

# **Bristol, NH**

## **Hazard Mitigation Plan Update 2024**



**This plan integrates the following:**

- **Hazard Mitigation Plan Update (FEMA)**
- **Community Wildfire Protection Plan (DNCR)**

**March 1, 2024  
Final for Town Adoption**

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**Prepared for the Town of Bristol and NH Homeland Security & Emergency  
Management**

**By  
The Bristol Hazard Mitigation Planning Team**

**With assistance from Mapping and Planning Solutions**

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*"Plans are worthless, but planning is everything. There is a very great distinction because when you are planning for an emergency you must start with this one thing: The very definition of "emergency" is that it is unexpected, therefore it is not going to happen the way you are planning."*

*-Dwight D. Eisenhower*

#### HAZARD MITIGATION PLAN DEFINITIONS

"A natural hazard is a source of harm or difficulty created by a meteorological, environmental, or geological event."

"Hazard mitigation is any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards (44CFR 201.2). Hazard mitigation activities may be implemented prior to, during, or after an event. However, it has been demonstrated that hazard mitigation is most effective when based on an inclusive, comprehensive, long-term plan that is developed before a disaster occurs."

(Source: Local Mitigation Plan Review Guide, FEMA, October 1, 2011)



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**Photo Credit: <https://newenglandwaterfalls.com/nh-profilefalls.html>**

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## Acknowledgments

This plan integrates elements to qualify it as a Community Wildfire Protection Plan (CWPP), according to the US Forest Service and the NH Department of Natural & Cultural Resources (DNCR). The plan was created through a grant from NH Homeland Security & Emergency Management (HSEM). The following organizations have contributed invaluable assistance and support for this project:

- NH Homeland Security & Emergency Management (HSEM)
- Federal Emergency Management Agency (FEMA)
- NH Office of Strategic Initiatives (OSI)
- Mapping and Planning Solutions (MAPS)
- White Mountain National Forest (WMNF)
- NH Forests & Lands (DNCR)

**This plan is an update to the most recent Bristol Hazard Mitigation Plan, approved on June 24, 2016.  
This plan was funded under the Pre-disaster Mitigation Grant Program (PDM19)**

### Approval Notification Dates for 2024 Update

Approved Pending Adoption (APA).....February 29, 2024  
 Jurisdiction Adoption: ..... , 2024  
 CWPP Approval: ..... , 2024  
**\*Plan Approval Date (FEMA): ..... , 2024**  
 Receipt of FEMA Letter ..... , 2024  
 Plan Distribution (MAPS): ..... , 2024

*\*The start of the next five-year clock*

## TOWN OF BRISTOL HAZARD MITIGATION PLANNING TEAM (HMPT)

The Town of Bristol would like to thank the following people for the time and effort spent to complete this plan. The following people have attended meetings or been instrumental in completing this plan:

- Jeff Chartier..... Bristol Water & Sewer
- Randall Kelley..... Bristol Planning Board
- Ben LaRoche..... Bristol Fire Chief & EMD
- Jim McIntire..... Bristol Police Chief & DEMD\*
- Pierre Couture..... Bristol School Superintendent
- Christina Goodwin.... Bristol Town Administrator
- Denise DeStefano.... Bristol Planning Board
- Mark Bucklin..... Bristol Highway Department
- Butch Burbank..... Bristol Interim TA
- Leslie Dion..... Director TTCC
- Angel Ekstrom..... CNPHN, MPC
- Jennifer Gilbert..... NH DBEA/OSI
- Lynne Doyle..... NH HSEM
- June Garneau..... MAPS
- Olin Garneau..... MAPS

Many thanks for all the hard work and effort you provided. This plan would not exist without your knowledge and experience. Bristol would also like to thank the Federal Emergency Management Agency and NH Homeland Security & Emergency Management as the primary funding sources for this plan.

Acronyms or abbreviations associated with the above list:

EMD..... Emergency Management Director  
 DEMD..... Deputy Emergency Management Director  
 TA..... Town Administrator  
 TTCC..... Tapply-Thompson Community Center  
 CNPHN..... Central NH Public Health Network  
 MPC..... Mitigation Preparedness Coordinator

*\*Former Employee*

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## Executive Summary

The Bristol Hazard Mitigation Plan Update 2024 was compiled to assist the town in reducing and mitigating future losses from natural, technological, or human-caused hazardous events. The plan was developed by the Bristol Hazard Mitigation Planning Team (HMPT), interested stakeholders, the general public, and Mapping and Planning Solutions (MAPS). The plan contains the tools necessary to identify specific hazards and aspects of existing and future mitigation efforts.



This plan is an **update** to the 2016 Bristol Hazard Mitigation Plan. To produce an accurate and current planning document, the planning team used the 2016 plan as a foundation, building upon that plan to provide more timely information.

This project was held virtually due to the Covid-19 pandemic. References to Covid-19 and its impact on Bristol are discussed in Chapter 5, Section C, Infectious Diseases.

**Mitigation action items for natural hazards are the main focus of this plan.** However, this plan addresses technological and human-caused hazards in addition to natural hazards, as shown below

### NATURAL HAZARDS

- |                                      |                          |
|--------------------------------------|--------------------------|
| 1) Severe Winter Weather             | 7) Infectious Diseases   |
| 2) High Wind Events                  | 8) Drought               |
| 3) Inland Flooding                   | 9) Wildfires             |
| 4) Landslide & Erosion               | 10) Extreme Temperatures |
| 5) Tropical & Post-Tropical Cyclones | 11) Earthquakes          |
| 6) Lightning & Hail                  |                          |

### TECHNOLOGICAL HAZARDS

- |                        |                                  |
|------------------------|----------------------------------|
| 1) Conflagration       | 4) Long Term Utility Outage      |
| 2) Hazardous Materials | 5) Aging Infrastructure          |
| 3) Dam Failure         | 6) Known & Emerging Contaminants |

### HUMAN-CAUSED HAZARDS

- |                            |                         |
|----------------------------|-------------------------|
| 1) Mass Casualty Incidents | 3) Terrorism & Violence |
| 2) Cyber Events            | 4) Transport Accidents  |

Some hazards listed in the 2018 New Hampshire Hazard Mitigation Plan were not included in this plan as the team felt they were unlikely to occur in Bristol or were not applicable. An explanation of why these hazards are excluded from this plan can be seen in Chapter 3, Section A.

This plan also provides a list of Critical Infrastructure & Key Resources (CIKR) categorized as follows: Emergency Response Facilities (ERF), Non-Emergency Response Facilities (NERF), Facilities & Populations to Protect (FPP), and Potential Resources (PR). Also, this plan addresses the town's involvement in the National Flood Insurance Program (NFIP).

Communities can sometimes cope with the impact of particular natural hazards. For example, although severe winter weather is often a common hazard in the state, most New Hampshire communities handle two to three-foot snowstorms with little or no disruption of services. On the other hand, an unexpected ice storm can have disastrous effects on a community. Mitigation for sudden storms such as ice storms is difficult to achieve. Establishing warming and cooling centers, creating notification systems, providing public outreach, tree trimming, opening shelters, and perhaps burying overhead power lines are just a few actions that may be implemented.

In summary, finding mitigation action items for every hazard that affects a community can be difficult. With economic constraints, cities and towns are less likely to have the financial ability to complete certain mitigation action items, such as burying power lines. In preparing this plan, the Bristol HMPT (the team) has considered a comprehensive list of mitigation action items that could diminish the impact of hazards. The team has also decided to maintain a list of preparedness action items for future reference and action.

To simplify the language in the plan, the following abbreviations and acronyms will be used:

Bristol Hazard Mitigation Plan Update 2024 .....	the plan or this plan
Bristol .....	the town or the community
Hazard Mitigation Planning Team .....	the team or HMPT
Hazard Mitigation Plan.....	HMP
Emergency Operations Plan .....	EOP
Mapping and Planning Solutions.....	MAPS
Mapping and Planning Solutions Planner.....	the planner
NH Homeland Security & Emergency Management .....	HSEM
Federal Emergency Management Agency .....	FEMA

*For more acronyms, please refer to Appendix E: Acronyms.*

**Mission Statement:**

To make Bristol less vulnerable to the effects of hazards through the effective administration of hazard mitigation planning, wildfire hazard assessments, and a coordinated approach to mitigation policy and planning activities.

**Vision Statement:**

The Town of Bristol will reduce the impacts of natural hazards and other potential disasters through implementing mitigation measures, public education and deliberate capital expenditures within the community. Homes and businesses will be safer and the community's ISO rating may be improved.



## **Chapter 1: Hazard Mitigation Planning Process**

### **A. AUTHORITY & FUNDING**

The Bristol Hazard Mitigation Plan Update 2024 was prepared following the Disaster Mitigation Act of 2000 (DMA), Section 322 Mitigation Planning, signed into law by President Clinton on October 30, 2000. This hazard mitigation plan was prepared by the Bristol Hazard Mitigation Planning Team (HMPT) under contract with New Hampshire Homeland Security & Emergency Management (HSEM), operating under the guidance of Section 206.405 of 44 CFR Chapter 1 (10-1-97 Edition) and with the assistance and professional services of Mapping and Planning Solutions (MAPS). HSEM funded this plan through Federal Emergency Management Agency (FEMA) grants. Matching funds for team members' time were also part of the funding formula.

### **B. PURPOSE & HISTORY OF THE FEMA MITIGATION PLANNING PROCESS**

*The ultimate purpose of the Disaster Mitigation Act of 2000 (DMA) is to:*

*"...establish a national disaster hazard mitigation program -*

- To reduce the loss of life and property, human suffering, economic disruption and disaster assistance costs resulting from natural disasters; and*
- To provide a source of pre-disaster hazard mitigation funding that will assist States and local governments (including Indian tribes) in implementing effective hazard mitigation measures that are designed to ensure the continued functionality of critical services and facilities after a natural disaster".<sup>1</sup>*

DMA 2000 amends the Robert T. Stafford Disaster Relief and Emergency Assistance Act by, among other things, adding a new section, "322 – Mitigation Planning", which states:

*"As a condition of receipt of an increased Federal share for hazard mitigation measures under subsection (e), a State, local, or tribal government shall develop and submit for approval to the President a mitigation plan that outlines processes for identifying the natural hazards, risks, and vulnerabilities of the area under the jurisdiction of the government."<sup>2</sup>*

HSEM aims to have all New Hampshire communities complete a local hazard mitigation plan to reduce future losses from natural hazards before they occur. HSEM outlined a process whereby communities throughout the state may be eligible for grants and other assistance upon completing this hazard mitigation plan.

The Bristol Hazard Mitigation Plan Update 2024 is a planning tool to reduce future losses from natural, technological, and human-caused hazards as required by the Disaster Mitigation Act of 2000. This plan does not constitute a section of the town's Master Plan. However, mitigation action items from this plan may be incorporated into future Master Plan updates.

The DMA emphasizes local mitigation planning. It requires local governments to prepare and adopt jurisdiction-wide hazard mitigation plans as a condition for receiving grants under the Hazard Mitigation Grant Program (HMGP). Local governments must review this plan yearly and update this plan every five years to continue program eligibility.

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<sup>1</sup> Disaster Mitigation Act (DMA) of 2000, Section 101, b1 & b2

<sup>2</sup> Disaster Mitigation Act (DMA) of 2000, Section 322a

### **C. JURISDICTION**

This plan addresses one jurisdiction – the Town of Bristol, Grafton County, New Hampshire.

### **D. SCOPE OF THE PLAN & FEDERAL & STATE PARTICIPATION**

A community's hazard mitigation plan often identifies many natural hazards and is somewhat broad in scope and outline. The scope and effects of this plan were assessed based on the impact of hazards and wildfire on Critical Infrastructure & Key Resources (CIKR), current residential buildings, other structures within the town, future development, administrative, technical and physical capacity of emergency response services and response coordination between federal, state and local entities.

In seeking approval as a Hazard Mitigation Plan (HMP) and a Community Wildfire Protection Plan (CWPP), the planning effort included the participation of NH Homeland Security & Emergency Management (HSEM), the United States Department of Agriculture-Forest Service (USDA-FS), the NH Department of Natural & Cultural Resources (DNCR), and the NH Bureau of Economic Affairs (BEA) as well as routine notification of upcoming meetings to other state and federal entities. Designation as a CWPP may allow a community to gain federal funding for hazardous fuel reduction and other mitigation projects supported by the USDA-FS and NH-DNCR. By merging the two federal planning processes (hazard and wildfire), duplication is eliminated, and the town has access to a larger pool of resources for pre-disaster planning.

The Healthy Forest Restoration Act (HFRA) of 2003 includes statutory incentives for the US Forest Service to consider local communities as they develop and implement forest management and hazardous fuel reduction projects. However, a community must prepare a CWPP to take advantage of this opportunity. This hazard mitigation planning process not only satisfies FEMA's criteria regarding wildfires and all other hazards but also addresses the minimum requirements for a CWPP:

- **Collaboration:** *Local and state government representatives must collaboratively develop a CWPP in consultation with federal agencies and other interested parties.*
- **Prioritized Fuel Reduction:** *A CWPP must identify and prioritize areas for hazardous fuel reduction treatments and recommend the types and methods of treatment that will protect one or more at-risk communities and essential infrastructure.*
- **Treatment of Structural Ignitability:** *A CWPP must recommend measures that homeowners and communities can take to reduce the ignitability of structures throughout the area addressed by the plan.<sup>3</sup>*

Finally, as required under the Code of Federal Regulations (CFR), Title 44, Part 201.6(c) (2) (ii) and 201.6(c) (3) (ii), the plan must address the community's participation in the National Flood Insurance Program (NFIP) and its continued compliance with the program. As part of a vulnerability assessment, the plan must address the NFIP-insured structures that have been repetitively damaged due to floods.

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<sup>3</sup> Healthy Forest Restoration Act; HR 1904, 2003; Section 101-3-a.b.c; [http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=108\\_cong\\_bills&docid=f:h1904enr.txt.pdf](http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=108_cong_bills&docid=f:h1904enr.txt.pdf)

## E. PUBLIC & STAKEHOLDER INVOLVEMENT

Public and stakeholder involvement was stressed during the initial meeting, and community officials were given a matrix of potential team members (see below). Community officials were urged to contact as many people as possible to participate in the planning process, including residents, officials, and residents from surrounding communities. The Town of Bristol understands that natural hazards do not recognize political boundaries.

The team provided excellent public and stakeholder notification. Many interested citizens and stakeholders had the opportunity to become aware of the hazard mitigation planning in Bristol. A press release (see following page) was posted on the Town Office Bulletin Board, at the Old Town Hall, in the Bristol Buzz (a bi-monthly town newsletter), and on the town's website. The press release was used to notify businesses and private and non-profit organizations that work with underserved communities and socially vulnerable populations that meetings were taking place, and they were invited to attend.

### HAZARD MITIGATION POTENTIAL TEAM MEMBERS

#### FEDERAL

- USDA Forest Service

#### STATE

- Department of Transportation (DOT)
- Department of Natural & Cultural Resources (DNCR)
- Bureau of Economic Affairs (BEA)

#### LOCAL

- Select Board Member(s)
- Town Manager/Administrator
- Planning Board Member(s)
- Town Planner
- Police Chief
- Fire Chief
- Emergency Management Director
- Emergency Medical Services
- Education/School
- Recreation Director
- DPW Director or Road Agent
- Water & Waste Management
- Public Utilities
- Dam Operator(s)
- Major Employer(s)
- Senior Citizen Facilities
- Vulnerable populations
- Academia

#### OTHER OR SPECIAL INTEREST

- Landowners
- Homeowners Association(s)
- Forest Management
- Developers & Builders
- Major Businesses

#### NEWS

#### EVENTS

#### TOWN PROJECTS

#### COVID-19

#### [4th of July Weekend Information »](#)

##### **SATURDAY, JULY 2:**

1:30 PM BOAT PARADE - at the foot of Newfound Lake - prizes! Rain date is July...

#### [The Town of Bristol Commences Hazard Mitigation Planning »](#)

The Bristol Fire Chief/Emergency Management Director (EMD) will meet with June Garneau of Mapping and Planning...

#### [Town Clerk/Tax Collectors Office »](#)

The TC/TX office will be closed on June 24th. The Town Clerk / Tax Collector's office will be closing at 4:00 pm on...

#### [Memorial Day Parade Information »](#)

#### [Mobile Food Pantry in Plymouth »](#)

#### [Job Announcements - One full-time and one part-time »](#)

##### **Shared Administrative Assistant**

#### [Job Announcement: Town Administrator »](#)

The Town of Bristol, New Hampshire, is seeking a Town Administrator to lead the community into its next phase. The...

[VIEW ALL](#)

§201.6(b) requires that there be an open public involvement process in the formation of a plan. This process shall provide an opportunity for the public to comment on the plan during its formation as well as an opportunity for any neighboring communities, businesses, and others to review any existing plans, studies, reports, and technical information and incorporate those into the plan, to assist in the development of a comprehensive approach to reducing losses from natural disasters.

[Home](#)

## The Town of Bristol Commences Hazard Mitigation Planning

POSTED ON: JUNE 14, 2022 - 5:48AM

The Bristol Fire Chief/Emergency Management Director (EMD) will meet with June Garneau of Mapping and Planning Solutions and other team members from Bristol on May 26, 2022, to begin work on the required five-year update of the 2016 Bristol Hazard Mitigation Plan. The Town and Mapping and Planning Solutions are conducting a series of Hazard Mitigation meetings to develop the plan over the next few months.

During these public meetings, the planning team will address natural, technological, and human-caused hazards such as Inland Flooding, Long-Term Utility Outage, and Transport Accidents; the team will determine "Action Items" to help mitigate the effects of these hazards. The team will also review shelter sites and the need for generators at those sites.


By examining critical infrastructure and key resources, along with past hazards, the team will establish priorities for future mitigation projects and steps that can be taken to increase public awareness of hazards in general.

As mandated by the Disaster Mitigation Act of 2000, all municipalities must complete a local Hazard Mitigation Plan to qualify for Federal Emergency Management Administration (FEMA) funding should a natural disaster occur. The planning processes are made possible by grants from FEMA.

The Hazard Mitigation Planning Team is currently being formed. Bristol citizens and any interested stakeholders are invited to participate. Zoom meetings are scheduled for Thursday afternoons from 2:00 PM to 4:00 PM on May 26 and June 23, 2022. Additional meetings will also be scheduled. The public is encouraged to attend all meetings. To be included in the process, all interested parties should contact Ben LaRoche, FC/EMD, by email at [blaroche@bristolnh.gov](mailto:blaroche@bristolnh.gov). Interested parties will be added to the Zoom meeting invitation list or advised where they can attend the meeting in person.


More information on the hazard mitigation planning process is available from June Garneau at Mapping and Planning Solutions, [jgarneau@mappingandplanning.com](mailto:jgarneau@mappingandplanning.com).

Lastly, the planner sent a monthly calendar (see below) and email inviting stakeholders to participate in planning meetings being held by MAPS. Bristol's neighbors, Alexandria, Bridgewater, New Hampton, and Hill, are part of MAPS' monthly email. EMDs, Police Chiefs, Fire Chiefs, Rangers, and other state, federal, and private officials were included in this email blast.



### Upcoming Zoom Meetings

(Highlighted by "Counties" as of November 21, 2022)



Day	Date	Time	Town/Location	Plan Type	HSEM Field Rep	County
Tuesday	11/29/22	1:30 PM	Lyman Zoom Meeting	HMP	Paul Hatch	Grafton
Wednesday	11/30/22	2:00 PM	Chester Zoom Meeting	EOP	Courtney Jordan	Rockingham
Thursday	12/1/22	10:00 AM	Whitefield Zoom Meeting	HMP	Vacant	Coos
Tuesday	12/6/22	9:00 AM	New Hampton Zoom Meeting	EOP	Liz Gilboy	Belknap
Thursday	12/8/22	10:00 AM	Canaan Zoom Meeting	HMP	Paul Hatch	Grafton
Thursday	12/8/22	2:00 PM	Bristol Zoom Meeting	HMP	Paul Hatch	Grafton
Wednesday	12/14/22	10:00 AM	Jackson Zoom Meeting	EOP	Vacant	Carroll
Wednesday	12/14/22	1:00 PM	Hebron Zoom Meeting	HMP	Paul Hatch	Grafton

Team composition can be impacted in some communities due to lower population and because many people “wear more than one hat”. It is often challenging to attract citizens to participate in town government. In smaller communities, those working in town government generally hold full-time jobs and volunteer in various town positions. Depending on the population, the percentage of interested citizens in a town’s planning processes may be diminished. Due to the availability of jobs, a high elderly population, and other economic factors, smaller communities have a dwindling number of young people interested in politics.

In contrast to small-town NH, Bristol has a robust town government that includes the usual full-time departments of a larger city and a population of nearly 3,500. In addition, the presence of Newfound Lake and several businesses and agencies make Bristol a bustling center of activity in central New Hampshire.

Bristol had good participation in developing this plan; the Emergency Management Director (EMD)/Fire Chief, the Police Chief/Deputy EMD, the Highway Superintendent, the Recreation Director, and the Health Officer participated in meetings. The Town Administrator, members of the Planning Board, the Bristol School Superintendent, and the Central New Hampshire Public Health Network also participated. Comments made by all team members were integrated into the narrative discussion and incorporated into the document. Although the public was informed about the planning meetings, no one from the general public attended Bristol’s meetings.

## ***F. INCORPORATION OF EXISTING PLANS, STUDIES, REPORTS, AND TECHNICAL INFORMATION***

The planning process included a complete review of the Bristol Hazard Mitigation Plan 2016 for updates, development changes, and accomplishments. The team worked with the planner to identify pertinent information from the reviewed documents; this information was then added to the appropriate place in the plan. Also, as noted in the bibliography and footnotes throughout the plan, many other documents were used to create this mitigation plan. Some, but not all, of those plans and documents are listed below:

The Bristol Hazard Mitigation Plan 2016 .....	Compare & Contrast
Bristol Master Plan (2023) .....	Community Information
Bristol Annual Report (2021) .....	Fire Report & Development
Other Hazard Mitigation Plans (New Hampton, Woodstock, Bethlehem) .....	Formats & Mitigation Ideas
The Bristol Subdivision Regulations (2020) .....	New Development Regulations
The Bristol Site Plan Review Regulations (2020) .....	Commercial Regulations
The Bristol Zoning Ordinance (2023) .....	Zoning Regulations
Floodplain Development Ordinance (Part of Zoning) .....	Floodplain Regulations
Census 2020 Data .....	Population Data
The NH DRA Summary of Inventory of Valuation MS-1 2021 for Bristol .....	Structure Evaluation
The Economic & Labor Market Information Bureau Community Profile .....	Population Trends
The American Community Survey (ACS 2017-2021) .....	Population Trends
Mitigation Ideas, FEMA, January 2013 .....	Mitigation Strategies
The Department of Cultural & Natural Resources (DNCR) .....	DNCR Fire Report
The NH Bureau of Economic Affairs (BEA) .....	Flood Losses
Property Tax Valuation (Department of Revenue Administration) .....	Property Information

Other technical manuals, federal and state laws, and research data were combined with these elements to produce this integrated hazard mitigation plan. Please refer to *Appendix A: Bibliography* and the plan’s footnotes.

## G. HAZARD MITIGATION GOALS

Before identifying new mitigation action items, the team reviewed and agreed to the goals in the State of New Hampshire Multi-Hazard Mitigation Plan Update 2018. These goals are detailed below.

### KEY GOALS

- *Minimize loss and disruption of human life, property, the environment, and the economy by implementing appropriate hazard mitigation measures.*
- *Enhance the protection of the civilian population during and after a hazardous event through alerting systems and later through public education.*
- *Promote continued comprehensive hazard mitigation planning at local levels.*
- *Address the challenges posed by climate change.*
- *Strengthen Continuity of Operations (COOP) and Continuity of Government (COG) at the local level.*

### NATURAL HAZARD OBJECTIVES

- *Reduce long-term flood risks through assessment, identification, and strategic mitigation.*
- *Minimize illnesses and deaths related to events that threaten human and animal health.*
- *Assist communities with plan development and public education to reduce the impact of natural disasters.*
- *Ensure mitigation strategies consider the protection and resiliency of natural, historical, and cultural resources.*

### TECHNOLOGICAL HAZARD OBJECTIVES

- *Ensure technological hazards are responded to appropriately and mitigate the effect on citizens.*
- *Build upon state and local capabilities to identify and respond to emerging contaminants.*
- *Collaborate between federal, state, and local agencies and private partners, Non-Governmental Organizations (NGOs), and Volunteer Organizations Active in Disaster (VOADs).*
- *Enhance public education about technological hazards.*
- *Ensure hazardous material (HazMat) teams are adequately equipped and trained.*
- *Build a more resilient voice and data system to lessen the effects of technological hazards.*

### HUMAN-CAUSED HAZARD OBJECTIVES

- *Ensure that grant-related funding processes allow for reasonable and practical actions at the community and state levels.*
- *Identify Critical Infrastructure & Key Resources (CIKR) risks and vulnerabilities.*
- *Improve the ability to respond to and mitigate Cyber Events.*
- *Foster collaboration between federal, state, and local agencies on training and exercising.*
- *Ensure that state and community assets are prepared for all phases of emergency management, including training, reunification, and exercising.*



## H. HAZARD MITIGATION PLANNING PROCESS & METHODOLOGY

The planning process consisted of twelve steps; some were accomplished independently, while others were interdependent. Many factors affected the planning process's sequence, such as the number of meetings, community preparation, attendance, and other community needs. The planning process resulted in significant cross-talk regarding natural, technological, and human-caused hazards.



