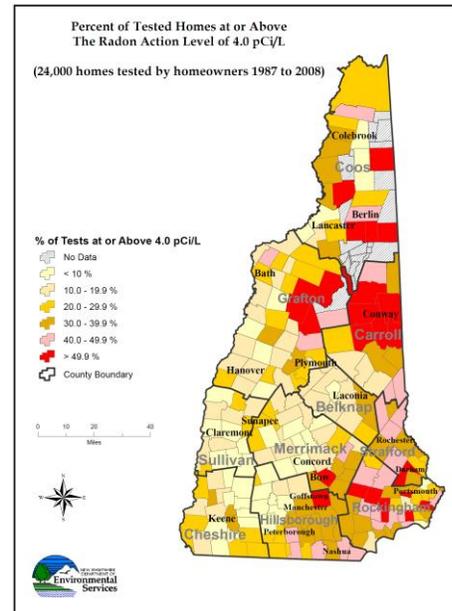


Stream gauge at bridge indicating change in river level in early March 2011.

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.⁴²

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.⁴³ 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.⁴⁴



⁴² “Ice Jams in New Hampshire,” CRREL, <http://icejams.crrel.usace.army.mil/tectran/IERD26.pdf> Visited July 25, 2013

⁴³ <http://www.nh.gov/safety/divisions/hsem/NaturalHazards/index.html> visited February 8, 2011.

⁴⁴ NH DES Radon Program <http://des.nh.gov/organization/divisions/air/pehb/ehs/radon/index.htm>, accessed October 9, 2012.

HAIL

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>

EPIDEMIC

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. 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 good places for transmission to occur.

The New Hampshire Health and Human Services developed an epidemic and pandemic response plan in February 2007, so that communities can be prepared and respond to outbreaks.⁴⁵

Over the past ten years, two strains of influenza viruses have become concerns across the country. The Lakes Region of New Hampshire has a large influx of seasonal visitors, which could make viral containment very difficult. Between 2005 and 2006, the Avian Influenza H5N1 virus infected 81 people and killed 52 in 10 countries in Asia and Africa. Most of the H5N1 cases were a result of human contact with infected poultry and the spread of the virus has not continued beyond that person. Although no human-to-human cases have been reported, viruses have the ability to mutate. The significance of the H5N1 pandemic is that it brought local, state, and federal attention to the need for pandemic emergency preparedness plans. Bridgewater is a member of the Central NH Public Health Network <http://nhphn.org/central-nh-regional-public-health-network/>.

In 2009, the WHO declared a global H1N1 pandemic.⁴⁶ H1N1 is an influenza virus that can spread "human to human" through respiratory droplets from coughs or sneezes.⁴⁷ Many of the planning systems developed out of the H5N1 pandemic were useful during this pandemic.⁴⁸

⁴⁵ <http://www.dhhs.nh.gov/dphs/cdcs/avian/documents/pandemic-plan.pdf>, visited February 8, 2011.

⁴⁶ http://c3ph.org/Files/vaccine_fact.pdf, visited February 15, 2011.

⁴⁷ <http://c3ph.org/Files/H1N1FAQ.pdf>, visited February 15, 2011.

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 1997.⁴⁹

⁴⁸ <http://www.cdc.gov/h1n1flu/cdcresponse.htm>, visited February 8, 2011.

⁴⁹ NH Department of Health and Human Services <http://www.dhhs.nh.gov/media/pr/2013/01-jan/01112013flu.htm>, visited January 17, 2013.

APPENDIX H: PRIORITIZATION DETAILS

As the Committee began the process of prioritizing these actions, the group adopted a modified version of the standard tool for project prioritization, the STAPLEE Method. In addition to the standard STAPLEE categories (Social, Technical, Administrative, Political, Economic, and Environmental), the committee considered whether a particular action impacted Life Safety and Protected Property within Bridgewater, as well as whether there was a Local Champion for the project and whether the action augmented other Local Objectives. The STAPLEE term “Economic” was changed to “Cost”.

This section contains a summary of rankings for each of the proposed Actions by the Bridgewater Hazard Mitigation Committee. For each action, the benefits and costs of implementing the action (under each of the eleven categories) was considered and scored -1, 0, 1 with a ‘minus one’ indicating that the costs outweighed the benefits in a particular category, a ‘one’ meant that the benefits were greater than the costs, and a ‘zero’ meant that while there are costs associated with the project, they are balanced out by the benefits. The eleven category scores were summed for an overall project total. A maximum total score is 11, the minimum is -11. Actual results ranged from 8 to 0. These ratings were arrived at through committee discussion and group consensus.