All steps were included but not necessarily in the numerical sequence listed. The steps are as follows:

### PLANNING STEPS

Step 01: Team formation, orientation, and goals

Step 02: Identify hazards and their risk and probability

*Table 3.1 – Hazard Identification & Risk Assessment (HIRA)*

Step 03: Profile and list historic and potential hazards

*Table 3.2 – Historic Hazard Identification*

Step 04: Profile, list, and establish risk for Critical Infrastructure & Key Resources (CIKR)

*Tables 4.1 to 4.4 – Critical Infrastructure & Key Resources*

Step 05: Assess the community's participation in the National Flood Insurance Program (NFIP)

*Chapter 3, Section D*

Step 06: Prepare an introduction to the community, discuss emergency service capabilities and development trends, and review statistical information about the town

*Chapter 2, Sections A, B, and C & Table 2.1, Town Statistics*

Step 07: Review current plans, policies, and mutual aid and brainstorm to identify improvements

*Table 6.1 – Capabilities Assessment*

Step 08: Examine the status of the mitigation action items from the last plan

*Table 7.1 – Accomplishments since the last Plan*

Step 09: Evaluate and categorize potential mitigation action items

*Tables 8.1 - Potential Mitigation Strategies & the STAPLEE*

Step 10: Prioritize mitigation action items to determine an action plan

*Table 9.1 – The Mitigation Action Plan*

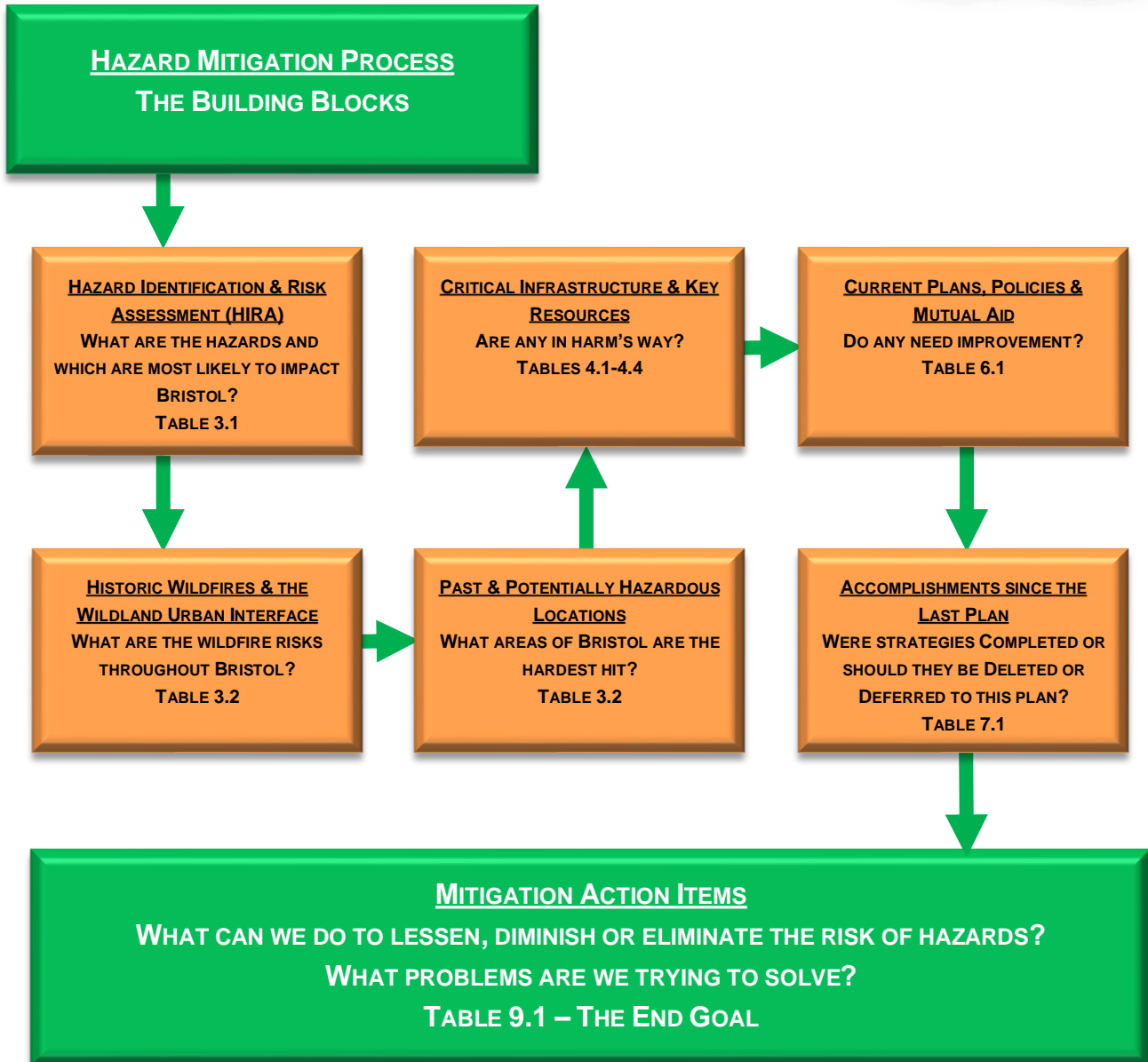
Step 11: Review the plan before submission to HSEM for APA (Approved Pending Adoption)

Step 12: Adopt and monitor the plan

## ***I. HAZARD MITIGATION BUILDING BLOCKS & TABLES***

The foundation for this mitigation plan was the previous plan; each completed table had its starting point with the last hazard mitigation plan completed by the community.

Using a building block approach, each table led to the next table. The final goal was to develop prioritized action items that would lessen or diminish the impact of natural hazards on the town when put into an action plan.





## J. NARRATIVE DESCRIPTION OF THE PROCESS

Completion of this new hazard mitigation plan required significant preparation. The plan was developed with substantial local, state, and federal coordination. All meetings were geared to accommodate brainstorming, open discussion, and increased awareness of potentially hazardous conditions in the town.

The planning process included a complete 2016 Bristol Hazard Mitigation Plan review. Using the 2016 plan as a base, each element of the old plan was examined and revised to reflect changes that had taken place in development and the priorities of the community. Also, referring to the 2016 plan, strategies from the past were reassessed and improved upon for the future.

The following narrative explains how the 2016 Bristol Hazard Mitigation Plan was used during each step of the planning process to make revisions that resulted in this plan.

### MEETING 1, MAY 26, 2022

The first virtual meeting of the Bristol Hazard Mitigation Team was held on May 26, 2022. Meeting attendance included Jeff Chartier (Water & Sewer Superintendent), Randall Kelley (Planning Board-Vice Chair), Ben LaRoche (Fire Chief & Emergency Management Director), Jim McIntire (Police Chief & Deputy Emergency Management Director), Olin Garneau (Mapping & Planning Solutions), and June Garneau (Mapping & Planning Solutions).

To introduce the team to the planning process, the planner reviewed the evolution of hazard mitigation plans, the funding, the 12-step process, the collaboration with other agencies, and the Goals<sup>4</sup>. The planner also explained the need to sign in, \*track time, and provide public notice to encourage community involvement.

Work then began on *Table 2.1, Town Statistics*. Most of the work on this table was completed at this meeting. The planner agreed to determine the remaining items either through GIS or get at a later date. There was some discussion about the seasonal population change in Bristol with summer and winter visitors. Other discussions included ways to alert the public, shelters, and the location of the EOCs.

Next on the agenda were hazard identification and the completion of *Table 3.1, Hazard Identification & Risk Assessment (HIRA)*. Then, using the town's last HMP and the State of New Hampshire Multi-Hazard Mitigation Plan Update 2018, the team assessed which hazards could affect the community.

#### Meeting 1 – May 26, 2022

##### **1) Introduction**

- a) Evolution of Hazard Mitigation Plans & Community Wildfire Protection Plans
- b) Reasons for Hazard Mitigation and Update
- c) Community involvement to solicit input on how to mitigate the effects of hazards
- d) Devise a plan that lessens, diminishes, or completely eliminates the threat of Hazards to the Town

##### **2) The Process**

- a) Funding
- b) Review of 12 Step Process & The Team
- c) Collaboration with other Agencies (HSEM, WMNF)

##### **3) Meetings**

- a) Community Involvement - Public Notice, Press Release
- b) Stakeholders
- c) Signing In, Tracking Time, Agendas, Narrative

##### **4) Today's Topics**

- a) Table 2.1, Town Information
- b) Table 3.1, Hazard Identification & Analysis
- c) Hazard Descriptions
- d) Table 4.1-4.4, Critical Infrastructure & Key Resources

##### **5) Homework**

- a) Homework – Critical Infrastructure & Key Resources
- b) Digital Photos – contributions welcome

##### **6) Future Meetings**

- a) Thursday, June 23, 2022 @ 2:00 PM

<sup>4</sup> Emailed to the team before the first meeting along with these attachments - Agenda, Acronyms & Abbreviations, and the State Hazards

After the hazards had been identified, the team then assessed the risk severity and probability by ranking each hazard on a scale of 1-5 (5 being very high or catastrophic) based on the following:

The Human Impact .....Probability of Death or Injury  
 The Property Impact .....Physical Losses and Damages  
 The Business Impact .....Interruption of Service  
 The Probability .....Likelihood of this occurring within 25 years

The rankings were then calculated to reveal the hazards which pose the most significant risks to the community. Eleven natural hazards, six technological hazards, and four human-caused hazards were identified. After analyzing the natural hazards in Table 3.1, Severe Winter Weather, High Wind Events, and Inland Flooding were designated “High Risk” hazards for the town.

The planner explained what we would be working on at the next meeting and set a date for June 23, 2022; the meeting was adjourned.

### MEETING 2, JUNE 23, 2022

Virtual meeting attendance included Jeff Chartier, Ben LaRoche, Jim McIntire, Pierre Couture (Superintendent of SAU4), Christina Goodwin (Health Officer), Denise DeStefano (Planning Board Chair), Mark Bucklin (Highway Superintendent), Angel Ekstrom (Central NH Regional Public Health Network), Olin Garneau and June Garneau.

The meeting began with a review of the work done at the previous meeting. First, the planner reviewed *Table 2.1, Town Statistics*, to ensure data accuracy. Next, the planner reviewed *Table 3.1, Hazard Identification & Risk Assessment (HIRA)*, to ensure the team felt the town's hazards were in the correct order. No changes were made to either table.

Next, having completed Table 3.1 at the previous meeting, the team started working on descriptions of each hazard and how they could impact the community.

To gain more knowledge of the impact of these hazards, the planner asked the team to describe each hazard as it relates to Bristol. For example, some of the questions asked were:

- *How often do these hazards occur?*
- *Do the hazards damage either the roads or structures?*
- *Have the hazards resulted in the loss of life?*
- *Are the elderly and functional needs populations particularly at risk?*
- *What has been done in the past to cope with the hazards?*
- *Was outside help requested?*
- *Are the hazards further affected by an extended power failure?*
- *What mitigation actions can we take to eliminate the hazard or diminish its impact?*

### Meeting 2 – June 23, 2022

#### **1) Last Meeting**

- a) Reviewed planning process, purpose, funding & collaboration.
- b) Reviewed community involvement and stakeholders
- c) Worked on Town Statistics
- d) Worked Hazard Identification & Risk Assessment (HIRA) (did not finish)

#### **2) Today's Topics**

- a) Review....
  - i) Table 2.1, Town Statistics
  - ii) Table 3.1, Hazard Identification & Risk Assessment (HIRA)
- b) Work on....
  - i) Hazard Descriptions
  - ii) Tables 4.1-4.4, Critical Infrastructure & Key Resources (CIKR)
  - iii) Table 3.2, Historic Hazard Identification (time allowing)

#### **3) Homework**

- a) Review materials sent by MAPS
- b) Digital Photos – contributions welcome

#### **4) Future Meetings**

- a) \_\_\_\_\_

In addition to bringing more awareness to the hazards, these questions provided additional information to analyze the impact of the hazards on the community. The planner noted that these descriptions would be used in Chapter 5.

With time running out, the planner reviewed what would occur at the next meeting and thanked the team. The next meeting was set for September 8, 2022.

### **MEETING 3, SEPTEMBER 8, 2022**

Virtual meeting attendance included Ben LaRoche, Jim McIntire, Pierre Couture, Christina Goodwin, Mark Bucklin, Butch Burbank (Interim Town Administrator), Leslie Dion (Select Board), Olin Garneau, and June Garneau.

First on the agenda was the completion of Hazard Descriptions from the previous meeting. Next, the team worked on *Tables 4.1–4.4, Critical Infrastructure & Key Resources (CIKR)*. The Emergency Response Facilities, the Non-Emergency Response Facilities, the Facilities & Populations to Protect, and the Potential Resources from the 2016 plan were examined. A few minor adjustments were made for this plan. In addition, the evacuation routes, helicopter landing zones, and bridges on the evacuation routes were defined. Lastly, each Critical Infrastructure & Key Resource was analyzed for their “Hazard Risk”.

#### **Meeting 3 – September 8, 2022**

##### **1) Last Meeting**

- a) Reviewed...
  - i) Table 2.1, Town Statistics
  - ii) Table 3.1, Hazard Identification & Risk Assessment (HIRA)

##### **2) Today's Topics**

- a) Finish....
  - i) Hazard Descriptions
- b) Work on....
  - i) Tables 4.1-4.4, Critical Infrastructure & Key Resources (CIKR)
  - ii) Table 3.2, Historic Hazard Identification

##### **3) Homework**

- a) Review materials sent by MAPS
- b) Digital Photos – contributions welcome

##### **4) Future Meetings**

- a) Thursday, October 6, 2022, @ 2:00 PM
- b) Thursday, November 10, 2022, @ 2:00 PM
- c) Thursday, December 8, 2022, @ 2:00 PM

The team then began work on *Table 3.2, Historic Hazard Identification*, which lists past and potentially hazardous locations or events. First, they looked at the hazards listed in the last plan and determined which they would like to see kept in this plan. Next, the team examined the record of Major Disaster and Emergency Declarations that have taken place in recent years.

With time running out and Table 3.2 not finished, the planner thanked the team for their work, set the next meeting date for October 13, 2022, and adjourned the meeting.

### **MEETING 4 – OCTOBER 13, 2022**

Virtual meeting attendance included Jeff Chartier, Ben LaRoche, Jim McIntire, Pierre Couture, Christina Goodwin, Denise DeStefano, Mark Bucklin, Olin Garneau, and June Garneau.

First on the agenda was the completion of *Table 3.2, Historic Hazard Identification*. After finishing the remainder from the previous meeting, the team also reviewed Table 3.2. While reviewing Table 3.2, the planner took the opportunity to explain the Wildland Urban Interface (WUI); this area is determined to be where the urban environment interfaces with the wildland environment and is the most prone area to the risk of wildfires. In Bristol, it was noted that the WUI would cover the entire town due to the abundance of forested land. The planner also took some time to discuss development trends in the town. The team noted a few underway development projects, but most were small projects, and none were in hazard-prone areas. Mitigation strategies were discussed to protect structures and educate citizens about wildfire risk.

Table 7.1, *Accomplishments since the Last Plan*, also pre-populated with data from the 2016 plan, was the next agenda item. The planner discussed each strategy to determine which had been “Completed”, should be “Deleted”, or should be “Deferred” to this plan as a new mitigation action item. Some of the action items from the 2016 plan had been completed or partially completed by the town. Some were deleted as they were no longer useful or considered emergency preparedness, not mitigation. Still, others were “deferred” for consideration as new “Action Items” for this plan. The planner promised to translate her notes into paragraphs to review at the next meeting.

Then the team started work on *Table 6.1, Current Plans, Policies & Mutual Aid*; like other tables, this table was also pre-populated with information from the 2016 plan. Looking closely at the existing policies from the last plan and current mechanisms that are in place, the team determined if each plan, policy, or mutual aid system should be designated as “No Improvements Needed” or “Improvements Needed” based on the Key to Effectiveness found in Chapter 6.

It was explained to the team that those items that needed improvement would become new Action Items for this plan and be discussed again and re-prioritized when we got to the final table, *Table 9.1, The Mitigation Action Plan*.

With time running out, Table 6.1 was not completed. The planner adjourned the meeting and promised to write statements supporting the concepts and ideas expressed for Table 6.1. The next meeting was scheduled for November 10, 2022.

#### MEETING 5 – NOVEMBER 10, 2022

Virtual meeting attendance included Jeff Chartier, Jim McIntire, Pierre Couture, Christina Goodwin, Mark Bucklin, Olin Garneau, and June Garneau.

To begin the meeting, the planner walked the team through a complete review of Table 7.1. Having translated notes from the last meeting into paragraphs, the planner reviewed each item in Table 7.1 to see if the concepts and ideas of the team remained intact and to verify the accuracy of the information. A few changes were made with this review, leaving additional items from Table 7.1 (that were not also in Table 6.1) deferred to become new mitigation action items for this plan. Although several strategies from the last plan were determined to be emergency preparedness and not mitigation, the team kept them as reminders to complete these important action items.

#### Meeting 4 – October 13, 2022

- 1) Last Meeting
  - a) Finished...
    - i) Hazard Descriptions
  - b) Worked on...
    - i) Tables 4.1-4.4, Critical Infrastructure & Key Resources (CIKR)
    - ii) Table 3.2, Historic Hazard Identification (did not finish)
- 2) Today's Topics
  - a) Finish....
    - i) Table 3.2, Historic Hazard Identification
  - b) Work on....
    - i) Table 6.1, Current Plans, Policies & Mutual Aid
    - ii) Table 7.1, Past Hazard Mitigation Plan Assessment
- 3) Homework
  - a) Review materials sent by MAPS
  - b) Digital Photos – contributions welcome
- 4) Future Meetings
  - a) Thursday, November 10, 2022, @ 2:00 PM
  - b) Thursday, December 8, 2022, @ 2:00 PM

#### Meeting 5 – November 10, 2022

- 1) Last Meeting
  - a) Finished...
    - i) Table 3.2, Historic Hazard Identification
  - b) Worked on...
    - i) Table 7.1, Past Hazard Mitigation Plan Assessment
    - ii) Table 6.1, Current Plans, Policies & Mutual Aid (did not finish)
- 2) Today's Topics
  - a) Review....
    - i) Table 7.1, Past Hazard Mitigation Plan Assessment
  - b) Finish & review...
    - i) Table 6.1, Current Plans, Policies & Mutual Aid
  - c) Work on...
    - i) Start thinking about mitigation ideas
    - ii) Table 9.1, Mitigation Action Plan
    - iii) STAPLEE
- 3) Homework
  - a) Review materials sent by MAPS
  - b) Digital Photos – contributions welcome
- 4) Future Meetings
  - a) Thursday, December 8, 2022, @ 2:00 PM

Next, the team reviewed Table 6.1 to ensure that the comments and ideas expressed by the team were fully represented. Then, the team finished the items not completed at the previous meeting. Work on this table resulted in additional action items” for this plan.

The planner gave the team virtual handouts detailing a comprehensive list of possible mitigation action items (see Chapter 8, Sections A & B, and Appendix F). The planner also encouraged team members to explore the link on their agendas for the FEMA Mitigation Idea booklet to see if any of the strategies in this book would be helpful in Bristol (see right).

**Link to Explore:**  
[https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas\\_02-13-2013.pdf](https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf)

The next meeting was scheduled for December 8, 2022.

### MEETING 6 – DECEMBER 8, 2022

Virtual meeting attendance included Jeff Chartier, Ben LaRoche, Jim McIntire, Christina Goodwin, Angel Ekstrom, Olin Garneau, and June Garneau.

The meeting began with an overall recap of the work already done. The recap included a brief look at each of the following completed tables:

- *Table 2.1 – Town Statistics*
- *Table 3.1 – Hazard Identification & Risk Assessment (HIRA)*
- *Table 3.2 – Historic Hazard Identification*
- *Tables 4.1-4.4 – Critical Infrastructure & Key Resources*
- *Table 6.1 – Current Plans, Policies & Mutual Aid*
- *Table 7.1 – Accomplishments since the Last Plan*

#### Meeting 6 – December 8, 2022

##### 1) Last Meeting

- a) Reviewed...
  - i) Table 7.1, Past Hazard Mitigation Plan Assessment
- b) Finished & reviewed...
  - i) Table 6.1, Current Plans, Policies & Mutual Aid

##### 2) Today's Topics

- a) Work on...
  - i) Table 9.1, Mitigation Action Plan
  - ii) STAPLEE

##### 3) Homework

- a) Review materials sent by MAPS
- b) Digital Photos – contributions welcome

##### 4) Future Meetings

- a) \_\_\_\_\_

This review helped the team understand how these tables served as a building block for the final two tables, *Table 8.1, Potential Mitigation Strategies & the STAPLEE*, and *Table 9.1, The Mitigation Action Plan*.

In addition to the action items identified in Tables 6.1 and 7.1, the team reviewed additional potential action items, including a comprehensive list of mitigation strategies derived from several sources and the *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards January 2013*. (See Chapter 8, Sections A & B, and Appendix F).

Next, the team began work on *Table 8.1, Potential Mitigation Action Items & the STAPLEE*, and *Table 9.1, The Mitigation Action Plan*. The planner explained that these tables were combined for the meeting and become separate tables in the final plan. Having pre-populated the tables with the action items that had been deferred from Tables 6.1 and 7.1, the team looked carefully at each “Action Item” to assign responsibility, the time frame for completion, the type of funding that would be required, and the estimated cost of the action (see Chapter 9, Section B).

Work on this table included the STAPLEE process, as shown in Chapter 8. Using handouts provided by the planner, the team could go through the STAPLEE process for the identified action items. The STAPLEE analysis would then become *Table 8.1, Potential Mitigation Action Items & the STAPLEE*. Most importantly, the STAPLEE process enabled the team to consider the cost-benefit of each action item.

The planner mentioned to the team what would occur during the next meeting on January 5, 2023. The planner promised to organize the notes in Tables 8.1 and 9.1 into complete paragraphs and set up the tables for each action item's "ranking" and "prioritizing". The meeting was adjourned.

### MEETING 7 – JANUARY 5, 2023

Virtual meeting attendance included Jeff Chartier, Ben LaRoche, Jim McIntire, Christina Goodwin, Olin Garneau, and June Garneau.

After considering each strategy forwarded from Tables 6.1 & 7.1, the team considered additional mitigation items, some the planner had suggested from other plans. After much discussion and a careful review, the team ultimately settled on thirty-four "Mitigation Action Items" that they felt were achievable and could help diminish the impact of natural hazards in the future.

Upon determining the mitigation action items and completing the STAPLEE process, the team was now ready to rank and prioritize the identified action items.

Before the meeting, the planner pre-ranked the action items based on the time frame, the town's authority to accomplish the strategy, the type of strategy, and the STAPLEE score and placed them in four categories, as shown in Chapter 9, Section A. The team reviewed a visual representation of this table to determine any final changes and the correct order for the rank.

Then, within each rank, the team assigned a priority. For example, if seven action items were ranked "1", the priority rank was 1-7. In this fashion, the team determined which action items were the most important within their rankings and in which order they would be accomplished.

With Tables 8.1 and 9.1 completed, the team's work was finished, except for the final review. The planner agreed to put the final "draft" plan together and email a copy for the team's review. The planner explained the process from this point forward and thanked the team for their hard work. No additional meeting was scheduled.

#### Meeting 7 – January 5, 2023

##### **1) Last Meeting**

- a) Reviewed...
  - i) All work done up until this point
- b) Worked on...
  - i) Table 9.1, Mitigation Action Plan
  - ii) STAPLEE

##### **2) Today's Topics**

- a) Review...
  - i) Table 9.1, Mitigation Action Plan
  - ii) STAPLEE
- b) Work on...
  - i) Ranking & Priority

##### **3) Homework**

- a) Review materials sent by MAPS
- b) Digital Photos – contributions welcome

##### **4) Future Meetings**

- a) \_\_\_\_\_

Documentation for the planning process, including public involvement, is required to meet DMA 2000 (44CFR§201 (c) (1) and §201.6 (c) (1)). The plan must include a description of the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how other agencies participated. A description of the planning process should include how the planning team or committee was formed, how input was sought from individuals or other agencies who did not participate on a regular basis, what the goals and objectives of the planning process were, and how the plan was prepared. The description can be in the plan itself or contained in the cover memo or an appendix.

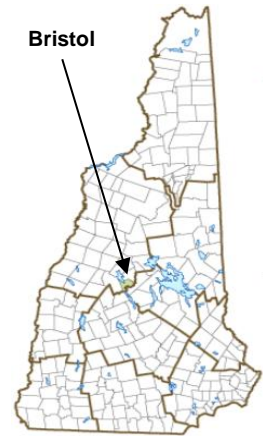


## Chapter 2: Community Profile

### A. INTRODUCTION

*“Bristol, New Hampshire, incorporated in 1819, is a beautiful New England town that encompasses the southern portion of Newfound Lake, the fifth-largest lake in the State. Bristol offers all the benefits of small town living remaining close to major recreational attractions and business centers”, states the Bristol town website<sup>5</sup>.*

In the southeast corner of Grafton County and the Lakes Region Tourism Region, Bristol borders Bridgewater and Hebron to the north, New Hampton to the east, Hill to the south, and Alexandria to the west. The largest employer in Bristol is Freudenberg-NOK, with 450 employees, followed by Newfound Area School District, with 250 employees.



### TOWN GOVERNMENT

A five-member Select Board governs the Town of Bristol, with a Town Administrator overseeing the town's day-to-day operations. The town's departments include but are not limited to Fire, Police, Highway, Planning, Zoning, Recreation, and Conservation.

### DEMOGRAPHICS & HOUSING

Bristol's population has increased from 2,614 in 1990 to 3,244 in 2020, showing an increase of 630, according to the US Census 2020.<sup>6</sup> This data represents a growth rate of approximately 24.1%.

There are an estimated 2,495 housing units, most of which are occupied (1,452), while vacant housing units total 1043, thus confirming the presence of second homes.<sup>7</sup> The estimated median household income is \$67,895, and the median age is 42.8 years.<sup>8</sup>

### EDUCATION & CHILD CARE

Students in grades K-5 attend Bristol Elementary School, grades 6-8 attend Newfound Memorial Middle School, and students in grades 9-12 attend the Newfound Regional High School. There are no private schools, colleges, or universities; however, there are two childcare facilities with 121 children.<sup>9</sup>

**Incorporated:** 1819

**Origin:** Bristol was incorporated in 1819, established on land taken from Bridgewater and New Chester (Hill). Extensive deposits of fine sand or clay similar to the Bristol sand used in Bristol, England, to make fine china and pottery gave this town its name. Here the sand was used to make a superior quality brick, marketed as Bristol brick. The town was center of manufacturing in the early days for such diverse goods as paper, leather, woolens, flannel, bedsteads, and piano stools. Bristol encompasses the lower two-thirds of Newfound Lake, including Wellington State Park.

**Villages and Place Names:** unknown

**Population, Year of the First Census Taken:** 675 residents in 1820

**Population Trends:** Population change for Bristol totaled 1,088 over 41 years, from 2,198 in 1980 to 3,286 in 2021. The largest decennial percent change was a 19 percent increase between 1980 and 1990. The 2021 Census estimate for Bristol was 3,286 residents, which ranked 108th among New Hampshire's incorporated cities and towns.

**Population Density and Land Area, 2021 (US Census Bureau):** 192.4 persons per square mile of land area. Bristol contains 17.1 square miles of land area and 5.0 square miles of inland water area.

*Source: Economic & Labor Market Information Bureau, NH Employment Security, October 2022; Received 5/10/2022*

<sup>5</sup> <https://www.bristolnh.gov/about-bristol>

<sup>6</sup> US Census 2020

<sup>7</sup> 2020 DEC Redistricting Data

<sup>8</sup> American Community Survey (ACS 2021) 5-Year Estimate Data

<sup>9</sup> Economic & Labor Market Information Bureau, NH Employment Security, October 2022; Received 5/10/2022

### NATURAL FEATURES

Bristol covers approximately 17.1 square miles of land area and 5.0 square miles of inland water. The community is dominated by Newfound Lake in the northwest and the Pemigewasett River in the southeast. In other areas of Bristol, rolling hills and woodlands are typical. The lowest elevation in town is 466' above sea level near the lake. The highest point in Bristol is Bristol Peak, at 1,803' above sea level.

Vegetation is typical of New England, including deciduous and conifer forests, open fields, swamps, and riverine areas. The terrain lends itself to abundant small ponds, streams, and rivers, most notably the Pemigewasett and Newfound Rivers and the Danforth, Black, and Tenmile Brooks.

### TRANSPORTATION

The major evacuation routes in Bristol are NH Routes 104 and 3A and the state-owned River Road. NH Route 104 begins at Interstate 93 in New Hampton and travels through the southern part of Bristol, roughly paralleling the Pemigewasett River. NH Route 3A travels from Bridgewater in the north to Hill in the south, intersecting with Route 104 in downtown Bristol. West Shore and Cardigan Mountain Roads are state-maintained roads that may be important for evacuation. Other more minor and less traveled roadways lend access to other areas of the town.

## ***B. EMERGENCY SERVICES***

### EMERGENCY OPERATIONS CENTER & EMERGENCY MANAGEMENT DIRECTOR

The Town of Bristol has a designated Emergency Management Director (EMD). The EMD maintains an Emergency Operations Center (EOC) as part of the town's emergency preparedness program. The EOC is where the EMD, department heads, government officials, and volunteer agencies gather to coordinate their response to a significant emergency or disaster. In Bristol, the designated EOC is the Fire Station.

### FIRE DEPARTMENT & EMS

The Bristol Fire Department is a municipal fire department providing quality fire services and emergency medical services to the residents and visitors of Bristol 24 hours a day, 365 days a year. The Fire Department operates one station within the community and provides emergency medical services and transportation. The department staffs a full-time Chief and eight full-time and ten part-time firefighters and has an additional 15 paid-on-call firefighters. The Bristol Fire Department participates with Lakes Region Fire Mutual Aid and other area departments.

### POLICE DEPARTMENT

The Bristol Police Department is a full-time department providing quality law enforcement services to the residents and visitors of Bristol. The department staffs a full-time Chief, nine full-time, and two part-time officers. The Bristol Police Department has mutual aid with the NH State Police (Troops D & F), the Grafton County Sheriff's Office, and surrounding towns in both Grafton and Belknap Counties.



### DEPARTMENT OF PUBLIC WORKS (DPW)

The Bristol Highway Department operates year-round, 24 hours daily, as needed. The department staffs a full-time Superintendent, five full-time and one part-time employee. The department's mission is to support the citizens of Bristol through the safe operation, proper maintenance, and future development of highways, supporting infrastructure and utilities cost-consciously without sacrificing quality. The department belongs to the NH Public Works Mutual Aid Association.

### MEDICAL FACILITIES

Bristol's closest medical facility is Concord Hospital-Franklin in Franklin (14.5 miles, 25 beds). The alternative medical facility would be Speare Memorial Hospital in Plymouth (18 miles, 25 beds). Locally, Midstate Health could also be available for minor medical procedures.

### EMERGENCY SHELTER(S)

The primary shelter is where evacuees are directed during an emergency. The designated primary shelter in Bristol is the Newfound Regional High School, which offers a large sleeping area, restrooms, showers, and kitchen facilities. It has a partial generator, which keeps parts of the building operational during power outages. The designated secondary shelter for the town is the Bristol Elementary School, which does not have a generator. See Action Item #16 in Table 9.1, *The Mitigation Action Plan*, regarding generators.

## C. BRISTOL'S CURRENT & FUTURE DEVELOPMENT TRENDS

Nearly every New Hampshire community experienced a significant drop in new home construction after the Great Recession of 2008. Bristol was no exception. Between 2008 and 2014, single-family new home construction in Bristol was consistent with New Hampshire trends; it remained sluggish. However, unlike other parts of the state, building construction ticked up a bit in the pre-pandemic years and has remained slow but steady, as shown in the chart (see right) from City-Data.com<sup>10</sup>.

Since the pandemic's beginning in 2020, development in New England has undergone several changes. One of the most significant changes was occasionally used homes modified as permanent residents for those wishing to flee the cities. Lot line adjustments and minor subdivisions were also quite common. Then real estate boomed, at least during 2021 and through most of 2022, only to settle to more moderate levels by the fall.

In the 2022 Bristol Annual Report, the Planning Board stated, *"The Bristol Planning Board is tasked with doing work that enhances "public health, safety, and general welfare and encourages the appropriate and wise use of land" (RSA 672:1). It reviews site plans and subdivision proposals and*

#### Single-family new house Construction building permits

- 1997: 7 buildings, average cost: \$75,000
- 1998: 14 buildings, average cost: \$101,700
- 1999: 15 buildings, average cost: \$78,300
- 2000: 10 buildings, average cost: \$128,000
- 2001: 22 buildings, average cost: \$139,600
- 2002: 20 buildings, average cost: \$150,000
- 2003: 30 buildings, average cost: \$175,000
- 2004: 32 buildings, average cost: \$175,000
- 2005: 17 buildings, average cost: \$124,400
- 2006: 23 buildings, average cost: \$172,800
- 2007: 16 buildings, average cost: \$121,100
- 2008: 9 buildings, average cost: \$182,400
- 2009: 4 buildings, average cost: \$178,900
- 2010: 8 buildings, average cost: \$165,900
- 2011: 8 buildings, average cost: \$172,800
- 2012: 10 buildings, average cost: \$184,000
- 2013: 2 buildings, average cost: \$193,300
- 2014: 2 buildings, average cost: \$193,300
- 2015: 9 buildings, average cost: \$226,800
- 2016: 8 buildings, average cost: \$261,800
- 2017: 8 buildings, average cost: \$261,800
- 2018: 4 buildings, average cost: \$249,800
- 2019: 4 buildings, average cost: \$249,800

<sup>10</sup> City-Data.com; <http://www.city-data.com/city/Bristol-New-Hampshire.html>

updates the Master Plan. It also recommends changes to regulatory “land use” documents like the Zoning Ordinance....”<sup>11</sup>

The Bristol Planning Board’s process for all subdivision, site plan, and excavation applications is extensive and involves on-site examinations and the expertise of other departments and commissions as appropriate. Local regulations are designed to meet state regulations and maintain the community’s small-town character. Bristol’s regulations address wetland areas, stormwater flow, and fire protection. All large subdivisions and commercial enterprises are required to address water availability, and the planning mechanisms that are in place require adequate fire protection to be installed. New development approval requires live hydrants, cisterns, sprinklers, or other fire mitigation provisions as appropriate. All development that has occurred or is proposed in hazard-prone areas has been and will be closely monitored and mitigated to reduce the town’s hazard vulnerability.

**Completed Actions by the Planning Board in 2021**

- 6 Minor Site Plan Reviews - 4 Amended Site Plans
- 1 Subdivision- 1 Incorrectly Delineated Wetlands
- 11 Special Use Permits - 1 Lot Line Adjustment
- 8 Preliminary Conceptual Consultations - 2 Mergers
- 4 Public Hearings on Proposed Zoning Amendments - 1 Boundary Line Agreement
- 1 Conditional Use Permit

The town recognizes the importance of growth and understands the impact of hazards on new facilities and homes if built within the community’s hazard-prone areas. The Planning Board, the Land Use Department, and the Select Board will monitor and guide growth and development using the Master Plan, Subdivision Regulations, the Site Plan Review process, and the Zoning Ordinance. Building permits are required.

As a relatively small community, other town officials are almost always aware of construction that is taking place. The Planning Board will follow town regulations to ensure that any construction in hazardous areas will be built to minimize vulnerability to the hazards identified in this plan.

**TABLE 2.1: TOWN STATISTICS**

Table 2.1 - Town Statistics				
Census Population Data	2020	2010	2000	1990
Bristol, NH - Census Population Data	3,244	3,054	3,033	2,614
Grafton County	91,118	89,118	81,826	74,998
30-year Growth Rate	24.10%	Growth Rate = 2020POP-1990POP/1990POP		
Elderly Population-% over 65 (2021 ACS 5-Year)	18.0%			
Median Age (2021 ACS 5-Year)	42.8			
Median Household Income (2021 ACS 5-Year)	\$67,895			
Individuals below the poverty level (2021 ACS 5-Year)	8.9%			
Change in Population-Summer Weekends (%)	300% (depending on events)			
Change in Population-Winter Weekends (%)	100%			

<sup>11</sup> Town Bristol, 2022 Annual Report, Planning Board Report, page 90

**Table 2.1 - Town Statistics****Housing Statistics (2020 DEC Redistricting Data)**

<i>Total Housing Units</i>	2,495
<i>Occupied Housing Units</i>	1,452
<i>Vacant Housing Units</i>	1043 (occasionally use, seasonal use, recreational use)

**Assessed Building Values**

<b>Types buildings</b>	<b>Value</b>	<b>1% Damage</b>	<b>5% Damage</b>
<i>Residential</i>	\$293,866,800	\$2,938,668	\$14,693,340
<i>Manufactured Housing</i>	\$14,108,900	\$141,089	\$705,445
<i>Commercial</i>	\$40,434,100	\$404,341	\$2,021,705
<i>Tax Exempt</i>	\$735,900	\$7,359	\$36,795
<i>Utilities</i>	\$17,814,100	\$178,141	\$890,705
<i>Totals</i>	\$366,959,800	\$3,669,598	\$18,347,990

The above chart shows the 2022-MS1 structure values. These values are used to estimate structure loss value due to natural hazards (see Chapter 5) based on a loss of 0-1% or 1-5% of structures in the community. Source: 2022 Town Report, Summary Inventory of Valuation, page 107

**Regional Coordination**

<i>County</i>	Grafton
<i>Tourism Region</i>	Lakes

**Municipal Services & Government**

<i>Town Hall or Town Office(s)</i>	Town Office
<i>Town Administrator</i>	Yes, appointed
<i>Select Board (5 member)</i>	Yes, elected
<i>Planning Board</i>	Yes, appointed
<i>School Board</i>	Yes, elected
<i>Zoning Board of Adjustment</i>	Yes, appointed
<i>Conservation Commission</i>	Yes, appointed
<i>Master Plan</i>	Yes, currently updating/one section at a time
<i>Emergency Operation Plan (EOP)</i>	Yes, 2013
<i>Hazard Mitigation Plan (HMP)</i>	Yes, June 24, 2016
<i>Zoning Ordinances</i>	Yes, November 1985/March 2023
<i>Subdivision &amp; Site Plan Review Regulations</i>	Yes, October 19, 1977/June 24, 2020
<i>Capital Improvement Plan (CIP)</i>	Yes, Reviewed annually (CIP Committee)
<i>Capital Reserve Funds (CRF)</i>	Yes, Reviewed annually
<i>Land Use Permits Required</i>	Yes
<i>Town Web Site</i>	Yes, <a href="http://www.bristolnh.gov">www.bristolnh.gov</a>
<i>Floodplain Ordinance</i>	Yes, part of the Zoning Ordinance
<i>Member of NFIP</i>	Yes, April 15, 1980
<i>Flood Insurance Rate Maps (DFIRMS)</i>	February 20, 2008
<i>Flood Insurance Rate Study (FIS)</i>	February 20, 2008

**Percent of Local Assessed Valuation by Property Type - 2021 (NH Department of Revenue)**

**Table 2.1 - Town Statistics**

<i>Residential Buildings</i>	85.7%
<i>Commercial Land &amp; Buildings</i>	10.4%
<i>Other (including Utilities)</i>	3.8%
<b>Emergency Services</b>	
<i>Town Emergency Warning System(s)</i>	CivicReady, CodeRED
<i>School Emergency Warning System(s)</i>	SysAid
<i>Emergency Page</i>	Yes, accessible through the Fire Department
<i>Facebook Pages</i>	Town, Police, Fire, Highway, Historical Society
<i>Other Social Media</i>	Town (Instagram)
<i>Subscription Service</i>	Yes
<i>Local Newspapers / Newsletter</i>	Bristol Buzz (subscription)
<i>Public Access TV</i>	No
<i>Local TV Stations</i>	WMUR- TV
<i>Local Radio</i>	WLNH 98.3 Frank FM, WFTN Mix 94.1 FM
<i>Police Department</i>	Yes, full-time Chief, nine full-time, two part-time
<i>Police Dispatch</i>	Franklin Police Department
<i>Police Mutual Aid</i>	NH State Police - Troops D & F, Grafton County Sheriff's Office, surrounding town's police departments; most of the Belknap towns and all of the Grafton County bordering towns
<i>Animal Control Officer</i>	Bristol Police Department
<i>Fire Department</i>	Yes, full-time Chief, eight full-time, ten part-time, 15 paid-on-call
<i>Fire Dispatch</i>	Lakes Region Fire Mutual Aid
<i>Fire Mutual Aid</i>	Lakes Region Fire Mutual Aid
<i>Fire Stations</i>	One
<i>Fire Warden</i>	Yes
<i>Emergency Medical Services</i>	Bristol Fire Department
<i>EMS Dispatch</i>	Lakes Region Fire Mutual Aid
<i>Emergency Medical Transportation</i>	Bristol Fire Department
<i>HazMat Team</i>	Central NH HazMat Team
<i>Established Emergency Management Director (EMD)</i>	Yes
<i>Established Deputy EMD</i>	Yes
<i>Line of Succession (should EMD be out of the area)</i>	1st...Police Chief/Deputy EMD
	2nd...Duty Officer at the Fire Station
	3rd...Duty Officer at the Police Station
<i>Public Health Network</i>	Central NH Regional Public Health Network
<i>Health Officer</i>	Yes
<i>Deputy Health Officer</i>	Yes
<i>Land Use Officer</i>	Yes
<i>Established Public Information Officer (PIO)</i>	No
<i>Nearest Hospital(s)</i>	Speare Memorial Hospital (18 miles)

**Table 2.1 - Town Statistics**

	Concord Hospital - Franklin (14.5 miles)
<i>Primary EOC</i>	Fire Station (generator)
<i>Secondary EOC</i>	Town Office Meeting Room (generator)
<i>Primary Shelter</i>	Newfound Regional High School in Bristol (partial generator)
<i>Possible Shelter</i>	Newfound Memorial Middle School (partial generator)
<i>Possible Shelter</i>	Bristol Elementary School
<i>Household Pet Shelter</i>	Newfound Regional High School (partial generator)
<i>Large animal and livestock Shelter</i>	Wells Field (baseball, fenced in with water)
<i>Local Humane Society or Veterinarians</i>	Bristol Veterinary Hospital, NH Humane Society (Meredith)
<b>Utilities</b>	
<i>Town Sewer</i>	Municipal (800 homes), private septic
<i>Highway Department</i>	Yes, full-time Superintendent, 5 full-time, 1 part-time (seasonal)
<i>Miles of Class V Roads</i>	35 paved, five gravel, 40 total miles
<i>NH Public Works Mutual Aid</i>	Yes
<i>Water Supply</i>	Bristol Water & Sewer
<i>Waste Water Treatment Plant</i>	Yes
<i>Electric Supplier</i>	Eversource Energy, NH Electric Coop
<i>Natural Gas Supplier</i>	None
<i>Cellular Telephone Access</i>	Yes, limited
<i>Solar Arrays</i>	Waste Water Treatment Plant (750 kW), Library
<i>Oil Pipelines</i>	No
<i>Gas lines</i>	No
<i>High-Speed Internet</i>	Yes
<i>Telephone Company</i>	Consolidated Communications
<b>Transportation</b>	
<i>Primary Evacuation Routes</i>	NH Route 3A, NH Route 104
<i>Secondary Evacuation Routes</i>	River Road
<i>Nearest Interstate</i>	I-93, Exit 23 (6 miles)
<i>Nearest Airstrip</i>	Newfound Valley (1,900 ft. asphalt runway)
<i>Nearest Commercial Airport(s)</i>	Manchester-Boston Regional Airport, Manchester (60 miles)
	Portland International Jetport, Portland, ME (98 miles)
	Logan International Airport, Boston, MA (105 miles)
<i>Public Transportation</i>	No
<i>Railroad</i>	No

**Table 2.1 - Town Statistics****Education & Childcare**

<i>Elementary School(s)</i>	Bristol Elementary School grades PreK-5
<i>Middle School(s)</i>	Newfound Memorial Middle School grades 6-8
<i>High School(s)</i>	Newfound Regional High School grades 9-12
<i>School Administrative Unit (SAU)</i>	SAU 4
<i>Private School(s)</i>	No
<i>College(s)/Universities</i>	No
<i>Licensed Childcare Facilities</i>	2 facilities, 121 capacity

**Conserved Land as a Percent of Land in the Community (GIS Analysis; 2021 Conservation Files, Granit, UNH)**

	<b>Square Miles</b>	<b>Percent of Town Land</b>
<i>Approximate Square Miles in Community (land only)</i>	17.10	100.0%
<i>Approximate Total Un-Conserved Land</i>	15.74	92.0%
<i>Approximate Total Conserved Land</i>	1.36	8.0%
<i>Municipal/County Land (1)</i>	0.14	0.8%
<i>Federal Owned Land (2)</i>	0.37	2.1%
<i>State-Owned Land (3)</i>	0.32	1.8%
<i>Quasi Private (4)</i>	0.00	0.0%
<i>Private Land (5)</i>	0.54	3.2%

**Fire Statistics (NH Division of Forests & Lands, Fire Warden Report, and the town)**

<i>Wildfire Fires (2021)</i>	No
<i>Grafton County Fire Statistics (2021)</i>	30 fires, 3.41 acres
<i>State Forest Fires Statistics (2021)</i>	180 fires, 105 acres

Unless otherwise noted, information in Table 2.1 was derived from the town, the US Census 2020, and the Economic & Labor Market Information Bureau, NH Employment Security, October 22, 2022. Community Response Received 5/10/2022, <https://www.nhes.nh.gov/elmi/products/cp/profiles-pdf/bristol.pdf>.

## Chapter 3: Hazard Identification, Risk Assessment & Probability

### A. HAZARD IDENTIFICATION

The first step in hazard mitigation is to identify hazards. The team determined that eleven natural hazards can potentially affect the community. *Table 3.1, Hazard Identification & Risk Assessment (HIRA)*, estimates the level of impact that each listed hazard could have on humans, property, and business and averages them to establish an index of severity. The probability estimate for each hazard is multiplied by its severity to establish an overall relative threat factor.

Some hazards in Table 3.1 include subcategories of hazards. For instance, Severe Winter Weather includes snowstorms, ice storms, blizzards, and nor'easters. In such instances<sup>12</sup>, the analysis included a discussion of the subcategories. However, ultimately, the final analysis was based on the category in general, as shown in Table 3.1.

The NH State Hazard Mitigation Plan includes many of the same potential hazards identified in Bristol. However, several of the state's hazards were excluded from this plan. These hazards, which scored a zero during the HIRA process (see page 33), include the following:

<u>State Hazard</u>	<u>Reason for exclusion from this plan</u>
Coastal Flooding .....	Distance away from the sea
Solar Storm & Space Weather .....	Felt not to be something the town could manage
Avalanches .....	No known areas of avalanches
Radiological .....	Distance away from radiological sites

Specific hazards that have affected the town, the region, and the state in the past are detailed in *Table 3.2, Historic Hazard Identification*, and Chapter 5.

### B. RISK ASSESSMENT

The hazards listed in Table 3.1 were classified based on the "Relative Threat" score as calculated in Column F; these were then separated into three categories using Jenks Optimization, also known as the natural breaks classification<sup>13</sup>. The "Relative Threat" score was then labeled into three categories, *High Risk*, *Medium Risk*, and *Low Risk*, as shown in Table 3.1, Column G; these categories are also indicated in Chapter 5, Sections B-D. The plan demonstrates each hazard's likelihood of occurrence and its potential effect on the town. This process illustrates a comprehensive hazard statement and helps the town understand which hazards should receive the most attention.

In addition to the relative threat analysis in Table 3.1, the team used *Tables 4-1-4.4, Critical Infrastructure & Key Resources (CIKR)*, to identify and analyze the potential hazard risk based on a scale of 1-3 for each CIKR.

<sup>12</sup> Inland Flooding (Riverine, 100-year, local road flooding, ice jams, dam failure); Extreme Temperatures (hot & cold); High Wind Events (Tornadoes & Downbursts); Infectious Diseases (too many to list)

<sup>13</sup> The natural breaks classification process is a method of manual data classification partitions data into classes based upon natural groups within the data distribution; ESRI, <http://support.esri.com/en/knowledgebase/GISDictionary/term/natural%20breaks%20classification>



### C. PROBABILITY

The determination of the probability of occurrence is contained within Column D in Table 3.1, which assesses hazards based on the likelihood that the hazards will occur within 25 years. The probability scores indicate whether the identified hazard has a *Very Low*, *Low*, *Moderate*, *High*, or *Very High* probability. Probability categories are also indicated in Chapter 5, Sections B-D.

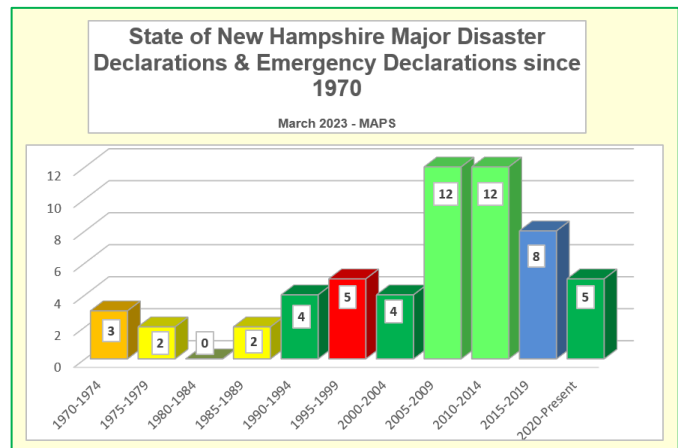
Bristol is reasonably safe from natural, technological, and human-caused hazards. However, due to Bristol's geographic location, along the shores of Newfound Lake and in the foothills of the White Mountains of New Hampshire, there is always a probability that future hazards will occur.

#### HAZARD PROBABILITY & CLIMATE CHANGE

Although not identified as a natural hazard in this plan, no plan can be considered complete without discussing climate change's impact on weather patterns. *"The challenges posed by climate change, such as more intense storms, frequent heavy precipitation, heat waves, drought, extreme flooding, and higher sea levels, could significantly alter the types and magnitudes of hazards impacting states in the future"*, FEMA stated in its State Mitigation Plan Review Guide<sup>14</sup>. FEMA recognizes climate change by including climate change in the hazard mitigation guide for state planners.

The chart to the right shows the increased frequency of Major Disaster Declarations (DR) and Emergency Declarations (EM) in New Hampshire, possibly indicating the impact of climate change.<sup>15</sup> The decade beginning in 2020 includes five disaster declarations: DR-4516 and EM-3445 (Covid-19), DR-4622 (Cheshire County), DR-4624 (Cheshire and Sullivan Counties), and DR-4693 (Belknap, Carroll, Grafton, and Coos Counties).

Communities in New Hampshire, such as Bristol, have become increasingly aware of climate change's impact on the hazards already experienced and anticipate an increase in probability in the future. As proactive measures, a roof-mounted solar array has been installed at the Bristol Public Library, and a solar array has been tied into portions of the wastewater treatment facility.



#### HAZARD PROBABILITY COMBINED WITH LONG-TERM UTILITY OUTAGE

Any potential disaster in Bristol is particularly impactful if combined with a long-term utility outage, as would most likely be true with severe winter storms, blizzards, ice storms, hurricanes, tropical storms, and windstorms. An outage could result in frozen pipes and a lack of water and heat during the winter, a concern for the town's elderly and vulnerable citizens. The food supply of individual citizens could become quickly depleted should a power failure last for a week or more. When combined with a long-term utility outage, any hazard's effects could have a higher probability of damaging impacts on the community.