Only score in those categories that you feel are pertinent and those that you feel comfortable giving input.			Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Objectives	Cost	Total
Scoring: 1 = Highly effective of feasible, 0 = Neutral, -1 = Ineffective or not feasible														
Hazard	ID	Bridgewater: Proposed Mitigation Actions												
Fire	3	Identify more water sources near the top of Bridgewater Hill for firefighting.	1	1	1	0	0	1	0	0	0	0	0	4
Fire	4	Create more water sources for firefighting near the top of Bridgewater Hill.	1	1	1	0	0	1	0	0	0	0	-1	3
Fire	1	Maintain Class VI roads and Trails for Emergency Access to homes and recreation areas that are difficult to reach.	1	1	1	0	0	0	0	0	0	0	0	3
Fire	2	Purchase a track vehicle for better access to homes and recreation areas that are difficult to reach.	1	1	0	0	0	1	0	0	0	0	-1	2
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.	0	0	1	0	0	0	0	0	0	0	0	1
Fire	7	Encourage homeowners to protect their properties against lightning strikes.	1	1	1	0	0	0	0	0	0	0	0	3
Fire	6	Install lightning protection on all critical facilities	1	1	1	0	0	0	0	0	0	0	-1	2
All	8	Work with PSNH and NHECoop to ensure that trees around wires are trimmed back on a regular basis.	0	0	0	0	0	0	0	0	0	0	0	0

Hazard	ID	Bridgewater: Proposed Mitigation Actions	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Obstacles	Cost	Total
All	9	Develop a town policy for regular tree maintenance along roads and utilities.	0	0	0	0	0	0	0	0	0	0	0	0
All	10	Implement a town policy for regular tree maintenance, including funding.	0	0	0	0	0	0	0	0	0	0	0	0
All	11	Provide information to landowners regarding tree maintenance	0	0	0	0	0	0	0	0	0	0	0	0
Winter Weather	12	Ensure that extra attention is given to clearing snow and ice from higher elevation roads (especially Clements Rd.).	0	0	0	0	0	0	0	0	0	0	0	0
Winter Weather	13	Ensure that vegetation is cut back, allowing greater solar exposure and melting along higher elevation roads (especially Clements Rd.).	0	0	0	0	0	0	0	0	0	0	0	0
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.	1	1	1	0	0	1	0	0	0	0	0	4
MV with HazMat	15	Ensure that local personnel maintain training and have the appropriate equipment in initial spill response.	1	1	1	0	0	1	0	0	0	0	-1	3
All	17	Set up a repeater to improve communication capability in the northern section of town for the Highway, Police, and Fire Departments.	1	1	1	0	0	0	0	0	0	0	-1	2
All	19	Make arrangements (MOU) for utilizing regional supplies with the Red Cross.	1	0	1	0	0	0	0	0	0	0	0	2
All	18	Purchase cots and MREs for the emergency shelter and identify storage space.	1	0	1	0	0	0	0	0	0	0	-1	1
Flood/Erosion	20	Upgrade the culvert near the intersection of Poole Hill Road and Dick Brown Road.	1	1	1	0	0	1	0	0	0	0	-1	3
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.	0	0	1	0	0	0	0	0	0	0	0	1
All	22	Consider adopting a community notification system such as Reverse 911 or Code Red.	0	0	1	0	0	0	0	0	0	0	0	1
Flood/Erosion	24	Raise and widen the red-listed Hammond Hill bridge	1	1	1	0	0	0	0	0	0	0	-1	2
Flood/Erosion	23	Complete reconstruction & rechanneling at the red-listed Hammond Hill bridge.	1	1	-1	0	0	0	0	0	0	0	-1	0

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

Bridgewater Hazard Mitigation Plan, 2008

Bridgewater Master Plan, 2006

Bridgewater Zoning Ordinance

Bridgewater Subdivision Regulations

Bridgewater Site Plan Regulations

“Development Activity in the Lakes Region, 2011 Annual Report”, Lakes Region Planning Commission.

FEMA Community Information System

Bridgewater Assessor Database, 2012

State of New Hampshire Multi-Hazard Mitigation Plan, Update 2013

National Oceanic and Atmospheric Administration website, <http://www.ncdc.noaa.gov/>

NH Division of Forests and Lands <http://www.nhdf.org/fire-control-and-law-enforcement/fire-statistics.aspx>

NH Department of Transportation Traffic Volume Reports,

<http://www.nh.gov/dot/org/operations/traffic/tvr/locations/index.htm>

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/MS/MS/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 Earthquake 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,	http://magic.lib.uconn.edu/connecticut_data.html

"Connecticut GIS Data", University of Connecticut	
2012 Maine earthquake	http://www.huffingtonpost.com/2012/10/17/main-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/hurricane/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 for local risk and vulnerability assessment	http://www.csc.noaa.gov/products/nchaz/htm/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	http://nisconsortium.org/
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practices	
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=stelpdb1042901
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, below. They have a wealth of historic climate data and weather information, trends, etc.	http://www.nrcc.cornell.edu/
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.climateinortheast.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 organizations share knowledge and resources throughout the disaster cycle—preparation, response, recovery and mitigation.	http://www.nvoad.org