<sup>14</sup> State Mitigation Plan Review Guide, FEMA, Released March 2015, Effective March 2016, Section 3.2, page 13

<sup>15</sup> Derived from FEMA's record of disasters; categorized by decade since 1970 by the planner; 2020-2029 includes Covid-19



**TABLE 3.1: HAZARD IDENTIFICATION & RISK ASSESSMENT (HIRA)**

Table 3.1 - Hazard Identification & Risk Assessment (HIRA)							
Scoring for Probability (Columns A, B & C)	Column A	Column B	Column C	Column D	Column E (A+B+C)/ 3	Column F D x E	Column G Risk
1=Very Low (0-20%)	What is the probability of death or injury?	What is the probability of physical losses & damage?	What is the probability of interruption of service?	What is the probability of this occurring within 25 years?	Average of Human, Property & Business Impact	Relative Threat	High 8.0-11.9
2=Low (21-40%)							
3=Moderate (41-60%)							Medium 4.0-7.9
4=High (61-80%)	Human Impact	Property Impact	Business Impact	Probability of Occurrence	Severity	Risk Severity x Occurrence	Low 0.0-3.9
5=Very High (81-100%)							
Natural Hazards							
1) Severe Winter Weather	1.00	2.00	4.00	5.00	2.33	11.67	High
2) High Wind Events	1.00	3.00	3.00	5.00	2.33	11.67	High
3) Inland Flooding	1.00	3.00	1.00	5.00	1.67	8.33	High
4) Landslide & Erosion	1.00	3.00	1.00	4.00	1.67	6.67	Medium
5) Tropical & Post-Tropical Cyclones	1.00	2.00	2.00	3.00	1.67	5.00	Medium
6) Lightning & Hail	1.00	2.00	2.00	3.00	1.67	5.00	Medium
7) Infectious Diseases	1.00	1.00	1.00	5.00	1.00	5.00	Medium
8) Drought	1.00	1.00	2.00	3.00	1.33	4.00	Medium
9) Wildfires	1.00	1.00	2.00	2.00	1.33	2.67	Low
10) Extreme Temperatures	1.00	1.00	1.00	2.00	1.00	2.00	Low
11) Earthquakes	1.00	1.00	1.00	1.00	1.00	1.00	Low
Technological Hazards							
1) Conflagration	3.00	3.00	2.00	2.00	2.67	5.33	Medium
2) Hazardous Materials	2.00	3.00	2.00	2.00	2.33	4.67	Medium
3) Dam Failure	1.00	3.00	3.00	2.00	2.33	4.67	Medium
4) Long Term Utility Outage	1.00	2.00	3.00	2.00	2.00	4.00	Medium
5) Aging Infrastructure	1.00	1.00	1.00	3.00	1.00	3.00	Low
6) Known & Emerging Contaminants	1.00	1.00	1.00	1.00	1.00	1.00	Low
Human-Caused Hazards							
1) Mass Casualty Incidents	2.00	1.00	1.00	5.00	1.33	6.67	Medium
2) Cyber Events	1.00	1.00	3.00	3.00	1.67	5.00	Medium
3) Terrorism & Violence	1.00	2.00	1.00	2.00	1.33	2.67	Low
4) Transport Accidents	1.00	1.00	2.00	2.00	1.33	2.67	Low

### D. NATIONAL FLOOD INSURANCE PROGRAM (NFIP) STATUS

Bristol entered the National Flood Insurance Program (NFIP) Member on April 15, 1980. Bristol has a relatively large floodplain with approximately 6.21 square miles of land in the 100-year floodplain<sup>16</sup>. However, in further analysis, the floodplain is only 1.21 square miles, excluding 5.0 square miles of inland water. The floodplain areas are primarily along the Pemigewasset and Newfound Rivers and, to a lesser degree, along Danforth Brook. A large portion of the floodplain is around and includes Newfound Lake. See Chapter 5, Section A for more information.

Bristol is likely to experience flooding on several roads and along most rivers and streams, and the overall flood risk due to riverine and 100-year flood events is high. The latest Flood Insurance Rate Studies (FIRS) and Digital Flood Insurance Rate Maps (DFIRMS) are dated February 20, 2008. The latest DFIRM and FIS are incorporated by reference when amended in the Floodplain Zoning Ordinance.

According to the Office of Strategic Initiatives (OSI), there are 12 NFIP policies in effect in Bristol, including 19 single-family and one 2-4 family policy in force for a total amount of \$3,512,800 worth of insurance. There have been 15 paid losses for a total of \$79,525. The BEA/OSI also reports 0 repetitive losses and \$0 in repetitive loss payments.<sup>17</sup>

#### FLOODPLAIN ZONING ORDINANCE

Appendix B. Floodplain Zoning Ordinance of the Bristol Zoning Ordinance states, in part, *“This Article adopted pursuant to the authority of RSA 674:16, shall be known as the Town of Bristol Floodplain Ordinance. If any provision of this Ordinance differs or appears to conflict with another regulation the provision imposing the greater restriction or more stringent standard shall control. (Amended 2021)”*

*The following regulations in this Ordinance shall apply to all lands designated as Special Flood Hazard Areas by the Federal Emergency Management Agency (FEMA) in its “Flood Insurance Study for the County of Grafton NH,” or as amended, together with the associated Flood Insurance Rate Maps, dated February 20, 2008 or as amended, which are declared to be a part of this Ordinance and are hereby incorporated by reference. (Amended 2021).”<sup>18</sup>*

Appendix B details the exact specifications for building or substantial improvements in the flood zone, beginning with Section I, Definition of Terms. Section II states, *“All proposed development in any special flood hazard areas shall require a permit.”* Section III states, *“The Land Use Office shall review all Land Use permit applications for new construction or substantial improvements to deter whether proposed building sites will be reasonably safe from*



In 1968, although well-intentioned government flood initiatives were already in place, Congress established the National Flood Insurance Program (NFIP) to address both the need for flood insurance and the need to lessen the devastating consequences of flooding. The goals of the program are twofold: to protect communities from potential flood damage through floodplain management, and to provide people with flood insurance.

For decades, the NFIP has been offering flood insurance to homeowners, renters and business owners, with the one condition that their communities adopt and enforce measures to help reduce the consequences of flooding.

Source:

[http://www.floodsmart.gov/floodsmart/pages/about/nfip\\_overview.jsp](http://www.floodsmart.gov/floodsmart/pages/about/nfip_overview.jsp)

#### Severe Repetitive Loss (SRL) Properties--

NFIP-insured buildings that, on the basis of paid flood losses since 1978, meet either of the loss criteria described on page SRL 1. SRL properties with policy effective dates of January 1, 2007, and later will be afforded coverage (new business or renewal) only through the NFIP Servicing Agent's Special Direct Facility so that they can be considered for possible mitigation activities.

Source: <http://www.fema.gov/national-flood-insurance-program/definitions#R>

<sup>16</sup> GIS Analysis of Grafton County DFIRM (Digital Flood Insurance Rate Map)

<sup>17</sup> NH Office of Strategic Initiatives (OSI); Jennifer Gilbert, October 10, 2022

<sup>18</sup> <https://www.townofbristolnh.org/sites/g/files/vyhlif2866f/uploads/zoning-ordinance-2020.pdf>

*flooding*” and continues to specify requirements. Sections IV-IX further discuss, in detail, the requirements for building in the flood zone, including, but not limited to, permitting requirements, the review process, assurances to minimize infiltration of flood water, as built elevation and floodproofing, alteration or relocation of watercourses, flood elevations, manufactured homes, recreational vehicles, and the variance and appeals process.<sup>19</sup>

The town uses the Floodplain Ordinance to guide development and ensure compliance and enforcement of NFIP standards. The Planning Board, the Land Use Department, and the Select Board adhere to the rules, regulations, and requirements outlined in the ordinance. The Bristol Zoning Ordinance can be found on the town’s website.<sup>20</sup>

Bristol’s Floodplain Administrator is responsible for determining substantial improvement and damage. These determinations are made for all development in a special flood hazard area that proposes to improve an existing structure, including alterations, movement, enlargement, replacement, repair, additions, rehabilitations, renovations, repairs of damage from any origin (such as, but not limited to flood, fire, wind, or snow) and any other improvement of or work on such structure including within its existing footprint.

The Floodplain Administrator, in coordination with any other applicable community official(s), shall be responsible for the following:

- Determine if a substantial damage (SD) determination needs to be made and communicate SD and permit requirements to property owners.
- Verify the cost of repairs to the structure.
- Verify the market value of the structure.
- Make the SD determination and issue it to the property owner.
- Permit development/ensure compliance with community ordinance.
- Inspect development and maintain as-built compliance documentation post-construction.

The team understands that the benefits of the NFIP also extend to structures not in the 100-year floodplain and felt it worthwhile to have NFIP brochures and information available at the Town Office for current homeowners and potential developers. The Team also indicated they would review the floodplain ordinance after a significant event to determine if changes could be made to provide further mitigation for flooding. Several flood-related mitigation strategies have been added to this plan. The town will continue to work with the Bureau of Economic Affairs and carefully monitor its compliance with the NFIP.

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<sup>19</sup> <https://www.townofbristolnh.org/sites/g/files/vyhlf2866f/uploads/zoning-ordinance-2020.pdf>

<sup>20</sup> Ibid

**TABLE 3.2: HISTORIC HAZARD IDENTIFICATION****Key for Table 3.2**

**2016 HMPT**..... 2016 Hazard Mitigation Planning Team  
**2024 HMPT**..... 2024 Hazard Mitigation Planning Team  
**DR** ..... Major Disaster Declarations (DR) since 1953  
**EM** ..... Emergency Declarations (EM) since 1953  
**FM** ..... Fire Management Assistance Declaration (FM) since 1953

Table 3.2 includes the following sections:

<b>A. Inland Flooding</b>	<b>D. Severe Winter Weather</b>	<b>G. Miscellaneous Hazards</b>
<b>B. Wildfires</b>	<b>E. Earthquakes</b>	<b>H. Other Hazards</b>
<b>C. High Wind Events</b>	<b>F. Drought</b>	

Type of Event	Date of Event	Location	Description	Source
<b>A. Inland flooding includes flooding caused by 100-year rain events, heavy rainfall, rapid snowmelt, ice jam flooding, dam failure, and local road flooding:</b> Riverine flooding is the most common disaster event in NH. Significant riverine flooding in some areas of the state occurs in less than ten-year intervals and seems to increase with climate change. The entire State of NH has a high flood risk. Flood events have the potential to impact the community on a townwide basis. Bristol has small isolated events annually but has not had a significant flooding event since October 2017.				
Summary of flood events, including Major Disaster & Emergency Declarations in the state & regionwide				
<b>Flooding</b> Prior to 1970	1927, 1936, 1938, 1943 (2), 1953, 1955, 1959		Spring and fall flooding events resulting from severe storms and heavy snowmelt	See below
<b>Flooding</b> 1970-1979	1972 (DR-327), 1973 (DR-399), 1974 (DR-411), 1976, 1978 (DR-549), 1979 (EM-3073)			
<b>Flooding</b> 1980-1989	1986 (DR-771), 1987 (DR-789)			
<b>Flooding</b> 1990-1999	1990 (DR-876), 1991 (DR-923), 1991 (DR-917), 1995, 1996 (DR-1077), 1996 (DR-1144), 1998 (DR-1231)		Spring and fall flooding events resulting from severe storms and heavy snowmelt	See below
<b>Flooding</b> 2000-2009	2003 (DR-1489), 2005 (DR-1610), 2006 (DR-1643), 2007 (DR-1695), 2008 (DR-1787), 2008 (DR-1799)			
<b>Flooding</b> 2010 - 2019	2010 (DR-1892), 2010 (DR-1913), 2011 (DR-4006), 2012 (DR-4065), 2013 (DR-4139), 2015 (DR-4206), 2017 (DR-4329), 2017 (DR-4355), 2018 (DR-4370), 2019 (DR-4457)			
<b>Flooding</b> 2020 - Present	2021 (DR-4622), 2021 (DR-4624)			
A detailed summary of flood events in the community				
<b>Inland Flooding</b> (Heavy Rain)	July 11, 1973	All Ten NH Counties	<b>Major Disaster Declaration DR-399:</b> The town sandbagged the dam at the foot of the lake, and some roads washed out.	FEMA & 2024 HMPT

Type of Event	Date of Event	Location	Description	Source
Inland Flooding (Heavy Rain)	March 30-April 11, 1987	Carroll, Cheshire, Grafton, Hillsborough, Merrimack Rockingham, Strafford & Sullivan	<b>Major Disaster Declaration DR-789:</b> Several roads washed out	FEMA & 2024 HMPT
Inland Flooding (Heavy Rain)	October 20- November 15, 1995	Carroll, Cheshire, Coos, Grafton, Merrimack & Sullivan	<b>Major Disaster Declaration DR-1077:</b> Several roads washed out	FEMA & 2024 HMPT
Inland Flooding (Heavy Rain)	October 20-23, 1996	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan	<b>Major Disaster Declaration DR-1144:</b> Several roads washed out	FEMA & 2024 HMPT
Inland Flooding (Heavy Rain)	June 12-July 2, 1998	Belknap, Carroll Grafton, Hillsborough, Merrimack & Rockingham	<b>Major Disaster Declaration DR-1231:</b> Several roads were washed out	FEMA & 2024 HMPT
Inland Flooding (Heavy Rain)	October 7-18, 2005	Belknap, Cheshire, Grafton, Hillsborough, Merrimack & Sullivan	<b>Major Disaster Declaration DR-1610:</b> State and federal disaster assistance reached more than \$3 million to help residents and business owners in New Hampshire recover from losses resulting from the severe storms and flooding in October. Several roads were washed out.	FEMA & 2024 HMPT
Inland Flooding (Heavy Rain)	May 12-23, 2006	Belknap, Carroll, Grafton, Hillsborough, Merrimack, Rockingham & Strafford	<b>Major Disaster Declaration DR-1643:</b> Flooding occurred in most of southern NH during May 12-23, 2006 (Mother's Day Storm). In Bristol, the upper and lower dams on the Newfound River overtopped (debris), causing the downtown area's evacuation.	FEMA & 2024 HMPT
Inland Flooding (Heavy Rain)	April 15-23, 2007	All Ten NH Counties	<b>Major Disaster Declaration DR-1695:</b> FEMA & SBA obligated more than \$27.9 million in disaster aid for flood damages following the April nor'easter (Tax Day Storm). In Bristol, several roads were washed out. The town received \$21,512.38 in disaster relief from FEMA.	FEMA & 2024 HMPT
Inland Flooding (Heavy Rain & Tornado)	July 24-August 14, 2008	Belknap, Carroll & Grafton & Coos	<b>Major Disaster Declaration DR-1787:</b> A period of severe storms and flooding from July 24 to August 14; a tornado occurred on July 24, 2008. No significant impact in Bristol.	FEMA & 2024 HMPT
Inland Flooding (Heavy Rain)	February 23 - March 3, 2010	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan	<b>Major Disaster Declaration: DR-1892:</b> See below, Section D	FEMA & 2024 HMPT
Inland Flooding (Heavy Rain)	May 26-30, 2011	Coos & Grafton County	<b>Major Disaster Declaration DR-4006:</b> Flooding and hail occurred due to a severe storm on May 26-30, 2011, in Coos & Grafton Counties (aka Memorial Day Weekend Storm). No significant impact in Bristol.	FEMA & 2024 HMPT

Type of Event	Date of Event	Location	Description	Source
<b>Inland Flooding</b> (Tropical Storm Irene)	August 26- September 6, 2011	<b>EM 3333:</b> All Ten NH Counties <b>DR-4026:</b> Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, & Sullivan	<b>Major Disaster Declaration DR-4026 &amp; Emergency Declaration EM-3333:</b> See below, Section C	FEMA & 2024 HMPT
<b>Inland Flooding</b> (Heavy Rain)	July 9-10, 2013	Cheshire, Sullivan & Grafton	<b>Major Disaster Declaration DR-4139:</b> Severe storms, flooding, and landslides occurred from June 26 to July 3, 2013, in Cheshire and Sullivan Counties and southern Grafton County. Hemlock Brook Road and Hemphill Road washed out in Bristol, with minor power outages.	FEMA & 2024 HMPT
<b>Inland Flooding</b> (Heavy Rain)	July 1-2, 2017	Grafton & Coos	<b>Major Disaster Declaration DR-4329:</b> The Federal Emergency Management Agency (FEMA) announced that federal disaster assistance was available to supplement state and local recovery efforts in the areas affected by severe storms and flooding from July 1- 2, 2017, in two New Hampshire Counties. There was no significant impact in Bristol; damages occurred in surrounding towns.	FEMA & 2024 HMPT
<b>Inland Flooding</b> (Heavy Rain)	October 29- November 1, 2017	Sullivan, Grafton, Coos, Carroll, Belknap & Merrimack	<b>Major Disaster Declaration, DR-4355:</b> The Federal Emergency Management Agency (FEMA) announced that federal disaster assistance is available to NH to supplement state and local recovery efforts in the areas affected by severe storms and flooding from October 29-November 1, 2017, in five counties. In Bristol, heavy rain and wind caused significant damage to the wastewater treatment facility. The town received FEMA money for this event.	FEMA & 2024 HMPT
<b>Inland Flooding</b> (Heavy Rain)	July 11-12, 2019	Grafton	<b>Major Disaster Declaration, DR 4457:</b> The Federal Emergency Management Agency announced a major disaster declaration for a period of severe storms and flooding from July 11-12, 2019, in one New Hampshire County. No significant impact in Bristol.	FEMA & 2024 HMPT
<b>Inland Flooding</b> (Ice Jams)	Potential	Townwide	Occasional ice jams on the Pemigewasset, Fowler, and Smith Rivers, but no significant impact usually occurs. There was some over-the-road flooding but no washouts.	2024 HMPT
<b>Inland Flooding</b> (Heavy Rain)	Regularly	Hemlock Brook & Hemphill Roads	Hemlock Brook and Hemphill Roads wash out almost every time there is heavy rain due to the steepness and gravel on the roads.	2024 HMPT
<b>B. Wildfires:</b> New Hampshire is heavily forested and is therefore vulnerable to wildfire, particularly during periods of drought. The proximity of many populated areas to the state's forested land exposes these areas to the potential impact of wildfire. Wildfires have the potential to impact the community on a townwide basis. Since the prior hazard mitigation plan, no significant wildfire events have occurred in Bristol.				
<b>A summary of wildfire events, including Major Disaster &amp; Emergency Declarations in the state and other recent large fires</b>				
<b>Wildfire</b> (Shaw Mountain)	July 2, 1953	Carroll County	<b>Major Disaster Declaration DR-11:</b> This wildfire occurred in Carrol County at Shaw Mountain. This fire did not reach Grafton County or Bristol.	FEMA & 2024 HMPT

Type of Event	Date of Event	Location	Description	Source
<b>Wildfire</b> (Bayle Mountain)	May 2015	Carroll County	<b>The Bayle Mountain Fire:</b> This Class D fire burned 275 acres and took five days to put out on rocky and steep terrain in Ossipee, NH. Blackhawk and private helicopters, along with fire crews from all over the state, assisted in extinguishing this fire. The Bayle Mountain Fire did no damage to homes. This fire did not reach Grafton County or Bristol.	Local Resources
<b>Wildfire</b> (Stoddard)	April 2016	Cheshire County	<b>Fire Management Assistance Declaration, FM-5123:</b> Stoddard, NH. The Stoddard Fire burned 190 acres in April 2016 and caused the evacuation of 17 homes; Class D fire. This fire did not reach Grafton County or Bristol.	FEMA & 2024 HMPT
<b>Wildfire</b> (Covered Bridge Fire)	November 2016	Carroll County	<b>The Covered Bridge Fire:</b> A brush fire near the Albany Covered Bridge grew to 329 acres, primarily on White Mountain National Forest land. No structures were lost; Class E fire. This fire did not reach Grafton County or Bristol.	Local Resources
<b>Wildfire</b> (Dilly Cliff)	October 2017	Grafton County	<b>The Dilly Cliff Fire</b> occurred on the Lost River Gorge Trail in North Woodstock off Route 112 (Lost River Road); Class C: Human-caused; 75 acres. The Dilly Cliff Fire was determined to be extinguished 36 days after it began. This fire was in Grafton County but did not reach Bristol.	Local Resources
<b>Wildfire</b> (Bemis)	May 14, 2022	Carroll County	<b>The Bemis Fire</b> lasted six days, burning 106 acres on the steep terrain around Bemis Brook in Crawford Notch State Park. Local firefighters, the NH Division of Forest and Lands, and members of the US Forest Service from Maine, Colorado, and Virginia all responded to extinguish the fire. There were no structures damaged or injuries to the public or responders. This fire did not reach Grafton County or Bristol.	Local Resources
<b>A detailed summary of wildfire events in the community</b>				
<b>No wildfires of significance have occurred in Bristol since the 2016 Hazard Mitigation Plan was completed.</b>				2024 HMPT
<b>C. High Wind Events, including Tropical &amp; Post-Tropical Cyclones, Tornadoes, Downbursts &amp; Windstorms:</b> Tornadoes are spawned by thunderstorms and occasionally hurricanes; tornadoes may occur singularly or in multiples. A downburst is a severe localized wind blasting down from a thunderstorm. Downburst activity is prevalent throughout NH and becoming more common with climate change; most downbursts go unrecognized unless significant damage occurs. Hurricanes develop from tropical depressions, which form off the coast of Africa. New Hampshire's exposure to direct and indirect impacts from hurricanes is real but modest compared to other states in New England. A hurricane downgraded to a Tropical Storm is more likely to impact New Hampshire. Tornadoes and other wind events can impact the community on a townwide basis. Since the prior hazard mitigation plan, no significant high wind events have occurred in Bristol.				
<b>A summary of high wind events &amp; tropical &amp; post-tropical cyclone events, including Major Disaster &amp; Emergency Declarations in the state &amp; nationwide</b>				
<b>Tropical &amp; Post-Tropical Cyclones</b>	1804, 1869, 1938, 1944, 1954 (2), 1960, 1976, 1978, 1985, 1991 ( <b>DR-917</b> ), 1999 ( <b>DR-1305</b> ), 2005 ( <b>EM-3258</b> ), 2011 ( <b>EM-3333 &amp; DR-4026</b> ), 2012 ( <b>EM-3360</b> )	Number 4 (1938), Number 7 (1944), Carol (1954), Edna (1954), Donna (1960), Belle (1976), Amelia (1978), Gloria (1985), Bob (1991), Floyd (1999), Katrina (2005), Irene (2011), Sandy (2012)		See below
<b>High Wind Events</b> (Tornadoes)	1814, 1890, 1951, 1953, 1957, 1961, 1963, 2008 ( <b>DR-1782</b> )	All listed tornadoes were reported as F2, except for the June 1953 tornado, which was reported as an F3.		See below



Type of Event	Date of Event	Location	Description	Source
<b>A detailed summary of high wind &amp; tropical &amp; post-tropical cyclone events in the community</b>				
<b>Tropical &amp; Post-Tropical Cyclone</b> (Great New England Hurricane)	September 21, 1938	All Ten NH Counties	<b>The Great New England Hurricane:</b> Statewide, multiple deaths occurred, and damages in NH were about \$12.3 million in 1938 (about \$200 million now). During this storm, 20,000 structures, 26,000 automobiles, 6,000 boats, and 325,000 sugar maples were lost or damaged throughout New England. 80% of the people lost power. Although there was no local recollection, it was expected that the damage would have been similar to the rest of the state in Bristol.  (Source <a href="http://nhpr.org/post/75th-anniversary-new-englands-greatest-hurricane">http://nhpr.org/post/75th-anniversary-new-englands-greatest-hurricane</a> )	FEMA & 2024 HMPT
<b>Tropical &amp; Post-Tropical Cyclone</b> (Hurricanes Carol & Edna)	August 31, 1954	All Ten NH Counties	<b>Hurricanes Carol &amp; Edna:</b> Hurricane Carol resulted in extensive tree and power line damage and significant crop losses. Localized flooding and winds measuring over 100 mph also occurred. Hurricane Carol was followed by Hurricane Edna just 12 days later, which caused already weakened trees to fall. Although there was no local recollection, it was expected that the damage would have been similar to the rest of the state in Bristol.  (Source: <a href="http://www.wmur.com/Timeline-History-Of-NH-Hurricanes/11861310">http://www.wmur.com/Timeline-History-Of-NH-Hurricanes/11861310</a> )	FEMA & 2024 HMPT
<b>Tropical &amp; Post-Tropical Cyclone</b> (Tropical Storm Floyd)	September 16-18, 1999	Belknap, Cheshire & Grafton	<b>Major Disaster Declaration DR-1305:</b> The declaration covers damage to public property from the storm that spawned heavy rains, high winds, and flooding throughout September 16-18. No significant damage occurred in Bristol.	FEMA & 2024 HMPT
<b>Tropical &amp; Post-Tropical Cyclone</b> (Hurricane Katrina evacuation)	August 29-October 1, 2005	All Ten NH Counties	<b>Emergency Declaration EM-3258:</b> Assistance was provided to evacuees from the area struck by Hurricane Katrina, and emergency assistance to those areas began on August 29, 2005. The President's action made federal funding available to all 10 New Hampshire counties. There was no significant impact in Bristol.	FEMA & 2024 HMPT
<b>Tropical &amp; Post-Tropical Cyclone</b> (Tropical Storm Irene)	August 26-September 6, 2011	<b>EM 3333:</b> All Ten NH Counties <b>DR-4026:</b> Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, & Sullivan	<b>Major Disaster Declaration DR-4026 &amp; Emergency Declaration EM-3333:</b> Tropical Storm Irene, August 26-September 6, 2011, occurred in seven New Hampshire counties, causing flood and wind damage. In addition, an Emergency Declaration was declared for all ten New Hampshire counties. Tropical Storm Irene brought heavy rain to Bristol, but no significant damage occurred.	FEMA & 2024 HMPT
<b>Tropical &amp; Post-Tropical Cyclone</b> (Hurricane Sandy)	October 26-November 8, 2012	<b>DR-4095:</b> Belknap, Carroll, Coos, Grafton, Rockingham & Sullivan <b>EM-3360:</b> All Ten NH Counties	<b>Major Disaster Declaration DR-4095 &amp; Emergency Declaration EM-3360:</b> The declaration covers damage to property from the storm that spawned heavy rains, high winds, high tides, and flooding from October 26-November 8, 2012. Hurricane Sandy came ashore in NJ and brought high winds, power outages, and heavy rain to six New Hampshire counties. No impact occurred during this storm.	FEMA & 2024 HMPT
<b>High Wind Events</b>	1990s	Newfound Lake	A microburst at the foot of Newfound Lake on Shore Drive caused shingle damage.	2024 HMPT



Type of Event	Date of Event	Location	Description	Source
High Wind Events	1990s	Hemphill	Winds that come down Hemphill will occasionally cause trees to fall across the road, bringing down power lines and affecting the communication tower on the hill; clearcutting is worsening the situation. Microbursts may be possible.	2024 HMPT
<b>D. Severe Winter Weather, including Nor'easters, Blizzards &amp; Ice Storms:</b> Severe winter weather in NH may include heavy snowstorms, blizzards, nor'easters, and ice storms, particularly at elevations over 1,000 feet above sea level. Generally speaking, NH will experience at least one of these hazards during any winter season; however, most NH communities are well prepared for such hazards. Severe winter weather and ice storms can impact the community townwide. No significant winter weather events have occurred in Bristol since the winter of 2020.				
<b>A summary of severe winter weather events, including Major Disaster &amp; Emergency Declarations in the state &amp; regionwide</b>				
Severe Winter Weather (Ice Storms)	1942, 1969, 1970, 1979, 1991, 1998 (DR-1199), 2008 (DR-1812)		Major ice storms have caused significant disruptions to power, transportation, and public and private utilities.	FEMA & 2024 HMPT
Severe Winter Weather (Snowstorms)	1920, 1929, 1940, 1950, 1952, 1958 (2), 1960, 1961, 1969, 1978, 1982, 1993 (EM-3101), 2001 (EM-3166), 2003 (EM-3177), 2003 (EM-3193), 2004, 2005 (EM-3207), 2005 (EM-3208), 2005 (EM-3211), 2008 (EM-3297), 2009, 2011 (EM-3344 & DR-4049), 2013 (EM-1405), 2015 (DR-4209), 2017 (DR-4316), 2018 (DR-4371)		Major severe winter weather events marked by snowfalls exceeding 2' in parts of the state resulted in disruptions to power and transportation systems.	FEMA & 2024 HMPT
<b>A detailed summary of severe winter storm events in the community</b>				
Severe Winter Weather (Snowstorm)	Winter of 1968-69	All Ten NH Counties	The winter of 1968-69 brought record amounts of snow to New Hampshire. Pinkham Notch at the base of Mount Washington recorded more than 75" of snowfall in four days at the end of February 1969 in addition to snow that had already fallen in previous storms. All of NH experienced difficulty with snow removal because of the great depths that had fallen from December 1968 to April 1969. Bristol reported heavy snow accumulations; school was canceled two days in a row during one of the storms.	2024 HMPT
Severe Winter Weather (Ice Storm) Long-Term Utility Outage	1975	Townwide	Ice storm, trees down, power lines, power was out in some areas for as many as seven days.	2024 HMPT
Severe Winter Weather (High Winds, Coastal Flooding & Snowstorm)	February 16, 1978	All Ten NH Counties	<b>Major Disaster Declaration DR-549:</b> The Blizzard of '78, a regionwide storm severely affecting southern New England, resulted in high snow accumulations throughout New Hampshire. This storm also brought hurricane-force winds, making this one of the more intense this century across the northeastern United States. Recorded accumulations show up to 28" in northeast New Hampshire, 25" in west-central New Hampshire, and 33" along the coast of New Hampshire. The Highway Department handled the heavy snow accumulation that fell in Bristol.	FEMA & 2024 HMPT
Severe Winter Weather (Snowstorm & High Winds)	March 13-17, 1994	All Ten NH Counties	<b>Emergency Declaration EM-3101:</b> The Highway Department handled the heavy snow accumulation in Bristol.	FEMA & 2024 HMPT

Type of Event	Date of Event	Location	Description	Source
<b>Severe Winter Weather</b> (Ice Storm)	January 7-25, 1998	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, Strafford & Sullivan	<b>Major Disaster Declaration DR-1199:</b> A major ice storm struck nearly every part of the state with more impact in northern communities and areas over 1,000 feet above sea level. Many trees were down, and there was a massive loss of timber and a large amount of slash on the forest floor. In Bristol, the ice storm was widespread. There were some trees down and power outages. The storm devastated the Sugar Hill State Forest; there is still "slash" on floors. This storm was elevation-dependent, with little damage in town to severe damage above 1,000 feet.	FEMA & 2024 HMPT
<b>Severe Winter Weather</b> (Snowstorm)	March 5-7, 2001	Cheshire, Coos, Grafton, Hillsborough, Merrimack, & Strafford	<b>Emergency Declaration EM-3166:</b> The emergency declaration covers jurisdictions with record and near-record snowfall from a late winter storm in March 2001, which affected six New Hampshire counties. The Highway Department handled the heavy snow accumulation that fell in Bristol.	FEMA & 2024 HMPT
<b>Severe Winter Weather</b> (Snowstorm)	December 6-7, 2003	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack & Sullivan	<b>Emergency Declaration EM-3193:</b> The emergency declaration covers jurisdictions with record and near-record snowfall that occurred throughout December 6-7, 2003, and affected eight New Hampshire counties. The Highway Department handled the heavy snow accumulation that fell in Bristol.	FEMA & 2024 HMPT
<b>Severe Winter Weather</b> (Snowstorms)	January 22-23, 2005 February 10-11, 2005 March 11-12, 2005	<b>EM-3208-002</b> (Jan, Feb & Mar): All Ten NH Counties <b>EM-3207</b> (Jan): Nine NH Counties <b>EM-3208</b> (Feb): Five NH Counties <b>EM-3211</b> (Mar): Five NH Counties	<b>Emergency Declaration EM 3208-002:</b> The Federal Emergency Management Agency (FEMA) had obligated more than \$6.5 million to reimburse state and local governments in NH for costs incurred in three snowstorms that hit the state in 2005. The total aid for all three storms was \$6,892,023 (January: \$3,658,114; February: \$1,121,727; March: \$2,113,182). <b>Emergency Declaration EM-3207:</b> The total aid for the January storm in Grafton was \$137,118. <b>Emergency Declaration EM-3208:</b> The total aid for the January storm in Grafton: \$213,539 <b>Emergency Declaration EM-3211:</b> The total aid for the March storm in Grafton was \$0, not declared in Grafton County. On all occasions during the 2005 winter season, the heavy snow accumulation that fell in Bristol was handled by the Highway Department. High accumulation caused the Social Center building to collapse. FEMA reimbursement was received for cleanup.	FEMA & 2024 HMPT
<b>Severe Winter Weather</b> (Snowstorm & Ice Storm)	December 11-23, 2008	All Ten NH Counties	<b>Major Disaster Declaration DR-1812 &amp; Emergency Declaration EM-3297:</b> Damaging ice storm impacted the entire state, including all 10 New Hampshire counties, resulting in fallen trees and large-scale power outages. Nearly \$15 million in federal aid had been obligated by May 2009. In Bristol, the elevations above 1000' were most significantly impacted (Peaked Hill, Hemlock Brook Road, Hemphill). There were trees down and power outages for up to two weeks. Power restoration took a long time, and generators were needed for public water and sewer.	FEMA & 2024 HMPT
<b>Severe Winter Weather</b> (Snowstorm)	February 23 - March 3, 2010	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan	<b>Major Disaster Declaration: DR-1892:</b> Flood and wind damage occurred in southern NH, including six counties, resulting in 330,000 homes without power. More than \$2 million was obligated by FEMA by June 2010. The Highway Department handled the heavy snow accumulation that fell in Bristol.	FEMA & 2024 HMPT

Type of Event	Date of Event	Location	Description	Source
Severe Winter Weather (Snowstorm)	October 29-30, 2011	<b>DR-4049:</b> Hillsborough & Rockingham <b>EM-3344:</b> All Ten NH Counties	<b>Major Disaster Declaration DR-4049 &amp; Emergency Declaration EM-3344:</b> A severe winter storm occurred in two New Hampshire counties on October 29-30, 2011. <b>EM-3344:</b> The emergency declaration for snow removal and damage repair included all ten NH countries (Snowtober). Leaves were still on trees, contributing to multiple power outages in Bristol. In Bristol, there were a few limbs down but no significant tree damage; the children still trick-or-treated. The Highway Department handled the heavy snow accumulation that fell in Bristol.	FEMA & 2024 HMPT
Severe Winter Weather (Snowstorm)	February 8, 2013	All Ten NH Counties	<b>Major Disaster Declaration DR-4105:</b> A severe winter storm resulted in heavy snow in February 2013 in all ten New Hampshire counties (Nemo). The Highway Department handled the heavy snow accumulation that fell in Bristol.	FEMA & 2024 HMPT
Severe Winter Weather (Snowstorm)	December 2020	Townwide	A few snowstorms occurred within a short timeframe, leaving 30" of snow. The Highway Department handled the heavy snow accumulation that fell in Bristol.	2024 HMPT
Severe Winter Weather (Snowstorm) Long Term Utility Outage	December 22-25, 2022	Belknap, Grafton, Coos & Carroll	<b>Major Disaster Declaration, DR-4693:</b> A severe winter storm occurred December 22-25, 2022 Heavy wet snow caused trees and power lines to fall; some roadways were damaged, but no people or structures were impacted. Bristol has submitted for damage assistance in the \$20,000-25,000 range.	FEMA & 2024 HMPT

**E. Earthquakes:** According to the NH State Hazard Mitigation Plan, New Hampshire lies in an area of "Moderate" seismic activity compared to other areas of the United States. "Major" activity areas border New Hampshire to the north and southwest. Generally, earthquakes in NH cause little or no damage and have not exceeded a magnitude of 5.5 since 1940. Earthquakes have the potential to impact the community on a townwide basis. Since the prior hazard mitigation plan, no significant earthquakes have been felt in Bristol.

#### A summary of earthquakes with a magnitude of 4.0 or greater in the state & regionwide

Earthquakes	6/11/1638 ( <b>Central NH, 6.5</b> ), 10/29/1727 ( <b>Off Coastline, 6.0-6.3</b> ), 11/18/1755 ( <b>Off Coastline, 5.8</b> ), 11/10/1810 ( <b>Portsmouth, NH, 4.0</b> ), 7/23/1823 ( <b>Off Hampton, NH, 4.1</b> ), 12/19/1882 ( <b>Concord, NH, Unknown</b> ), 3/5/1905 ( <b>Lebanon, NH, Unknown</b> ), 8/30/1905 ( <b>Rockingham County, Unknown</b> ), 11/09/1925 ( <b>Ossipee, NH, 4.0</b> ), 3/18/1926 ( <b>New Ipswich, NH, Unknown</b> ), 11/10/1936 ( <b>Laconia, NH, Unknown</b> ), 12/20/1940 ( <b>Ossipee, NH, 5.5-5.8</b> ), 12/24/40 ( <b>Ossipee, NH, 5.5-5.8</b> ), 1/19/1982 ( <b>Laconia, NH, 4.0</b> ), 11/20/1988 ( <b>Berlin, NH, 4.0</b> ), 4/6/1989 ( <b>Berlin, NH, 4.1</b> ), 10/16/2012 ( <b>Hollis Center, ME, 4.0</b> )	Occurrences of earthquakes with a magnitude of 4.0 or greater in recorded New Hampshire History	State of NH Multi-Hazard Mitigation Plan, Update 2018
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#### A detailed summary of earthquakes that were felt in the community since 1940 with a magnitude of 3.0 or greater

Earthquake	December 20, 1940	Tamworth, NH	Magnitude 5.5	State of NH Multi-Hazard Mitigation Plan, Update 2018 & 2024 HMPT
Earthquake	December 24, 1940	Tamworth, NH	Magnitude 5.5	
Earthquake	June 15, 1973	Quebec Border / NH	Magnitude 4.8	
Earthquake	January 18, 1982	West of Laconia, NH	Magnitude 4.5	
Earthquake	November 20, 1988	Berlin, NH	Magnitude 4.0	
Earthquake	April 6, 1989	Berlin, NH	Magnitude 4.1	
Earthquake	April 20, 2002	Plattsburg, NY	Magnitude 5.1	
Earthquake	June 23, 2010	Ontario-Quebec Border	Magnitude 5.0	

Type of Event	Date of Event	Location	Description	Source
Earthquake	September 25, 2010	Boscawen, NH	Magnitude 3.1; felt in Bristol, but no reported damage	
Earthquake	October 16, 2012	Hollis Center, ME	Magnitude 4.0	
F. Drought: Drought is generally less damaging or disruptive than floods and other hazards and is more challenging to define. A drought is a natural hazard that evolves over months or even years and can last as long as several years to as short as a few months. According to the NH State Hazard Mitigation Plan, New Hampshire has a low probability, severity, and overall risk for drought. Droughts have the potential to impact the community on a townwide basis. No significant droughts have occurred in Bristol since the summer of 2022.				
A summary of drought in the state & regionwide				
Drought	1775, 1840, 1882, 1910's, 1929-1936, 1939-1944, 1947-1950, 1960-1969, 1999; 2001-2002, 2016-2017, 2020-2021, 2022	Occurrences of serious droughts in recorded New Hampshire history.		State of NH Multi-Hazard Mitigation Plan, Update 2018
A summary of drought in the community since 1929				
Drought	1929-1936	Statewide	Regional	State of NH Multi-Hazard Mitigation Plan, Update 2018 & 2024 HMPT
Drought	1939-1944	Statewide	Severe in the southeast and moderate elsewhere	
Drought	1947-1950	Statewide	Moderate	
Drought	1960-1969	Statewide	Regional longest recorded continuous spell of less than normal precipitation	
Drought	2001-2002	Statewide	The third worst drought on record	
Drought	2016-2017	Statewide	A declared drought for the summers of 2016 and 2017 moderating from extreme in southern New Hampshire to dry in the northern communities. The drought affected Bristol with the loss of around 35 dug wells; fire suppression was not affected.	
Drought	2020-2021	Statewide	A declared drought for 2020-2021, with NH's north country being impacted more than the southern communities. The drought affected Bristol with the loss of many dug wells. The fire department lost the ability to draft water at the High School and Freudenberg.	
Drought	2022	Statewide	A declared drought for 2022, moderating from drought conditions in southern New Hampshire to abnormally dry in the northern communities. The drought did not affect Bristol; no wells were lost, and fire suppression was not hampered.	
G. Miscellaneous Past or Potential Hazards: Natural, technological, and human-caused hazards and other unusual hazardous events have been noted throughout New Hampshire and can impact the community townwide. One concern is transporting hazardous material through communities by rail and tractor-trailer. No additional hazards have occurred in Bristol since the conflagration in September 2019.				
Terrorism & Violence	Spring 2015	Schools	Bomb threat	2016 HMPT & 2024 HMPT
Conflagration	September 2019	Beech Street	A five-unit apartment building caught fire and spread to another four-unit building next door. Both buildings were a total loss, and all residents were displaced. The hydrants could not handle both buildings being ablaze, so the Fire Department drafted from the river to augment the hydrants.	2024 HMPT

Type of Event	Date of Event	Location	Description	Source
Infectious Disease	January 2020 – April 2023	All Ten NH Counties	<b>Major Disaster Declaration, DR-4516:</b> The Federal Emergency Management Agency ("FEMA") within the US Department of Homeland Security is giving public notice of its intent to assist the State of New Hampshire, local and tribal governments, and certain private nonprofit organizations under the major disaster declaration issued by the President on April 3, 2020, as a result of the Coronavirus Disease 2019 ("COVID-19").	FEMA & 2024 HMPT
Infectious Disease	January 2020 – April 2023	All Ten NH Counties	<b>Emergency Declaration EM-3445:</b> Ten county declaration to provide individual assistance and public assistance as a result of the impact of COVID-19	FEMA & 2024 HMPT
Transportation Accident	Unknown	West Shore Marina	275-gallon oil spill	2016 HMPT & 2024 HMPT
Transportation Accident	Unknown	Fourth Street	Oil spill	2016 HMPT & 2024 HMPT
Transportation Accident	Unknown	Spring Street	An oil tank failed when it was filled, and the oil seeped into the wastewater system; this put the town in violation of state regulations due to the lack of "good bacteria".	2016 HMPT & 2024 HMPT

**H. Other Hazards:** Identified hazards with no specific example of occurrence.

<b>Natural Hazards</b>	<p>Although the team did not identify specific examples or past occurrences of these hazards, it felt worthwhile to list them as potential hazards to the town. These hazards can potentially impact the community either locally or townwide.</p> <p>See <i>Table 3.1, Hazard Threat Analysis</i>, and Chapter 5 for more details on these hazards.</p>
Landslide & Erosion	
Lightning & Hail	
<b>Technological Hazards</b>	
Dam Failure	
Aging Infrastructure	
Known & Emerging Contaminants	
<b>Human-caused</b>	
Mass Casualty Incidents	
Cyber Events	

Historic hazard events were derived from the following sources unless noted otherwise:

- Website for NH Disasters: <http://www3.gendisasters.com/mainlist/newhampshire/Tornadoes>
- FEMA Disaster Information: <http://www.fema.gov/disasters>
- The Tornado Project: <http://www.tornadoproject.com/alltorns/nhtorn.htm>
- The Tornado History Project: <http://www.tornadohistoryproject.com/>
- The Disaster Center (NH): <http://www.disastercenter.com/newhamp/tornado.html>
- EarthquakeTrack.com; <http://www.EarthquakeTrack.com>

**For more information on state and county-wide past events, see Major Disaster and Emergency Declarations, Appendix D, NH Major & Emergency Declarations.**

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## Chapter 4: Critical Infrastructure & Key Resources (CIKR)

Team discussion and brainstorming identified Critical Infrastructure & Key Resources (CIKR) within Bristol. The Hazard Risk rating was based on a scale of 1-3, with 1 indicating little or no risk.

**TABLE 4.1 - EMERGENCY RESPONSE FACILITIES (ERFs) & EVACUATION**

EMERGENCY RESPONSE FACILITIES (ERF)			
ERFs are primary facilities and resources needed during an emergency response.			
Facility	Type of Facility	Hazard Risk	
Town Offices (generator)	Town government, secondary EOC, records	All hazards	1
Newfound Regional High School (partial generator)	Primary shelter, school, gathering of people	All hazards	1
Newfound Memorial Middle School (partial generator)	Possible shelter, school, gathering of people	All hazards	1
Bristol Elementary School (no generator)	Possible shelter, school, gathering of people	All hazards	1
Main Fire Station (Lake Street) (generator)	Primary EOC, fire services, EMS	All hazards & Aging Infrastructure	2
Fire Station (High Street) (no generator, not needed)	Fire services, EMS, emergency management trailer	All hazards	1
Police Station (generator)	Law enforcement	All hazards & Aging Infrastructure	2
Highway Department Garage (no generator)	Heavy equipment, sand, gravel, diesel (tank)	All hazards	1
State DOT Shed (Bristol)	Diesel, heavy equipment, sand, gravel	All hazards	1
State DOT Shed (New Hampton)	Gas, diesel, heavy equipment, sand, gravel	All hazards	1
Speare Memorial Hospital, Plymouth	Medical Facility	All hazards	1
Concord Hospital - Franklin, Franklin (primary access)	Medical Facility	All hazards	1
Midstate Health (Bristol)	Medical Facility	All hazards	1
Communities for Alcohol & Drug-Free Youth (CADY)	Resource Center	All hazards	1
Evacuation Routes			
NH Route 3A (north & south)	Primary evacuation route	All hazards	1
NH Route 104 (east & west)	Primary evacuation route	All hazards & Inland Flooding	1
River Road	Secondary evacuation route	All hazards	1



EMERGENCY RESPONSE FACILITIES (ERF)			
Bridges & Culverts on the Evacuation Routes			
Route 3A - Lake Street Bridges (2) (State Highways)	Bridge of evacuation route	All hazards	1
Route 104 - Pleasant Street Bridge (State Highway)	Bridge of evacuation route	All hazards	1
Bridges on state roads are in good shape and not subject to flooding.			
Dams			
Newfound Lake Dam (DES)	High-hazard dam	All hazards	1
Ayers Island Dam (private)	High-hazard dam	All hazards	1
Lower IPC (private)	Significant-hazard dam	All hazards & Aging Infrastructure	2
Newfound River Hydro (private)	Low-hazard dam	All hazards	1
Farm Pond Dam (private)	Non-menace	All hazards	1
Poitras Dam (private)	Non-menace	All hazards	1
According to GIS data from the Department of Environmental Services, an additional eleven dams are listed in Bristol; ten are in ruins, and one is breached.			

**TABLE 4.2 – NON-EMERGENCY RESPONSE FACILITIES (NERFs)**

NON-EMERGENCY RESPONSE FACILITIES (NERF)			
<b>NERFs are facilities that, although critical, are not necessary for immediate emergency response efforts. This would include facilities to protect public health and safety and to provide backup emergency facilities.</b>			
Facility	Type of Facility	Hazard Risk	
Ayers Island Dam Workshop	Electricity	All hazards	1
Ayers Island Hydro-Electric Plant	Electricity	All hazards	1
Newfound Hydro Dam Workshop	Electricity	All hazards	1
Newfound Hydro-Electric Plant	Electricity	All hazards	1
Danforth Brook Well	Public water supply	All hazards	1
Fowler Well	Public water supply	All hazards	1
Water Storage Tank (North Main Street)	Public water supply	All hazards	1
Pleasant Street Pump Station	Wastewater facility	All hazards	1
Central Street Pump Station	Wastewater facility	All hazards	1

NON-EMERGENCY RESPONSE FACILITIES (NERF)			
Bristol Hill Road Pump Station	Wastewater facility	All hazards	1
Hemphill communication tower (town-owned)	Communications	All hazards	1
Bert Williams Booster Station (North Main Street)	Public water supply	All hazards	1
Wastewater Treatment Plant	Wastewater facility	All hazards	1

**TABLE 4.3 – FACILITIES & POPULATIONS TO PROTECT (FPPs)**

FACILITIES & PEOPLE TO PROTECT (FPP)			
FPPs are facilities that need protection because of their importance to the town and residents who may need help during a hazardous event.			
Facility	Type of Facility	Hazard Risk	
Bristol Elementary School	School	All hazards	1
Newfound Memorial Middle School	School	All hazards	1
Newfound Regional High School	School	All hazards	1
Riverview Elderly Housing	Senior living	All hazards	1
Central Square Apartments	Senior living	All hazards	1
Country Manor Estates	Senior living	All hazards	1
Mae's Place	Assisted Living	All hazards	1
Fox Meadow Retirement Home	Assisted Living	All hazards	1
Tapply-Thompson Community Center	Gathering of people	All hazards	1
Central Square Historic District ( National Registry)	Gathering of people	All hazards	1
Freudenberg NOK	Factory, gathering of people	All hazards	1
Multi-family housing (throughout town)	Gathering of people	All hazards	1
Piggy Back Ride & Slippery Slide	Childcare facility	All hazards & Inland Flooding	1
PB&J	Childcare facility	All hazards	1
Historic Town Hall (National)	Gathering of people	All Hazards	1
Whipple House (State)	Historic structure, lodging	All Hazards	1
Bristol Fire Station on High Street (State Reg)	Historic structure, fire storage	All Hazards	1
Minot-Sleeper Library (National)	Historic structure, library	All Hazards	1
Bristol United Church of Christ	Gathering of people	All Hazards	1

**TABLE 4.4 – POTENTIAL RESOURCES (PRs)**

POTENTIAL RESOURCES (PR)			
PRs are potential resources that could be helpful for emergency response in the case of a hazardous event.			
State Highway Dept. Patrol Facility (Bristol)	Heavy equipment, sand, gravel	All hazards	1
State Highway Dept. Patrol Facility (New Hampton)	Heavy equipment, sand, gravel	All hazards	1
Bristol United Church of Christ	Kitchen facilities	All Hazards	1
Tapply-Thompson Community Center	Kitchen facilities	All hazards	1
Bristol Elementary School	Kitchen facilities	All hazards	1
Newfound Memorial Middle School	Kitchen facilities	All hazards	1
Newfound Regional High School	Kitchen facilities	All hazards	1
Bristol Community Services	Food, water	All hazards	1
Hannaford Grocery	Food, water, groceries, etc.	All hazards	1
Rite Aid	Pharmacy, food, water, etc.	All hazards	1
Lavalley Building Supply	Building materials, equipment	All hazards	1
Aubuchon Hardware	Building materials, equipment	All hazards	1
JP Morrison Construction	Sand, gravel	All hazards	1
Cumberland Farms	Gas, food, water	All hazards	1
Park N Go	Gas, food, water	All hazards	1
Bristol Village Store	Gas, food, water	All hazards	1
Dollar General	Food, water	All hazards	1
Shackett (seasonal) Grocery store	Food, water	All hazards	1
Please refer to the Resource Inventory List in the Bristol Emergency Operations Plan for additional resources.			

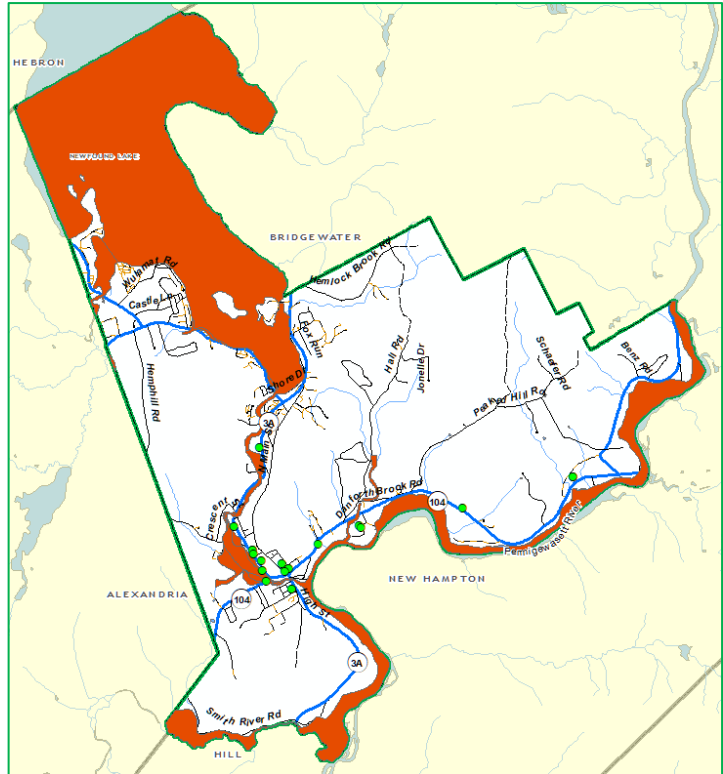
## Chapter 5: Hazard Effects in Bristol

### A. IDENTIFYING VULNERABLE CRITICAL INFRASTRUCTURE & KEY RESOURCES (CIKR)

Identifying the Critical Infrastructure & Key Resources (CIKR) that are most likely to be damaged in inland flooding events is important, as inland flooding is the most significant hazard in New Hampshire. Identifying the CIKR with a wildfire risk is also important, as the town is heavily forested.

#### Overall Flood Risk

Bristol's CIKR were identified and listed in Chapter 4; each CIKR was analyzed for its flooding potential. This analysis and the red area in the GIS image to the right indicate the floodplain. Using GIS, it was determined that no CIKR are in the FEMA floodplain; however, the Fire Station is very close. The green dots represent the CIKR; the blue lines are state roads.



When working on Table 4.1, the team indicated that NH Route 104 has the potential for flooding and one FPP (Facilities & Populations to Protect), the Piggy Back Ride & Slippery Slide. Please refer to Chapter 4, Tables 4.1-4.4 for more information.

All other CIKR are outside the flood zone except for a few culverts and bridges on the evacuation routes. It is expected that there may be other structures and homes within the flood zone. Town officials consider all at-risk properties when a flood hazard is likely.

#### Overall Wildfire Risk

CIKR falling within the Wildland Urban Interface (WUI) were reviewed using the same methodology as flooding. Identifying these facilities helped the team create and prioritize wildfire mitigation action items.