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 Natural Hazards	http://www.fema.gov/library/viewRecord.do?id=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

FEMA REGION I MITIGATION PLANNING CONTACTS

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Connecticut; Maine; New Hampshire

APPENDIX K: MONITOR, EVALUATE, & UPDATE

Table A: Periodic Hazard Mitigation Plan Review Record

Meeting Schedule (dates)	Tasks Accomplished	How well (or not-so-well) is implementation progressing?	Lead Parties	Public Involvement (citizens, neighboring communities)

There is a new tool called “Action Tracker” for Mitigation Actions. The Action Tracker is a new data system FEMA is using to document mitigation ideas and progress for all communities. Check this link to obtain and set up a profile to follow and maintain your community’s selected mitigation actions/projects: <http://fema.starr-team.com/Account/Login.aspx?ReturnUrl=%2f> or <http://fema.starr-team.com>.

Table B: Project Implementation Checklist

Hazard	ID	Action	Time Frame	Potential Funding	Responsible Party	Status 2015	Status 2016	Status 2017	Status 2018
Fire	3	Identify more water sources near the top of Bridgewater Hill for firefighting.	July 2015	Town Operating Budget	Fire Chief				
Fire	7	Encourage homeowners to protect their properties against lightning strikes.	July 2015	Fire Department	Fire Chief				
All	19	Make arrangements (MOU) for utilizing regional supplies with the Red Cross.	July 2015	Operating Budget	BoS				
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.	July 2015-2019	NH DOT, Highway and Police Department Budgets	Road Agent, Police Chief, BoS				
Winter Weather	13	Ensure that vegetation is cut back, allowing greater solar exposure and melting along higher elevation roads (especially Clements Rd.).	Sept. 2015-2019	NHElecCoop	Road Agent				
Fire	1	Maintain Class VI roads and Trails for Emergency Access to homes and recreation areas that are difficult to reach.	Sept. 2015-2019	Fire Dept & Highway Dept. Budgets, Snowmobile Clubs	Fire Chief & Road Agent				
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.	Sept. 2015-2019	Town Operating Budget	Fire Chief				
Winter Weather	12	Ensure that extra attention is given to clearing snow and ice from higher elevation roads (especially Clements Rd.).	Dec. 2015-2019	Highway Department Budget	Road Agent				
All	11	Provide information to landowners regarding tree maintenance	Dec. 2015-2019	Highway Department Budget	Road Agent				
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.	Dec. 2015-2019	Operating Budget	BoS				
MV with HazMat	15	Ensure that local personnel maintain training and have the appropriate equipment in initial spill response.	Dec. 2015-2019	Fire and Highway Department Budgets	Fire Chief & BoS				
All	22	Consider adopting a community notification system such as Reverse 911 or Code Red.	July 2015	Grafton Co., Town Operating Budget	BoS				

Hazard	ID	Action	Time Frame	Potential Funding	Responsible Party	Status 2015	Status 2016	Status 2017	Status 2018
All	18	Purchase cots and MREs for the emergency shelter and identify storage space.	July 2016	grants, Operating Budget	BoS				
Fire	2	Purchase a track vehicle for better access to homes and recreation areas that are difficult to reach.	July 2016	Town Operating Budget	Fire Chief				
Fire	4	Create more water sources for firefighting near the top of Bridgewater Hill.	Sept. 2016	Fire Dept. Budget	Fire Chief				
Flood/Erosion	20	Upgrade the culvert near the intersection of Poole Hill Road and Dick Brown Road.	Sept. 2016	FEMA HMPGrant, Highway Dept.	Road Agent				
All	8	Work with PSNH and NHECoop to ensure that trees around wires are trimmed back on a regular basis.	July 2018	Highway Department Budget	Road Agent				
All	9	Develop a town policy for regular tree maintenance along roads and utilities.	July 2018	Highway Department Budget	Road Agent				
All	10	Implement a town policy for regular tree maintenance, including funding.	July 2018	Town Operating Budget	BoS				
Fire	6	Install lightning protection on all critical facilities	July 2018	Operational Budget, FEMA	BoS				
All	17	Set up a repeater to improve communication capability in the northern section of town for the Highway, Police, and Fire Departments.	Dec. 2018	FEMA grants	BoS				
Flood/Erosion	24	Raise and widen the red-listed Hammond Hill bridge	Dec. 2018	FEMA HMPGrant, NH DOT, Highway Dept., Warrant Article	Road Agent				
Flood/Erosion	25	Replace one abutment and the concrete deck at the bridge at Bridgewater Hill and Dick Brown Road.	Dec. 2018	FEMA HMPGrant, Highway Dept., Warrant Article	Road Agent				
Flood/Erosion	23	Complete reconstruction & rechanneling at the red-listed Hammond Hill bridge.	Dec. 2018	FEMA HMPGrant, NH DOT, Highway Dept., Warrant Article	Road Agent				