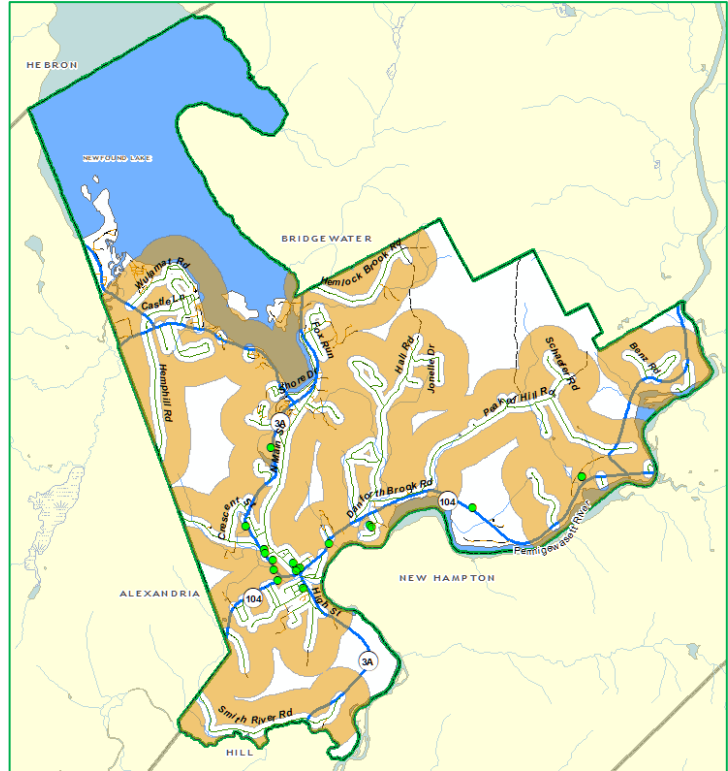
Traditionally, the WUI is determined using GIS analysis to create a 300' buffer from the centerline of all Class V roads and an additional 1,320' buffer from the first buffer. The orange symbology in the map image on the following page shows the traditional WUI in Bristol. This area is where the urban environment interfaces with the wildland environment and is the most prone to wildfire risk.

The traditional WUI was initially developed to identify human-interface areas that may exceed the typical length of fire hoses. In rural communities, this would virtually cover the entire town. A different method to determine the WUI in suburban communities or areas of rural communities includes identifying developments, streets, roads with limited egress, a high canopy of old-growth softwoods, or older wooden structures.

According to GIS analysis of Class V roads, multiple CIKRs were determined to be just inside the WUI. However, all of these facilities are also located on or off state highways, each with good defensible space (green dots). The remaining primary facilities are within the 300' WUI buffer of roadways, therefore easily accessible by fire apparatus and hoses.

As seen in the map image, there are numerous dead-end streets in Bristol, some of which may have higher than average wildfire risk due to the distance between structures, the number of old-growth softwoods that line the streets, and, of course, the lack of a second egress. The map image does not include Class VI private roads, which may also be at risk, but even without them, there are many limited egress high-risk neighborhoods. No facilities at high risk for wildfires were identified in Tables 4.1-4.4

As suggested above, many additional structures in Bristol are expected to be prone to wildfires, particularly in neighborhoods with limited egress and a canopy of old-growth trees or where forests completely surround structures. Because Bristol has a relatively large amount of forested land cover, it can be assumed that nearly every structure in town is within the Wildland Urban Interface. Mitigation strategies were discussed to protect structures and educate the citizens about the wildfire risk.



## B. CALCULATING THE POTENTIAL LOSS

It is difficult to ascertain the dollar amount of damage caused by hazards because the damage will depend on the hazard's extent and severity, making each hazard event somewhat unique. Therefore, we have assumed that hazards could damage 0-1% or 1-5% of the town's structures. Structure damage depends on the nature of the hazard and whether or not the impact is localized.

MS-1 Assessed Value of all Structures 2022 Annual Report			
Type of Structure	Value	1% Damage	5% Damage
Residential	\$293,866,800	\$2,938,668	\$14,693,340
Manufactured Housing	\$14,108,900	\$141,089	\$705,445
Commercial	\$40,434,100	\$404,341	\$2,021,705
Tax Exempt	\$735,900	\$7,359	\$36,795
Utilities	\$17,814,100	\$178,141	\$890,705
Totals	\$366,959,800	\$3,669,598	\$18,347,990

This plan assumes that the potential loss from the identified natural hazards would range from **\$0 to \$3,669,598** or **\$3,669,598 to \$18,347,990**, based on the 2022 MS1 total structure value of **\$366,959,800**. (See chart above)

Human loss of life was not included in the potential loss estimates but could be expected to occur depending on the hazard's severity and type. Although descriptions are given for technological and human-caused hazards, no potential loss estimates for these hazards are provided in this plan.

## C. NATURAL HAZARDS

The descriptions below represent the **local impact** on the community for the hazards identified by the team. The **extent** of these hazards is shown in *Appendix C, The Extent of Hazards*. Charts such as the Saffir-Simpson Hurricane Wind Scale, the Beaufort Wind Scale, the National Weather Service Heat Index, the Sperry-Piltz Ice Accumulation Index, and the Enhanced Fujita Scale for tornadoes are included in Appendix C.

The “Hazard Identification & Risk Assessment (HIRA)” and the “Probability” noted for each hazard below are taken from the analysis done in Table 3.1, *Hazard Identification & Risk Assessment (HIRA)*. The numbers preceding the hazard name in this section correspond to Table 3.1 and are ordered by “Relative Threat”. The estimated loss is determined using the methodology and table, as explained in Section B of this chapter.

**Table 3.1, The Hazard Identification & Risk Assessment (HIRA), is used to evaluate the probability and the potential impact of all hazards.**

### 1) SEVERE WINTER WEATHER

Hazard Identification & Risk Assessment (HIRA)..... High  
 Probability..... Very High  
 Estimated Structure Loss Value ..... \$3,669,598 to \$18,347,990

#### **Snowstorms, Blizzards & Nor’easters**

Heavy snowstorms typically occur from December through April. New England usually experiences at least one or two heavy snowstorms with varying severity each year. Power outages, extreme cold, and impacts on infrastructure are all effects of past winter storms felt in Bristol. These impacts are a risk to the community, including isolation, especially to senior citizens (18.0%) and other vulnerable populations. In addition, the ability to get in and out of town and emergency service access can be hindered.



Damage caused by severe winter snowstorms varies according to wind velocity, snow accumulation, duration, and moisture content. Seasonal accumulation can also be as significant as an individual snowstorm. Heavy overall winter accumulations can impact the roof load of some buildings. Significant snowstorms, nor’easters, and blizzards could diminish food supplies within two days.

Since the last hazard mitigation plan, Bristol has had two notable winter events. The first was the month of December 2020, when repeated snow storms left more than 30” of snow that the Highway Department handled easily. The second event occurred on December 22, 2023. The accumulation was significant; the heavy, wet snow caused trees and power lines to fall, and several roads were damaged. As shown in Table 3.2, other snowstorms and nor’easters have struck Bristol in the past, but the Highway Department could keep up with the accumulation.

Although Bristol’s Highway Department handles usual snow amounts without difficulty, the town’s 40 miles of roads are often impacted by poor weather conditions. Travel can be difficult with heavy traffic, particularly on Route 104 and 3A, which are the state’s responsibilities. Poor road conditions may hinder fire and other emergency responses.

### ***Ice Storms***

Ice storms are more concerning than 2-4' snowstorms, though the probability of a significant ice storm is lower than a significant snowstorm. An ice storm can inflict several million dollars of damage on forests and structures. Unlike typical snowstorms, which are generally handled well by the Highway Department, ice storms present significant problems. Downed power lines and fallen trees make it difficult for the highway crew and emergency responders. School buses are also at risk.

There have been significant ice storms in New Hampshire, but there was no damage in Bristol in two of the most significant events, 1979 and 2010. However, the 1998 and the 2008 Ice Storms caused substantial loss; trees, phone lines, and woodlands were damaged.

The 1998 storm caused widespread icing throughout the community, power outages in parts of town, and large areas of forested land were devastated, particularly on Sugar Hill and in the Sugar Hill State Forest. The community went weeks before full power was restored. Slash remains on the forest floor from the 1998 storm, thus contributing to the wildfire risk.

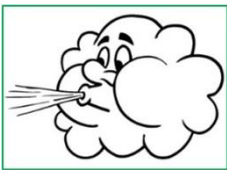
The 2008 storm was less widespread but heavily impacted elevations over 1,000'. Peaked Hill, Hemlock Brook, and Hemp Hill Roads were hardest hit. Because the 2008 storm was so widespread in other parts of the state, restoration crews were stretched thin, and full restoration took longer than usual in Bristol.

Since the last hazard mitigation plan, no damaging or debilitating winter storm events have occurred in Bristol. However, due to the widespread nature of severe winter weather, particularly from ice storms, the potential loss value is estimated to be between 1% and 5% of the total assessed value of all structures in town.

### **2) HIGH WIND EVENTS**

Hazard Identification & Risk Assessment (HIRA)..... High  
Probability..... Very High  
Estimated Structure Loss Value ..... \$0 to \$3,669,598

#### ***Isolated High Wind Events***



Isolated high winds and downdrafts are likely to occur in Bristol. These unpredictable wind events could fall timber, block roadways, down power lines, and impair emergency response. These unexpected windstorms affect old-growth softwood, especially when the water table is high in the spring. A great deal of the land cover in Bristol is forested.

The team noted that high winds often occur in Bristol.; due to Bristol's location at the foot of the northwest slanting Newfound Lake. Shore Drive, which has a fair amount of development and soil disturbance, is often impacted, but damage tends to be limited to tree limbs and shingle damage. Wind impacts can also be felt in the higher terrains and along several roadways, particularly Peaked Hill, Hemlock Brook, and Hemp Hill Roads. The team also noted that the power companies have recently increased their trimming efforts. The Highway Department and the power companies have repeatedly removed downed trees.



***Tornadoes & Downbursts (microbursts & macrobursts)***

The most significant difference between tornadoes and downbursts, also known as microbursts and macrobursts, is the direction, size, and direction from which the wind comes; all winds of these types can cause significant damage.

A tornado generally covers a large area, perhaps even several miles. It has winds that blow in a circular fashion, leaving behind downed trees lying in a swirling pattern. Straight-line winds and winds that burst downward indicate a microburst; the fallen trees left behind lay in roughly the same direction. A microburst must be 2.5 miles in width or less, whereas a macroburst is a similar wind event more than 2.5 miles wide and lasting longer than a microburst.

Microbursts are becoming more frequent and often result in damage. Like high winds, the effects would be primarily power outages and blowdowns; however, if a tornado, microburst, or macroburst were severe enough, property damage could also occur. In Bristol, a microburst would be more likely than a tornado. Since the previous hazard mitigation plan, Bristol has had no reports of downbursts or tornadoes.

Although downbursts are becoming more common, damaging high wind events are rare natural hazards in New Hampshire. Damage from high wind events largely depends on where the hazard strikes. If a high wind event strikes a densely populated or commercial area, the impact could be significant, resulting in personal injury, property damage, and economic hardship. Based on the potential devastation from tornadoes, macrobursts, or microbursts, the potential loss value was estimated to be between 0% and 1% of the total structure value.

**3) INLAND FLOODING**

Hazard Identification & Risk Assessment (HIRA).....	High
Probability.....	Very High
Estimated Structure Loss Value .....	\$3,669,598 to \$18,347,990

***100-Year Flood Events, Riverine Flooding & Local Road Flooding***

Riverine flooding and 100-year flood events can occur due to hurricanes, tropical and post-tropical cyclones, and heavy summer and fall rains. Local road flooding is often the result of rapid snowmelt and heavy spring or autumn rain events. Heavy rain from tropical downpours, hurricanes, severe thunderstorms, and rapid snowmelt often cause culverts to be overwhelmed and roads to wash out. If conducted improperly, timber harvesting, undersized or aging culverts, and inadequate ditching are possible causes of local road flooding.

Based on the Grafton County Floodplain Map and as described in Chapter 3, Section D, Bristol has a relatively moderate 100-year floodplain, with approximately 5.5% of the land in the floodplain, not including inland water. The floodplain is mainly around and including Newfound Lake, the Pemigewasett and Newfound Rivers, and Danforth Brook. 100-year flood events are uncommon in Bristol; table 3.2 details the inland flooding events, including three Major Disaster Declaration since 2017.

Bristol had no significant damage in the first of these events in July 2017. Later that same year, in October 2017, Bristol experienced heavy rain and wind, causing substantial damage to the wastewater treatment facility. The third event in July 2019 had little or no impact in Bristol.

Hemlock Brook and Hemp Hill Roads cause the most concern for the Highway Department. These roads wash out almost every time there is rain - they are gravel and steep, needing constant repair. A culvert replacement project for Hemlock Brook Road is included in Table 9.1. Overall, the more than 1,000 culverts in Bristol are thought to be in pretty good condition.

While staying within its budget, the Highway Department has been proactive in the maintenance and repairs of culverts, reducing the incidence of local road erosion and washouts. Stormwater improvement projects are included in *Table 9.1, The Mitigation Action Plan*, to further improve stormwater flow and promote resiliency in the drainage system.

The Highway Department is fortunate that the state maintains several major arteries. However, the 35 miles of paved and five miles of Class V gravel roads can make for a daunting task of upkeep. Significant rain, particularly if combined with rapid snow melt, can cause considerable damage to Bristol's roads.

Flooding can be severe enough to take out utilities and create areas of town that become inaccessible to emergency responders. The economic impact on the community, the loss of accessibility, and the time and cost of road repair factor into the estimated loss value. Therefore, the estimated loss value was determined to be between 1% and 5% of the total structure value.

#### **4) LANDSLIDE & EROSION**

Hazard Identification & Risk Assessment (HIRA).....	Medium
Probability.....	High
Estimated Structure Loss Value .....	\$0 to \$3,669,598

Landslides and erosion are often associated with heavy rains, steep terrain, and the overflow of riverbanks. Landslides often occur where unstable slopes threaten to collapse on homes, buildings, and local roads. Erosion and the subsequent loss of land along the river banks, road washouts, overburdened culverts, and changes in the course of rivers could also occur.

Bristol experiences erosion of the Pemigewasset (Pemi) riverbank whenever there is a significant change in the water level. The biggest concern for the erosion of the Pemi riverbanks is Baron Road and the potential for bank erosion next to the roadway. A section of Smith River Road is also eroding; a parcel of land and the roadway are potentially threatened. Lastly, the Fowler River can overflow, hampering access to one of the town's well sites. Other areas along Bristol's rivers, such as the Windridge Development, could be threatened; however, the team noted that the state discourages riprap as mitigation.

Heavy stream flooding often causes culverts to be overwhelmed and roads to wash out. Lack of planning, improper road design, and undersized culverts increase erosion risk along Bristol's roadways. Refer to Inland Flooding in this chapter for more information on road erosion.

Although landslides and erosion are issues, no structures appear to be in harm's way at this time. In the unlikelihood that structure loss would be experienced, it would be localized; therefore, the structure loss value was estimated to be between 0% and 1% of the total assessed structure value.

## 5) TROPICAL & POST-TROPICAL CYCLONES

Hazard Identification & Risk Assessment (HIRA).....	Medium
Probability.....	Moderate
Estimated Structure Loss Value .....	\$3,669,598 to \$18,347,990

Damaging winds due to tropical and post-tropical cyclones (hurricanes) are considered a medium risk, primarily because of Bristol's abundance of forested land. Significant forest damage could occur, like during the 1938 hurricane and hurricanes Carol and Edna in 1954. Although tropical and post-tropical cyclones could fit into several categories (wind and flooding), the team considered tropical and post-tropical cyclones separate events. Tropical and post-tropical cyclones are rare in New Hampshire but should be considered potential hazards. In most cases, tropical cyclones have been down-graded to post-tropical cyclones when they reach northern New Hampshire.

Tropical Storm Irene in 2011, the remnants of Hurricane Irene, brought heavy rain and wind to Bristol but did not create significant structural damage in the community. Tropical Storm Sandy in 2012 had little impact in Bristol, except for heavy rain. Since the prior hazard mitigation plan, no tropical or post-tropical cyclones have reached Bristol.

The probability that a tropical and post-tropical cyclone would remain a Category 1 or higher in this part of the state is low. Therefore, the potential loss value due to tropical and post-tropical cyclones was determined to be between 1% and 5% of the total assessed structure value.

## 6) LIGHTNING & HAIL

Hazard Identification & Risk Assessment (HIRA).....	Medium
Probability.....	Moderate
Estimated Structure Loss Value .....	\$0 to \$3,669,598

### **Lightning**

Lightning strikes have occurred in Bristol as a result of severe summer storms. Some of the town's structures are older and historic buildings, as detailed in Table 4.3. Forests surround other vulnerable structures. Dry timber on the forest floor, some of which remains from past ice or windstorms and the age of many buildings and outbuildings combined with lightning strikes, can pose a significant disaster threat. Lightning could damage specific structures, but the direct damage would not be widespread.



Although lightning is a potential problem, the town reports lightning events have struck the water and sewer control panels, despite surge protectors, once every three or four years. Action Item #17 in Table 9.1 addresses lightning protection for town facilities.

It was noted that severe thunder and lightning storms have been happening more often in recent years, perhaps due to climate change. Also concerning are the heavy rains that thunderstorms can produce and the subsequent erosion of ditches and roadways.

## Hail

Although not common in Bristol, hailstorm events resulting from significant thunder and lightning storms can occur anytime. Summer storms may produce hail large enough to damage roofs, siding, and automobiles. Damage from hail could also result in failed crops, thus impacting the local economy and individual citizens. However, it is noted that Bristol is not a heavily farmed community. Overall, it was felt that a hailstorm event would be unlikely and would cause minimal damage. Since the last hazard mitigation plan, no significant lightning or hail events have occurred in Bristol.

Based on the localized nature of lightning strikes and the minimal damage expected from hail, the potential loss value was determined to be between 0% and 1% of the total assessed structure value.

## 7) INFECTIOUS DISEASES

Hazard Identification & Risk Assessment (HIRA)..... Medium  
 Probability..... Very High  
 Estimated Structure Loss Value ..... Not estimated

*“Infectious diseases are disorders caused by organisms — such as bacteria, viruses, fungi or parasites. Many organisms live in and on our bodies. They're normally harmless or even helpful, but under certain conditions, some organisms may cause disease.*

*Some infectious diseases can be passed from person to person. Some are transmitted by bites from insects or animals. And others are acquired by ingesting contaminated food or water or being exposed to organisms in the environment.”<sup>21</sup>*

Infectious diseases and epidemics or pandemics present a possible threat to Bristol. Bristol is susceptible to an epidemic and subsequent quarantine with worldwide pandemics such as Covid-19, Lyme Disease, SARS, the Zika Virus, H1N1, the Avian Flu, and even the common seasonal flu virus. In fact, the United States and the world have been coping with the COVID-19 pandemic for nearly three years. All non-essential businesses and schools throughout New Hampshire and most of the United States were closed during the pandemic's early months in the spring of 2020. The Major Disaster Declaration for Covid-19 was terminated in April 2023.



Several facilities in Bristol hold events and activities that could increase the likelihood of spreading infectious diseases. Elementary students attend school in Bristol. Middle and high school students also attend school in Bristol with students from Alexandria, Bridgewater, Danbury, Groton, Hebron, Hill, and New Hampton. Churches, community centers, meeting houses, and social facilities also invite infectious disease outbreaks. Interactions between students and out-of-town sports teams and clubs can also bring infectious diseases.

With assistance from public health networks, town officials did their best to mitigate the onset of Covid-19 in Bristol. To help mitigate the crisis, the Town Office initially closed and later reopened with mitigation measures in place. The public library was closed for a while, and initially, the schools went virtual. The town and the SAU4 continue

<sup>21</sup> Infectious diseases, Overview, <https://www.mayoclinic.org/diseases-conditions/infectious-diseases/symptoms-causes/syc-20351173>

encouraging social distancing and protecting the town's most vulnerable citizens. There are no nursing homes in Bristol; however, there are several senior living and assisted living facilities; illnesses and death were most prevalent during Covid-19 in nursing homes.

As of April 20, 2023, 381,441 Covid-19 cases, 3,038 deaths, and 366 new cases were reported in New Hampshire (see the chart on the right).<sup>22</sup> Deaths by town are no longer available, but it was reported that there were 912 cumulative cases in Bristol, 23,489 cumulative cases, and 104 cumulative deaths in Grafton County.<sup>23</sup>

### COVID-19 Summary Report

(data updated as of April 20, 2023, 9:00 AM)

NH Total Case Count	381,441
New Cases for the Previous Week	366
Deaths Attributed to COVID-19	3,038
Total Current COVID-19 Cases	425
Current Hospitalizations Treated for COVID-19	9

On April 19, 2023, the Center for Disease Control (CDC) reported 1,129,576 Covid deaths in the United States since the pandemic began.<sup>24</sup> Testing and vaccines are helping to keep severe illness to a minimum; vaccines are available for all persons, including young children and toddlers. Although vaccination rates continue to climb slowly, a portion of the public remains unwilling or unable to be vaccinated. Unvaccinated individuals continue to represent the majority of hospitalizations, severe illnesses, and deaths. The CDC recommends that adults, particularly those who are medically compromised or over 65, receive two doses, two boosters, and a recently introduced vaccine that includes protection from the Omicron BA.5 variant and subvariants. Recommendations for children are slightly different. Only 16.7% of the US population has received the updated (bivalent) booster dose.

Bristol's emergency service personnel plan extensively to prepare for and respond to infectious diseases. The team felt that an epidemic or pandemic, like Covid-19, would continue to threaten the community's citizens. However, because there would be no direct impact on the town structures, the structure loss value was not estimated.

## 8) DROUGHT

Hazard Identification & Risk Assessment (HIRA).....	Medium
Probability.....	Moderate
Estimated Structure Loss Value .....	\$0 to \$3,669,598

An extended period without precipitation or drought could elevate the risk of wildfire and blow-downs in the community's forested areas. With an extreme drought, the water supply and aquifer levels could be threatened. According to the NH Department of Environmental Services (DES), drought is not rare in New Hampshire. DES states, *"In actuality, New Hampshire experiences drought quite frequently. For example, between the years 2000 and 2020, drought conditions occurred within 11 of those 20 years."*<sup>25</sup> A concern is that more frequent and longer-lasting droughts will occur with climate change. Only four significant droughts occurred before 2000, while three have occurred in just the past six years (2016, 2020, and 2022). In addition, drought conditions contributed to damage to the local forests and increased the risk of wildfire.



<sup>22</sup> <https://www.covid19.nh.gov/>

<sup>23</sup> <https://www.covid19.nh.gov/dashboard/map>

<sup>24</sup> <https://covid.cdc.gov/covid-data-tracker/#datatracker-home>

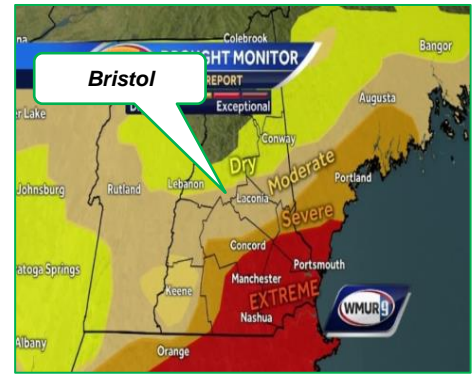
<sup>25</sup> <https://www.des.nh.gov/climate-and-sustainability/storms-and-emergencies/drought#:~:text=In%20actuality%2C%20New%20Hampshire%20experiences,11%20of%20those%2020%20years.>

The 2016-2017 drought brought extreme drought conditions in the south and dry or no drought conditions in the north<sup>26</sup>; Bristol was in moderate drought during most of the 2016 drought (see the tan section on the map to the right). There were reports of the loss of a few dug wells. Water for fire suppression was not impacted, and although the town can enact a water ban, it was not implemented.

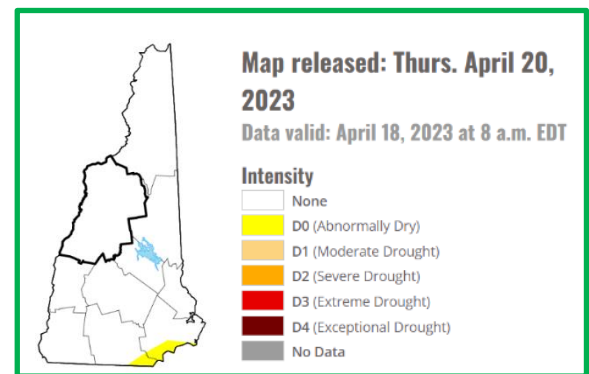
The 2020-2021 drought was less significant than the 2016 drought in southern NH but more significant in northern NH. Bristol did not enact a water ban but noted that this drought was worse overall than the 2016 drought. There were reported losses of artesian and dug wells, and one fire pond was lost near the High School. The Freudenberg Complex also lost its water source.

As of January 1, 2023, after the 2022 summer drought and periods of extreme to dry conditions, again moderating from south to north, there is very little drought in the state and only no drought in Bristol.<sup>27</sup> The bold black line shows Grafton County.

The cost of future droughts is challenging to calculate as any cost would likely result from associated fire risk, crop loss, and diminished water supply. Based on these assumptions, the structure loss value was not estimated.



WMUR Archives; September 15, 2016



## 9) WILDFIRES

Hazard Identification & Risk Assessment (HIRA)..... Low  
 Probability..... Low  
 Estimated Structure Loss Value ..... \$3,669,598 to \$18,347,990

There are two potential losses with a wildfire, the loss of forest land and the threat to the built-up human environment and structures within the Wildland Urban Interface (WUI). In many cases, the only time it is feasible for a community to control a forest fire is when the built-up human environment is threatened.

Any wildfire discussion must include a Wildland Urban Interface (WUI) discussion. The WUI can be determined in various ways; however, it represents the area where the forest and human habitation intersect. At times, the WUI is defined as the area out of reach of available fire hoses and water resources, while other times, it is determined to be areas with substantial tree cover and limited egress. For many New Hampshire communities, entire towns are thought to be in the WUI because of the abundance of hardwood and softwood trees. In more populated areas, the WUI is often determined to be in densely populated neighborhoods where a towering canopy of old-growth trees and limited access make people and structures more vulnerable. All structures within the WUI are assumed to be at some level of risk and, therefore, vulnerable to wildfire. See Section A in this chapter for more discussion on the WUI in Bristol.

<sup>26</sup> <https://www.wmur.com/article/extreme-drought-conditions-worsen-in-new-hampshire/5269231>

<sup>27</sup> <https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?NH>



The team described the forests of Bristol as consisting primarily of mixed forests. Some fires are felt to be “duff” fires, the burning of *“the layer of decomposing organic materials lying below the litter layer of freshly fallen twigs, needles, and leaves and immediately above the mineral soil.”*<sup>28</sup> However, with climate change, drought no longer has a low probability in New Hampshire, and more fires are likely to be surface fires. Burn permits are required in Bristol, as they are throughout the state, but often, burning occurs without the proper permits. Sometimes, it’s difficult for the fire department to monitor all conditions, and the occasional unauthorized burn will occur.

Due to the abundance of slash on the forest floor left by past ice storms and blowdowns and the mixture of hardwood and softwood trees throughout the community, there is potential for fast-burning fuels, and a wildfire could potentially occur. Also, outdoor enthusiasts' recreational use of woods trails creates additional risks. To help mitigate the effects of wildfire, the Bristol Fire Department strives to improve and maintain firefighting equipment, maintain water resources, and manage a Capital Reserve Fund to help pay costs for new equipment.

The 2022 Annual Report for the Bristol Fire Department reports 45 fire calls, representing only 3.13% of its incident activity in 2022.<sup>29</sup> Bristol has had no significant wildfires since the last hazard mitigation plan. However, an area of concern is the Sugar Hill State Forest, which abuts Bristol's downtown, more densely populated area. A state park fire could quickly become a conflagration with the right conditions, such as high wind and drought.

Significant wildfires in New Hampshire are uncommon; five large fires have occurred in the state recently. These include the Bemis Fire in Crawford Notch, the Dilly Cliff Fire in Woodstock, the Covered Bridge Fire in Albany, the Bayle Mountain Fire in Ossipee, and the Stoddard Fire in Stoddard. The Bristol Fire Department was not called to assist in these recent large fires.

Given the right conditions - drought, lightning, human interface - the potential for a significant wildfire is high. The impact of climate change on drought could also play a role in predicting wildfires. Therefore, the potential loss value was estimated to be between 1% and 5% of the total assessed structure value.

## **10) EXTREME TEMPERATURES**

Hazard Identification & Risk Assessment (HIRA)..... Low  
Probability..... Low  
Estimated Structure Loss Value ..... Not estimated

### ***Extreme Cold & Heat***



Winter temperatures can fall below -30°F, and summer temperatures, laden with high humidity, can soar to nearly 100°F. There was more concern about cold temperatures in the past, but with improved heating systems and local communications, most New Hampshire residents can cope with extreme cold. Many New Hampshire residents have also equipped their homes with generators and woodstoves. Many cities and towns offer warming centers or have established a functional needs list to check vulnerable citizens.

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<sup>28</sup> <http://www.fs.fed.us/nwacfire/home/terminology.html>

<sup>29</sup> Bristol 2022 Annual Report, Bristol Fire Department, page 81



More concerning today is extreme heat conditions, which seem to be more likely with climate change; temperatures above 95° for a week or more can impact the elderly and other vulnerable populations. Few residents, particularly vulnerable populations, have air conditioners and are less able to cope with extreme heat. Bristol's estimated senior citizen population is 18.0%, and the estimated poverty rate is 8.9% of the total population<sup>30</sup>. No deaths or illnesses due to cold or heat have been reported in Bristol since the prior hazard mitigation plan.

***Extreme Temperatures combined with Long Term Utility Outage***

When combined with power failure, extreme temperatures are of the most concern; power failure could result in no water, heat, or air conditioning for the town's most vulnerable populations. Town officials and the community as a whole should be concerned; they should look after their citizens to ensure that extreme temperatures do not create a life or property-threatening disaster. The town provides warnings and recommendations regarding extreme temperatures on the webpage, through the water department, and other social media. It has designated the Town Office as a cooling or warming center.

The cost of extreme temperatures is difficult to calculate as it is not based on the loss of structures. The expected loss value would be primarily on the economic impact on the community and the time and cost of emergency response. The structure loss value due to extreme temperatures was not estimated based on the assumption that damage would not occur to structures.

**11) EARTHQUAKES**

Hazard Identification & Risk Assessment (HIRA)..... Low  
Probability..... Very Low  
Estimated Structure Loss Value ..... \$3,669,598 to \$18,347,990

Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric, and phone lines, and are often associated with landslides and flash floods. Since 1940, only two earthquakes with a magnitude greater than 5.0 have occurred in New Hampshire; both earthquakes occurred in Ossipee in December of 1940 (5.5-5.8). Since 1982, three earthquakes with a magnitude greater than 4.0 have occurred in the state. One of these earthquakes occurred in Laconia in 1982 (4.0); two occurred in Berlin, one in 1988 (4.0), and another in 1989 (4.1).

Many New Hampshire residents felt the most recent earthquake in October 2012, with its epicenter in Hollis Center, ME. The team noted that the Hollis earthquake was not felt in Bristol. A less significant earthquake, with a magnitude of 3.1, occurred in Boscawen in September 2010. The Boscawen quake was felt in Bristol, but no damage occurred. Other small earthquakes, with less than a 3.0 magnitude, frequently occur in New Hampshire.

It is well documented that fault lines run throughout the state, but high-magnitude earthquakes have not been common in New Hampshire's history. Although historically, earthquakes have been rare, the potential exists, and depending on the location, the impact could be significant. Therefore, the potential structure loss value due to earthquakes was determined to be between 1% and 5% of the total assessed structure value.

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<sup>30</sup> US Census Bureau, American Community Survey, ACS, 2015-2019

## D. TECHNOLOGICAL HAZARDS

The following technological hazards were also considered while developing this hazard mitigation plan. Though these hazards are not analyzed in more detail as part of this plan, they are worth mentioning as real and possible hazards that could occur in Bristol. The estimated structure loss was not determined for technological hazards.

### 1) CONFLAGRATION

Hazard Identification & Risk Assessment (HIRA)..... Medium  
Probability..... Low

*“Conflagration is an uncontrolled burning that threatens human life, health, property or ecology. A conflagration can be accidentally or intentionally created”.<sup>31</sup>*

Older mill-style homes close to one another can potentially create dangerous conditions; one home on fire could quickly cause nearby homes to be in danger, too. When combined with high winds, a sizeable uncontrolled fire could spread from building to building across the community. Fire could begin as a wildfire and quickly escalate to a conflagration. Alternatively, a conflagration could ignite a major wildfire. The amount of damage from any fire depends on many factors; the location of the fire and emergency accessibility are just two of those factors.

In September 2019, a fire struck a five-unit apartment building, causing the adjacent four-unit building to burn. Both buildings were lost, and the residents were displaced. See Section G, Table 3.2 for more details. No other conflagrations have occurred since the prior hazard mitigation plan.

A conflagration could result in explosions, affect the transportation infrastructure, hamper communication and power systems, and shut down the numerous businesses along Bristol’s highways. The impact on communication, power, and transportation would likely be temporary, but damage to homes and businesses could be significant.

### 2) HAZARDOUS MATERIALS

Hazard Identification & Risk Assessment (HIRA)..... Medium  
Probability..... Low

Hazardous material in fixed locations is a concern in many New Hampshire communities and Bristol. Manufacturers, gas stations, fuel depots, small businesses, and even homes can have hazardous chemicals, explosive materials, or poisons on site. Breaches in the storage, use, production, or disposal can affect the groundwater, aquifers, water supply, and the air we breathe.

Bristol has several areas noted as susceptible to damage from a fixed hazardous material event, although there are no large fuel depots that would be at risk. Over a dozen Tier II reports are received by the Fire Department annually, the largest being the Freudenberg Complex. Otherwise, the concern is at downtown auto repair shops and gas stations in the conflagration area and the hazards at the wastewater treatment plant. In addition to receiving Tier II reporting, the Bristol Fire Department inspects facilities as required. It works with business owners to ensure the safety of its employees and the general public.

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<sup>31</sup> Fire Definitions; HotAsBlazes.com

Residents on private property may also store hazardous materials; to help its residents, the town participates in collecting household waste, such as paint.

Bristol is relatively safe from hazardous materials incidents. However, if hazardous materials ignited, entire buildings could be susceptible to explosion and fire. The resulting losses could be substantial in terms of structure loss and loss of business revenue for local merchants.

Although there have been transportation accidents involving hazardous materials (see Human-Casused Hazards, Transportation Accidents, below), no explosions or chemical incidents have occurred.

### **3) DAM FAILURE**

Hazard Identification & Risk Assessment (HIRA)..... Medium  
Probability..... Low

Six active dams are listed by the Department of Environmental Services (DES) in Bristol. The Newfound Lake (DES) and Ayers Island Dams (private) are classified as high-hazard dams. The Lower IPC (private) is a significant-hazard dam, the Newfound River Hydro Dam (private) is a low-hazard dam, and the remaining two, Farm Pond Dam (private) and Poitras Dam (private), are non-menace. The Town of Bristol does not own any dams.

The first high-hazard dam, the Newfound Lake Dam, owned by DES, is subject to FERC and state dam regulations. DES manages the dam, inspects it for safety, and takes mitigation measures to ensure that several structures below the dam are safe. Activities and reports authored by regulatory agencies are shared with the Fire Department. According to DES reporting, the Newfound Lake Dam is in good shape, no deficiencies or vulnerabilities are apparent, and no mitigation is needed at this time. Action Item #15 calls for a copy of the EAP for Newfound Lake Dam.

The second high-hazard dam, Ayers Island Dam, is privately owned and under no control of the town. Ayers Island Dam has had recent renovations, one related to preventative maintenance and another for earthquake hardening; the dam has been reinforced and refaced. It has been well-maintained over the past decade. An EAP has been completed for this dam and is at the Fire Station. Failure of the Ayers Island Dam would likely impact Franklin, but no structures in Bristol are in the inundation path. FERC and DES reports are provided to the Fire Department for the Ayers Island Dam, as they are for the Newfound Lake Dam. No mitigation is needed at this time.

### **4) LONG-TERM UTILITY OUTAGE**

Hazard Identification & Risk Assessment (HIRA)..... Medium  
Probability..... Low

Although rare, long-term utility outages of five or more days have occurred in Bristol due to local line damage from high winds, severe storms, and problems with the power grid. A significant or extended power outage lasting more than a week could result in hardship for individual residents, particularly the elderly, disabled, or poor. The team reported that long-term power outages have diminished due to utility companies' efforts to trim trees and branches near power lines.

Long-term utility outage is still a concern, particularly when combined with the above natural hazards. An extended power failure's most significant impact would be the inconvenience caused by the inability to pump water for residents who rely on wells. It is also noted that many services, including pharmacies and large grocers, are located out of

town; driving during severe weather events to obtain necessities can be difficult due to poor road conditions. The team felt that many residents are self-sufficient, as many are now equipped with generators and woodstoves.

As a relatively small, close-knit community, town officials know persons who may need help in emergencies. Nonetheless, a long-term utility outage would have a significant impact.

## 5) AGING INFRASTRUCTURE

Hazard Identification & Risk Assessment (HIRA)..... Low  
Probability..... Moderate

*“Infrastructure is the backbone of our community. While we don’t always acknowledge it, the condition of our infrastructure has a very real impact on our lives. We all depend on roads and bridges to get us where we are going, water infrastructure that delivers clean on-demand water, electricity to light our home and office, and schools that will facilitate a learning environment.”<sup>32</sup>*

Aging infrastructure is the continued deterioration of roads, bridges, culverts, ports, railroads, wastewater facilities, airports, dams, utilities, and public water and sewage systems. The State Multi-Hazard Mitigation Plan states that the average lifespan of a bridge is 50 years; the current average age of state-owned bridges in New Hampshire is 52-56 years.<sup>33</sup> The American Society of Civil Engineers gave NH an overall C- in its 2017 report card.<sup>34</sup>

As it is throughout New Hampshire and the United States, aging infrastructure is a concern in Bristol. In Bristol, older roads, water lines, and aging culverts are part of the town’s aging infrastructure. Some of the oldest water lines date back to the early 1950s; the town has more than 1,000 culverts to manage and 40 miles of roadways to maintain. This hazard mitigation plan includes the Central Street pump station (Action Item #18) to replace the aging pumping station and the main water line for the Central Street to Summer Street Area.

Lastly, the Fire and Police Stations have surpassed their effective use. However, fortunately, a new Public Safety Building has been approved in a warrant article, and the process to build is underway.

## 6) KNOWN & EMERGING CONTAMINANTS

Hazard Identification & Risk Assessment (HIRA)..... Low  
Probability..... Very Low

Known contaminants in drinking water occur naturally or when introduced by humans. Damage to the environment, the local flora and fauna, a reduction in land values, restrictions on public water sources, and an increase in short and long-term health issues are just some of the impacts of contaminants. There may also be a need for more robust water treatment equipment. However, emerging contaminants have not been historically monitored due to either a lack of laboratory capabilities or an understanding of the risk posed to human health.<sup>35</sup>

Naturally occurring contaminants could include trace elements such as arsenic, lead, manganese, and uranium. The most concerning of these to private well water is arsenic; arsenic is naturally occurring and common in groundwater. The NH State Multi-hazard Mitigation Plan states that “...health studies of New Hampshire residents have

<sup>32</sup> <https://www.infrastructurereportcard.org/wp-content/uploads/2016/10/2017-NH-Report-Card-hq-with-cover.pdf>

<sup>33</sup> NH Multi-hazard Mitigation Plan, 2018, page 156

<sup>34</sup> Ibid

<sup>35</sup> NH Multi-hazard Mitigation Plan-2018

*demonstrated the connection between arsenic and the increased prevalence of conditions such as bladder and other cancers and developmental effects on children.*"<sup>36</sup>

Hazardous material spills and other accidental introductions of chemicals into the ground and surface water can affect the safety of public and private water supplies. Human-made contaminants generally include pesticides and metals impacting groundwater or surface water. Emerging contaminants, such as poly or perfluoroalkyl substances (PFAs), have also been found in ground and surface water in New Hampshire; additional emerging contaminants, such as Methyl Tertiary Butyl Ether (MtBE), have also been found. Increased public awareness and testing of PFAs and MtBEs help counteract emerging contaminants' effects.

The Bristol Water & Sewer Department manages three water wells for the public water supply. These wells are well maintained, comply with current state regulations, and have been tested to reveal no PFOAs. The Water & Sewer Department follows all regulatory guidelines to ensure safe drinking water for the residents of Bristol. However, some of Bristol's residents have private well water; thus, radon and arsenic contamination in the aquifer may be a concern. Town officials encourage testing by individual homeowners for known and emerging contaminants.

### ***E. HUMAN-CAUSED HAZARDS***

The following human-caused hazards were also considered while developing this hazard mitigation plan. Though these hazards are not analyzed in more detail as part of this plan, they are worth mentioning as real and possible hazards that could occur in Bristol. The estimated structure loss was not determined for human-caused hazards.

#### **1) MASS CASUALTY INCIDENTS**

Hazard Identification & Risk Assessment (HIRA)..... Medium  
Probability..... Very High

A Mass Casualty Incident (MCI) is defined as *"any number of casualties that exceed the resources normally available from local resources"*<sup>37</sup>. MCIs have been known to occur due to bus, auto, train, and aircraft accidents and incidents involving large crowds. MCIs can also result from natural hazards such as hurricanes, floods, earthquakes, and tornadoes. No MCIs have occurred since the previous hazard mitigation plan.

An MCI could happen anywhere in Bristol, but more likely on NH Routes 104 and 3A; 104 is the main highway to the Newfound Regional High School. These roads are heavily traveled year-round but are particularly dangerous during winter storms. Animal crossings and poor weather can set up the conditions for an MCI. In addition, with students traveling to Bristol from other communities for middle and high school and travel for athletic competitions, the potential for an MCI is increased. Fortunately, there have been no reported MCIs since the last hazard mitigation plan.

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<sup>36</sup> Ibid

<sup>37</sup> DeValle Institute Learning Center; <https://delvalle.bphc.org/mod/wiki/view.php?pageid=89>

## **2) CYBER EVENTS**

Hazard Identification & Risk Assessment (HIRA)..... Medium  
Probability..... Moderate

Presidential Policy Directive (PDD-41) describes a cyber incident as *“An event occurring on or conducted through a computer network that actually or imminently jeopardizes the integrity, confidentiality, or availability of computers, information or communications systems or networks, physical or virtual infrastructure controlled by computers or information systems, or information resident thereon. For purposes of this directive, a cyber incident may include vulnerability in an information system, system security procedures, internal controls, or implementation that could be exploited by a threat source.”*<sup>38</sup>

With the increased use of computers and the internet, cyber events could include targets such as banks, hospitals, schools, churches, town, city, and state government operations, emergency operations and critical infrastructure. Cyber events have been known to occur almost anywhere, from very small towns to large facilities in New Hampshire, causing large expenditures, disruption in everyday business practices, and data loss. Several communities in New Hampshire have had their data held for ransom.

The Bristol planning team did not report any cyber-attacks, but the threat is certainly real. The town stores essential documents on a server at the Town Office; the information is also stored in the “cloud”. Security on computer networks, off-site backup, and user education are vital to protecting sensitive town information and data.

## **3) TERRORISM & VIOLENCE**

Hazard Identification & Risk Assessment (HIRA)..... Low  
Probability..... Low

Terrorism is feared throughout our country and the world; the disruption at soft targets is often the result of terrorist incidents. *“Soft Targets and Crowded Places (ST-CPs) are locations that are easily accessible to large numbers of people and that have limited security or protective measures in place making them vulnerable to attack.”*<sup>39</sup>

Bristol has several soft targets, such as the town water wells and water storage tank, the schools, the Community Center, Kelly Park, and Wells Field. The Town Office, the Public Library, lodging facilities, and even highways could be targets. Churches, social clubs, grocery stores, banks, small businesses, and other commonly used facilities could also be soft targets. Any closure of NH Routes 3A or 104 in Bristol would cause regional disruptions in the transportation system and could affect Bristol’s businesses and the local economy.

Bristol also has three hard, or secured, targets - the Freudenberg Facility, the Newfound Lake Dam, and the Ayers Island Dam.

As with many small towns, the terrorism threat is minimal; if a terrorist incident were to occur, it would most likely be a homegrown terrorist event. There has been no significant terrorist or violent incident since the prior hazard mitigation plan.

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<sup>38</sup> PDD-41; <https://obamawhitehouse.archives.gov/the-press-office/2016/07/26/presidential-policy-directive-united-states-cyber-incident>

<sup>39</sup> [https://www.cisa.gov/sites/default/files/publications/DHS-Soft-Target-Crowded-Place-Security-Plan-Overview-052018-508\\_0.pdf](https://www.cisa.gov/sites/default/files/publications/DHS-Soft-Target-Crowded-Place-Security-Plan-Overview-052018-508_0.pdf)

**4) TRANSPORT ACCIDENTS**

Hazard Identification & Risk Assessment (HIRA)..... Low  
Probability..... Low

The possibility of vehicular accidents involving hazardous materials is identified as potentially significant in Bristol. The town's major roads, NH Routes 3A and 104, are known to be used by vehicles carrying hazardous materials, particularly Route 104, a common delivery route. These roadways traverse the Bristol area, traveling through terrain with little or no population and, at other times, through more densely populated areas, such as the center of Bristol.

In addition to Bristol's main highways, many other roads are narrow and winding and subject to severe winter weather; they become treacherous when affected by flooding, winter snow conditions, and ice. Vehicular accidents, wildlife collisions, and truck accidents involving hazardous materials are always possible in these conditions. A major ice storm or another significant event can make egress and access difficult for individuals and first responders. All roadways in Bristol are susceptible to hazards such as road flooding and high winds leading to downed trees in the roadways and potentially hazardous materials spills.

The planning team reported hazardous materials incidents in the past hazard mitigation plan; these are listed in Section G., Table 3.2. Since the last plan, one transportation incident has occurred in Bristol - upon delivery to the Freudenburg facility, a truck leaked its hazardous contents in the parking lot.

In a hazardous materials incident, losses could be relatively high in property and structural damage, depending on the scope and location of the incident. However, the losses are expected to be localized and unlikely in densely populated areas, where the speed limit is reduced.



## Chapter 6: Current Policies, Plans & Mutual Aid

### A. ANALYSIS OF THE EFFECTIVENESS OF CURRENT PROGRAMS

After researching historic hazards, identifying CIKR, and determining potential hazards, the team determined what was already being done to protect its citizens and structures. Once identified, the team addressed each policy or plan to determine its effectiveness and whether improvements were needed. This analysis became one of the tools the team used to identify mitigation action items for this plan.

Creating new action items was less challenging, knowing what regulations were already in place. In addition, this process helped identify current plans and policies that are working well and those that should be addressed as a new action item and the responsible departments. The following table, *Table 6.1, Policies, Plans & Mutual Aid*, shows the analysis resulting from the team's discussion.

Existing policies, plans and mutual aid that were designated as "Improvements Needed" were added to **Table 9.1, Mitigation Action Items** as new strategies and were reprioritized to meet the current needs of the town.

**TABLE 6.1: CAPABILITIES ASSESSMENT**

#### KEY TO EFFECTIVENESS

**Excellent**.....The existing program works as intended and is exceeding its goals.

**Good**.....The existing program works as intended and meets its goals.

**Inadequate** .....The existing program does not work as intended or does not meet its goals.

**Poor**.....The existing program does not work as intended, often falls short of its goals, or may present unintended consequences.

Current Program or Activity	Description	Managing Department	How Effective	Improvements Needed
Emergency Generators	The town has a permanent generator at the Town Office and the Main Fire Station and partial generators at the Newfound Regional High School and the Newfound Memorial Middle School. The town could benefit from additional generators to keep key facilities operating during an emergency.	Emergency Management Director	Good	<b>Improvements Needed:</b> Although Bristol has emergency backup power at the Town Offices and the Police Station and partial generators at the middle and high schools, other key resources could benefit from permanent generators. This strategy was deferred to obtain and install permanent generators at the high school, the middle school, the Fire Station, the Highway Garage, and the Central Street Pump Station (upgrade) to improve the effectiveness of these facilities during a disaster. <b>Action Item #16 (also in Table 7.1)</b>
Wellhead Protection Program	A wellhead protection plan aims to prevent the contamination of groundwater used for drinking water. The area is the surface and subsurface area surrounding the public water supply where contaminants are likely to reach.	Water & Sewer	Good	<b>Improvements Needed:</b> Wellhead protection areas have been identified, and Best Management Practices are partially in place. This strategy was deferred to improve drinking water protection and security at the Fowler and Danforth sites. <b>Action Item #17 (also in Table 7.1)</b>
Radio Communications	Radio communications are vital for emergency response to all types of hazards. Radios should be interoperable and up-to-date with current technology.	Emergency Management Director	Inadequate at times (dead spots)	<b>Improvements Needed:</b> All three emergency departments in Bristol (Police/Fire/Highway Departments) have radio interoperability and up-to-date radios that work as intended. Some areas of town have dead spots, and more repeaters could be beneficial. This strategy was deferred to work with Lakes Region Fire Mutual Aid to obtain repeaters to improve radio communications. <b>Action Item #29 (also in Table 7.1)</b>

Current Program or Activity	Description	Managing Department	How Effective	Improvements Needed
Public Education & Awareness	The Town of Bristol is very well situated to provide public information and outreach to its citizens through various means.	Emergency Management Director & Other Departments	Good	<b>Improvements Needed:</b> The Fire Department has an Emergency Management tab with some emergency-related links. An emergency webpage is a great way to provide outreach to residents on emergency preparedness and mitigation techniques. This strategy was deferred to provide robust information on the emergency management webpage and social media platforms to educate the public on hazard mitigation and preparedness measures. Include preparedness information such as shelter locations, evacuation routes, methods of emergency alerting, and 911 compliance. Also include strategies to mitigate the impact of drought, earthquakes, tornados, severe winter weather, lightning, and climate change. Provide information on infectious diseases, encourage homeowners to install carbon monoxide alarms, and monitor radon in their homes. Offer residents and business owners reminders to clear snow from roofs during high accumulation snow years. The town can also get information via social media platforms (see Table 2.1). <b>Action Item #7 (also in Table 7.1)</b>
Bristol Hazard Mitigation Plan (2016)	A hazard mitigation plan is designed to address natural, technological, and human-caused hazards and to understand the risks these pose for the community. A hazard mitigation plan aims to create action items that will make the community safer by lessening or eliminating the effects of hazards.	Emergency Management Director	Good	<b>Improvements Needed:</b> The Bristol Hazard Mitigation Plan (2016) is being updated with this plan. This strategy was deferred to review this plan, the Bristol Hazard Mitigation Plan 2024, on an annual basis and to update the plan again in 2028. <b>Action Item #21 (also in Table 7.1)</b>
Tree Removal Program	Tree Removal Program reduces damage from fallen trees and limbs to power lines, stormwater ditches, and structures and reduces the wildfire risk.	Highway Department	Good (more reactive than proactive)	<b>Improvements Needed:</b> As trees become damaged and threaten roadways and structures on town roads, the Highway Department removes them. NH DOT, NH Electric Coop, and Eversource do this for state roads as needed. This strategy was deferred to continue local tree and brush removal efforts to help mitigate the effects of the Emerald Ash Borer, high wind events, ice storms, wildfires, and other natural hazards. <b>Action Item #1 (also in Table 7.1)</b>
Bridge Maintenance Program	There is currently one red-listed town-owned bridge in the community. Inspection and clean-up of bridges occur annually. The state inspects all bridges every other year and maintains them regularly.	Highway Department	Good	<b>Improvements Needed:</b> The Bristol Highway Department has established a short and long-term bridge maintenance and replacement schedule. Currently, there is one red-listed town-owned bridge and no state-owned red-listed bridges. This strategy was deferred to repair and upgrade the single town-owned red-listed Danforth Brook Road bridge. The town wants to start a CIP fund for this bridge while waiting for the state bridge aid. <b>Action Item #33</b>
Capital Improvement Program (CIP)	A Capital Improvement Plan (CIP) is a decision-making tool to plan and schedule town improvements over at least six years. A CIP provides a suggested timeline for budgeting and implementing needed capital improvements.	Planning Board	Excellent	<b>Improvements Needed:</b> The Bristol Capital Improvement Program is a ten-year program that works excellently for the Town of Bristol. A CIP is generally reviewed annually to ensure the program's goals are achieved. This strategy was deferred to educate the public about the CIP and how it helps the community. <b>Action Item #14</b>

Current Program or Activity	Description	Managing Department	How Effective	Improvements Needed
All Hazard Response Training Fire, HazMat, EMS & Police Department	Fire, HazMat, and EMS personnel training for all situations, including wildfire suppression, medical emergencies, and HazMat response. Police Department personnel training for law enforcement response, including active shooter and terrorism.	Fire Chief, Fire Warden, EMS Director, Police Chief & Emergency Management Director	Good	<b>Improvements Needed:</b> Training of all fire responders includes many aspects of emergency response, including EMS, confined space, wildfire, and HazMat training. Fire & EMS training is done locally or through Lakes Region Fire Mutual Aid, the State of New Hampshire Fire & EMS Training Facility in Bethlehem, or the Fire Academy. Police training includes many aspects of law enforcement response, including active shooter and terrorism. Police training is done locally or through the NH Police Academy. Although training is preparedness, not mitigation, emergency responder training was deferred to continue for the life of the plan. <b>Action Item #5</b>
CodeRED	CodeRED is a reverse calling warning system that uses listed phone numbers. CodeRED does not include cell and unlisted numbers or email addresses. The Bristol School District uses the SysAid reverse calling system, which is used for school activities and emergency notifications.	Emergency Management Director	Good	<b>Improvements Needed:</b> CodeRED and CivicReady are excellent warning systems, but they only store resident landline phone numbers. The town has continuously provided information to residents about CodeRED and CivicReady. This strategy was deferred to continue providing public outreach to encourage all residents to contact CodeRED & CivicReady to add cell numbers, emails, and unlisted numbers and verify the information. Use the town's website, a possible brochure at the town office, social media platforms, or a sign-up at Town Meeting. <b>Action Item #8</b>
Site Plan & Subdivision Regulations (2020) Zoning Ordinances (2022)	The purpose of subdivision regulations is to provide for the town's orderly present and future development by promoting public health, safety, convenience, and welfare. Zoning regulations deal with land use, including rural, residential, flood zone, agriculture, and timber management. Zoning regulations often include drainage and infrastructure provisions. The Site Plan Review Regulations allow the town to regulate commercial development.	Planning Board	Good	<b>Improvements Needed:</b> Bristol's regulations address setbacks, road frontage, and the size of the lot. Regulations include driveways, structures, roads, erosion, sediment control, and adequate stormwater flow. This strategy was deferred to review the town's planning mechanisms, including but not limited to the Subdivision & Zoning Regulations, the Site Plan Review Regulations, and the Floodplain Regulations, and to discuss changes that may mitigate the occurrence of and damage from the natural hazards identified in this plan. This strategy was also deferred to consider adding criteria-based regulations requiring water availability for fire suppression in new subdivisions. <b>Action Item #12</b>
911	E-911 signage compliance includes markers at driveway entrances that identify residence locations in conjunction with the E-911 alerting system.	Fire & Police Departments	Good	<b>Improvements Needed:</b> Bristol is about 70% compliant with E-911 signage. This strategy was deferred to this plan to consider ways to get this signage more compliant so that emergency responders can better assist the public in their time of need. Use public outreach opportunities such as the Emergency Notices webpage or available social media to promote better compliance and develop other means of increasing compliance. The town could purchase and install signage, improve their ordinance and fine, or provide signs for residents to install themselves to promote compliance better. <b>Action Item #3</b>
Culvert & Stormwater Maintenance Plan	A Culvert & Storm Water Maintenance Plan includes an inventory of all culverts and ditches in the community along with a record of the location, size, etc. The Bristol Highway Department and the NH DOT clean the drainage basins once a year, and after significant flooding events, culverts are repaired as needed.	Highway Department	Good	<b>Improvements Needed:</b> The Bristol Highway Department does a good job cleaning and repairing drainage basins and culverts and has a written inventory of storm drains in the downtown area. This strategy was deferred for continued maintenance and upkeep of the community's stormwater plan and the culvert and drainage systems. This strategy is also deferred to develop Access GIS through CAI. <b>Action Item #2</b>

Current Program or Activity	Description	Managing Department	How Effective	Improvements Needed
Emergency Action Plan (Dams)	Dam Emergency Action Plans are designed to provide notification and evacuation procedures should a dam failure occur.	Department of Environmental Services (DES)	Excellent (Ayers Island Dam)  Unknown at this time (Newfound Lake Dam)	<b>Improvements Needed:</b> High-hazard dams in NH require the development of a Dam Emergency Action (Operations) Plan. Bristol has two high-hazard dams, the Newfound Lake Dam and the Ayers Island Dam. The EMD/Fire Chief has a copy of the Ayers Island Dam EAP. This strategy is deferred to get a copy of the Newfound Lake Dam EAP. <b>Action Item #15</b>
Emergency Operation Plan (2013)	An Emergency Operations Plan identifies the response procedures and capabilities of the Town of Bristol in the event of a natural, technological or human-caused hazard.	Emergency Management Director	Good	<b>Improvements Needed:</b> The Bristol Emergency Operations Plan (EOP) was last updated in 2013 and is overdue for an update based on the state's 5-year recommendation. The new EOP should include an EOC Call Alert List, a detailed Resource Inventory List, and Player Packets. This strategy was deferred to this plan to update the EOP. <b>Action Item #26 (also in Table 7.1)</b>
Master Plan (being updated)	A Master Plan includes goals, objectives, and expectations for the town's future development.	Planning Board	Good	<b>Improvements Needed:</b> The Bristol Master Plan is updated regularly. Sections of the plan are worked on and adopted one at a time. This strategy was deferred to consider, including a natural hazards section, a discussion on climate change, and action items from this plan in future updates of the Master Plan. <b>Action Item #30</b>
National Flood Insurance Program (NFIP) & Floodplain Ordinance (part of Zoning Ordinance)	The National Flood Insurance Program (NFIP) addresses both the need for flood insurance and the need to lessen the devastating consequences of flooding. The goals of the NFIP are to protect communities from potential flood damage through floodplain management and to provide people with flood insurance. A community's floodplain ordinance regulates all new and substantially improved structures in the 100-year floodplain, as identified on the FEMA Flood Maps, which in Bristol are dated February 20, 2008.	Planning Board & Selectboard	Good	<b>Improvements Needed:</b> The town developed a flood ordinance and became a National Flood Insurance Program (NFIP) member on April 15, 1980. The town's Flood Ordinance works well to successfully prohibit or force compliance to the ordinance for building and substantial improvements to structures within the FEMA flood zone. This strategy was deferred to this plan to continue compliance with the NFIP, obtain NFIP brochures to have available at the Town Office, and provide public outreach regarding the benefits of membership in the NFIP, whether or not properties are in the FEMA floodplain. This strategy was also deferred to provide vital information on flood mitigation techniques that can be taken to protect individual homes and properties using the town's website or social media pages. Provide links to the NFIP, Ready.gov, and other pertinent websites. <b>Action Item #9</b>
NIMS & ICS Training	The National Incident Management System (NIMS) and the Incident Command System (ICS) provide training that can help ensure effective command, control, and communications during emergencies.	Emergency Management Director	Inadequate	<b>Improvements Needed:</b> NIMS & ICS training has been done by most first responders. Although this is preparedness, this was deferred to this plan to continue providing NIMS (IS-700) & ICS (ICS 100 & ICS 200) training to new first responders and new town officials as they become elected/or appointed. <b>Action Item #6</b>
Pressurized, Dry Hydrants & other Water Resources	Bristol Fire Department and the Water & Sewer Department maintain pressurized and dry hydrants. Approximately 159 pressurized hydrants, three dry hydrants, and multiple locations are available for water drafting in the community.	Bristol Fire Department & Bristol Water & Sewer Department	Excellent	<b>Improvements Needed:</b> Pressurized hydrants, dry hydrants, and drafting sites throughout Bristol to provide water resources for firefighting. This strategy was deferred to continue maintaining the pressurized hydrants (Water & Sewer), the dry hydrants, and other water resources (Fire Department) in the community to help mitigate the effects of structure fires and wildfires. <b>Action Item #4</b>

Current Program or Activity	Description	Managing Department	How Effective	Improvements Needed
NH Forest and Lands & Fire Permits	NH Forest & Lands, a division of the NH Department of Natural & Cultural Resources (DNCR), regulates open burning and permits.	NH Forests & Lands (DNCR) & Local Fire Warden	Excellent	<b>No Improvements Needed:</b> The system with NH Forests & Lands (DNCR) and the local fire warden works well. The public is aware of fire permitting requirements and the ability to get permits online. A \$5.50 fee is required (\$5.50).
Burning Index	New Hampshire Forests & Lands (DNCR) has a burning index that measures the risk for wildfires and how likely fires are to start on a given day. It also evaluates the potential damages wildfires can create, the number of people needed to fight them, and the type of equipment that might be needed.	NH Hampshire Forests & Lands (DNCR) & Fire Department	Excellent	<b>No Improvements Needed:</b> The Fire Department receives regular notification of the burning index via fax and email from NH Forests & Lands. This notification is made daily during the fire danger season, and a Fire Danger Sign is on Lake Street in Bristol.
Capital Reserve Fund (CRF)	A CRF is an account on a town's balance sheet reserved for long-term capital investment projects or any other significant and anticipated expense(s) that will be incurred. Reserve funds are set aside to partially ensure adequate funding to finance future projects, equipment, and other expenditures.	Select Board, Budget Committee & Town Department Heads	Good	<b>No Improvements Needed:</b> The town's Capital Reserve Funds are set aside each year at budget time to assist the town's departments with planned purchases of equipment and supplies. The Bristol Capital Reserve Funds work well and are part of the town warrant at the annual Town Meeting.
Building Codes	The town has not adopted International Building Codes (IBC) and International Residential Codes (IRC). The town recommends that builders follow the state-adopted codes for new construction so that national standards for flood, wind, earthquake, fire, and snow load are met.	Select Board & Planning Board	Inadequate	<b>No Improvements Needed:</b> The Town of Bristol has a Land Use Officer who can require Land Use Permits but cannot enforce the code; they can only recommend best practices. The permitting process requires builders to abide by the International Building Codes (IBC) and the International Residential Codes (IRC), which the State of New Hampshire has adopted. The town's people must vote on a warrant article to have enforcement for building permits; otherwise, enforcement is delegated to the state.
Life Safety & Fire Codes	Guides all buildings for life safety and fire codes	Fire Department	Good	<b>No Improvements Needed:</b> The National Fire Protection Association (NFPA) and the NH safety and fire codes guide the Bristol Fire Department to inspect all commercial, public assembly, and rental properties (3 units or more). The Bristol Fire Department does its best to provide timely inspections based on available staffing.
Mutual Aid Agreements (Fire, Police, Highway & EMS)	Mutual Aid agreements provide communications capabilities and cooperative assistance between area cities and towns; mutual aid provides access to resources appropriate to the scope of the emergency.	Police, Fire & Highway Departments & EMS	Excellent	<b>No Improvements Needed:</b> The Bristol Fire Department/EMS has a mutual aid agreement with Lakes Region Fire Mutual Aid. The Bristol Police Department has mutual aid agreements with surrounding towns in Grafton, Merrimack, and Belknap Counties, the NH State Police (Troops D & F), the Grafton County Sheriff's Office, and NH Fish & Game. The Highway Department and the Water & Sewer Department are members of the NH Public Works Mutual Aid Association. All mutual aid systems in Bristol work well; no improvements are needed.

Current Program or Activity	Description	Managing Department	How Effective	Improvements Needed
State Health Department Public Health Plan	The state health department's "Influenza, Pandemic, Public Health Preparedness and Response Plan" was written to prepare for any public health emergency; the town is part of the Central NH Regional Public Health Network.	Central NH Regional Public Health Network	Good	<b>No Improvements Needed:</b> The State Public Health Plan assists the community as part of the services provided by the Central NH Regional Public Health Network. The town has membership on the RCC for the Public Health Network, and members attend public health meetings whenever possible.
Local Road Design Standards	Local road design standards are specifications for constructing new roads in a community.	Select Board & Highway Department	Good	<b>No Improvements Needed:</b> Local road standards have been established to provide specifications for building new roads to ensure that the town does not assume ownership of substandard roads. The town will not assume ownership of roads not built to Class V standards. A public hearing is held to accept the roads, but the Select Board can accept new roads. This authority was given to the Select Board at a past Town Meeting.
SWQPA	The Shoreland Water Quality Protection Act (SWQPA) establishes minimum standards for the use and development of shorelands adjacent to the state's public water bodies. The SWQPA includes changes to vegetation requirements within the natural woodland and waterfront buffers, the impervious surface limitations, and the shoreland permit by notification process.	State of NH	Good	<b>No Improvements Needed:</b> The Town of Bristol follows and exceeds the regulations detailed in the Shoreland Water Quality Protection Act. Compliance with the Act is encouraged; it can be enforced under their wetlands/conservation overlay district.
Social Media Accounts	Social media accounts, such as Facebook, Twitter, Instagram, and local online newsletters, can provide excellent information on emergency preparedness and hazard mitigation strategies that can be taken to protect homes and property.	Department Heads	Good	<b>No Improvements Needed:</b> Facebook pages are maintained by the Town, Police, Fire, Highway, and Historical Society. The town also maintains an Instagram account. These social media accounts work very well to keep the citizens of Bristol informed about things happening in their town.



## Chapter 7: Last Mitigation Plan

### A. DATE OF LAST PLAN

Based on the Disaster Mitigation Act (DMA) of 2000, Bristol has developed hazard mitigation plans in the past. The most recent update was formally approved in 2016. The Bristol Hazard Mitigation Plan Update 2024 updates the 2016 plan.

Below are the action items that were identified in the 2016 plan. The team identified the current status of each strategy based on three sets of questions:

#### COMPLETED

- Has the strategy been completed?
- If so, what was done?

Strategies “deferred” from the prior plan, were added to **Table 9.1, Mitigation Action Plan** as new strategies and were reprioritized to meet the current needs of the town.

#### DELETED

- Should the strategy be deleted?
- Is the strategy mitigation or preparedness?
- Is the strategy useful to the town under the current circumstances?

#### DEFERRED

- Should the strategy be deferred for consideration in this plan?
- Should this strategy be reconsidered and included as a new action item for this plan if the strategy was not completed?

In *Table 7.1: Accomplishments since the Last Plan*, the team assessed what had been accomplished and determined what additional work may be needed. Columns in **red font** were extracted word-for-word from the 2016 Hazard Mitigation Plan. Six additional columns not shown here – *Rank, Problem, Hazard, Anticipated Cost, Potential Funding, and Comments* – can be found in the 2016 Hazard Mitigation Plan.

**TABLE 7.1: ACCOMPLISHMENTS SINCE THE LAST PLAN**

Bristol Proposed Project	Time Frame	Responsible Party	Completed, Deleted, or Deferred
Provide emergency power generation for critical facilities (Town Hall, Police Station).	Short	Town Admin., EMD	<b>Partially Completed &amp; Deferred:</b> Although Bristol has emergency backup power at the Town Offices and the Police Station and partial generators at the middle and high schools, several other key resources could benefit from permanent generators. This strategy was deferred to obtain and install permanent generators at the fire station, high school, middle school, highway garage, and the Central Street pump station (upgraded) to improve the effectiveness of these facilities during a disaster. <b>Action Item #16 (also in Table 6.1)</b>



Bristol Proposed Project	Time Frame	Responsible Party	Completed, Deleted, or Deferred
Conduct outreach and education for all types of emergencies, including the importance of providing up-to-date emergency contact information.	Ongoing	EMD, Town Admin.	<b>Completed &amp; Deferred:</b> The Fire Department has an Emergency Management tab with some emergency-related links. An emergency webpage is a great way to provide outreach to residents on emergency preparedness and mitigation techniques. This strategy was deferred to provide robust information on the emergency management webpage and social media platforms to educate the public on hazard mitigation and preparedness measures. Include preparedness information such as shelter locations, evacuation routes, methods of emergency alerting, and 911 compliance. Also include strategies to mitigate the impact of drought, earthquakes, tornados, severe winter weather, lightning, and climate change. Provide information on infectious diseases, encourage homeowners to install carbon monoxide alarms, and monitor radon in their homes. Offer residents and business owners reminders to clear snow from roofs during high accumulation snow years. The town can also get information via social media platforms (see Table 2.1). <b>Action Item #7 (also in Table 6.1)</b>
Improve drinking water protection and security at the Fowler site, including fencing.	Medium	W&S	<b>Completed &amp; Deferred:</b> Wellhead protection areas have been identified, and Best Management Practices are in place. This strategy was deferred to improve drinking water protection and security at the Fowler and Danforth sites, mainly through public outreach. <b>Action Item #17 (also in Table 6.1)</b>
Evaluate and upgrade radio communications for all essential services	Short	Town Admin., EMD	<b>Partially Completed &amp; Deferred:</b> All three emergency departments in Bristol (Police/Fire/Highway Departments) have radio interoperability, up-to-date radios, and work as intended. Some areas of town have dead spots, and more repeaters could be beneficial. This strategy was deferred to work with Lakes Region Fire Mutual Aid to obtain repeaters to improve radio communications. <b>Action Item #29 (also in Table 6.1)</b>
Use the Hazard Mitigation Planning Committee to review the HMP annually.	Ongoing (Annual)	EMD	<b>Completed &amp; Deferred:</b> The Bristol Hazard Mitigation Plan (2016) is being updated with this plan. This strategy was deferred to review this plan, the Bristol Hazard Mitigation Plan 2024, on an annual basis and to update the plan again in 2028. <b>Action Item #21 (also in Table 6.1)</b>
Incorporate HMP into other town planning documents (CIP, Master Plan, etc.	Medium	Town Admin., PB, EMD	<b>Completed &amp; Deferred:</b> Past hazard mitigation plans have been integrated into other planning mechanisms in Bristol. This strategy was deferred to integrate the 2024 hazard mitigation plan with other documents in the future. <b>Action Item #13</b>
Upgrade road drainage on Fourth Street.	Medium	DPW	<b>Partially Completed &amp; Deferred:</b> A short section of drainage improvement on Fourth Street has been done; however, the remaining sections still need drainage improvements. This strategy was deferred to complete the storm drain system project on the remaining sections of Fourth Street. <b>Action Item #22</b>
Upgrade road drainage on Timber Lane.	Long	DPW	<b>Deferred:</b> This strategy from the prior plan was not done due to oversight and budget constraints. The storm drains on Timber Lane need to be installed to contain the stormwater run-off in the ditch lines. This strategy was deferred to install the storm drains on Timber Lane. <b>Action Item #23</b>

Bristol Proposed Project	Time Frame	Responsible Party	Completed, Deleted, or Deferred
Purchase confined space equipment and ensure staff has training.	Medium	Fire Chief	<b>Completed &amp; Deferred:</b> The town has purchased confined space equipment and has trained personnel accordingly; however, training should continue. This strategy was deferred with other emergency training to continue training personnel on confined space equipment. <b>Action Item #5</b>
Improve and expand existing community Gamewell fire alarm system, including public outreach.	Medium	Fire Chief	<b>Deleted:</b> This strategy from the prior plan was not done due to oversight and budget constraints. This strategy was deleted as the town felt the Gamewell fire alarm system was no longer needed.
A. Identify populations that would be at risk in a power outage. B. Conduct outreach to at-risk populations including education regarding appropriate shelters and resources.	Medium	EMD, Town Admin.	<b>Deleted:</b> This strategy from the prior plan was not done due to oversight and changing priorities. This strategy was deleted as the team felt this list would be too difficult to establish and maintain.
Distribute Bristol HMP to abutting communities.	Short	Town Admin., EMD	<b>Deleted:</b> This strategy from the prior plan was not done due to changing priorities. This strategy was deleted as the town felt this was no longer necessary; however, the plan may be added to the town's website.
Upgrade road drainage on High Street.	Short	DPW	<b>Completed &amp; Deleted:</b> This strategy from the prior plan is completed. The town improved the High Street drainage by replacing a metal culvert with a plastic one to improve stormwater flow.
Cross-reference the Bristol Water System Emergency Plan and the Bristol Emergency Management Plan.	Short	W & S, EMD	<b>Completed &amp; Deleted:</b> The cross-reference of the Bristol Water System Emergency Plan and the Bristol Emergency Management Plan was done; therefore, this strategy was deleted.
Evaluate and map hazardous materials storage sites in town.	Long	Fire Chief	<b>Deleted:</b> This strategy from the prior plan was not done due to oversight. This strategy was deleted as the town no longer felt it was necessary, as Tier II reports offer this information.
Conduct outreach and education for all types of emergencies and make informational resources more widely available.	Ongoing	EMD, Town Admin.	<b>Deferred:</b> Combined with Action Item #9 from the prior plan. <b>Action Item #7 (also in Table 6.1)</b>
Develop and fund a tree maintenance program.	Medium	DPW	<b>Deferred:</b> As trees become damaged and threaten roadways and structures on town roads, the Highway Department removes them. NH DOT, NH Electric Coop, and Eversource do this for state roads as needed. This strategy was deferred to continue local tree and brush removal efforts to help mitigate the effects of the Emerald Ash Borer, high wind events, ice storms, wildfires, and other natural hazards. <b>Action Item #1 (also in Table 6.1)</b>

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## Chapter 8: New Mitigation Strategies & STAPLEE

### A. MITIGATION STRATEGIES BY TYPE

The following list of mitigation categories and possible strategy ideas was compiled from several sources, including the USFS, FEMA, other planners, and past hazard mitigation plans. This list was used during a brainstorming session to discuss the issues in town. Team involvement and the brainstorming sessions proved helpful in bringing new ideas, better relationships, and more in-depth knowledge of the community.

#### Prevention

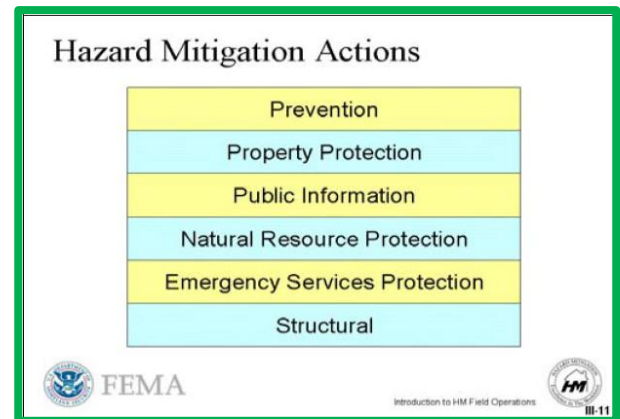
- Forest fire fuel reduction programs
- Special management regulations
- Fire Protection Codes NFPA 1
- Firewise® landscaping
- Culvert and hydrant maintenance
- Planning and zoning regulations
- Building Codes
- Density controls
- Driveway standards
- Slope development regulations
- Master Plan
- Capital Improvement Plan
- Rural Fire Water Resource Plan
- NFIP compliance

#### Public Education & Awareness

- Hazard information centers
- Public education and outreach programs
- Emergency website creation
- Firewise® training
- National Flood Insurance Program (NFIP)
- Public hazard notification
- Defensible space brochures

#### Emergency Service Protection

- Critical facilities protection
- Critical infrastructure protection
- Emergency training for town officials
- Ongoing training for first responders



#### Property Protection

- Current use or other conservation measures
- Transfer of development rights
- Firewise® landscaping
- Water drafting facilities
- High-risk notification for homeowners
- Structure elevation
- Real estate disclosures
- Floodproofing
- Building codes
- Development regulations

#### Natural Resource Protection

- Best management practices within the forest
- Forest and vegetation management
- Forestry and landscape management
- Development regulations for wetlands
- Watershed management
- Erosion control
- Soil stabilization
- Open space preservation initiatives

#### Structural Projects

- Structure acquisition and demolition
- Structure acquisition and relocation
- Bridge replacement
- Dam removal
- Culvert up-size or realignment

## B. POTENTIAL MITIGATION STRATEGIES BY HAZARD

To further promote the concept of mitigation, the team was provided with a handout developed by Mapping and Planning Solutions and used to determine what additional mitigation action items might be appropriate for the town. The mitigation action items from that handout are listed below and on the following page. The planning team considered each item from this comprehensive list of possible mitigation action items to determine if any of these action items could be put in place for Bristol, emphasizing new and existing buildings and infrastructure.

### Strategies that may apply to more than one hazard

### Type of Project

- *Community Outreach and Education*..... *Public Awareness*
- *Changes to Zoning Regulations* ..... *Prevention*
- *Changes to Subdivision Regulations* ..... *Prevention*
- *Steep Slopes Ordinance* ..... *Prevention*
- *Density Controls* ..... *Prevention*
- *Driveway Standards*..... *Prevention*
- *Emergency Website Creation* ..... *Public Awareness*
- *Critical Infrastructure & Key Resources*..... *Emergency Service Protection*
- *Emergency Training for Town Officials*..... *Emergency Service Protection*
- *High-risk Notification to Homeowners*..... *Property Protection*
- *Master Plan Update or Development* ..... *Prevention*
- *Capital Improvement Plan*..... *Prevention*

### Flood Mitigation Ideas

### Type of Project

- *Stormwater Management Ordinances*..... *Prevention*
- *Floodplain Ordinances* ..... *Prevention*
- *Updated Floodplain Mapping* ..... *Prevention*
- *Watershed Management*..... *Natural Resource Protection*
- *Drainage Easements* ..... *Prevention*
- *Purchase of Easements*..... *Prevention*
- *Wetland Protection* ..... *Natural Resource Protection*
- *Structural Flood Control Measures*..... *Prevention*
- *Bridge Replacement* ..... *Structural Project*
- *Dam Removal*..... *Structural Project*
- *NFIP Compliance* ..... *Prevention*
- *Acquisition, Demolition & Relocation*..... *Structural Project*
- *Structure Elevation* ..... *Structural Project*
- *Floodproofing* ..... *Property Protection*
- *Erosion Control*..... *Natural Resource Protection*
- *Floodplain/Coastal Zone Management*..... *Prevention*
- *Building Codes Adoption or Amendments* ..... *Prevention*
- *Culvert & Hydrant Maintenance* ..... *Prevention*
- *Culvert & Drainage Improvements* ..... *Structural Protection*
- *Transfer of Development Rights*..... *Property Protection*

**Natural Hazard Mitigation Ideas****Type of Project****Landslide & Erosion**

- Slide-Prone Area Ordinance ..... Prevention
- Drainage Control Regulations ..... Prevention
- Grading Ordinances ..... Prevention
- Hillside Development Ordinances ..... Prevention
- Open Space Initiatives ..... Prevention
- Acquisition, Demolition & Relocation ..... Structural Project
- Vegetation Placement and Management ..... Natural Resource Protection
- Soil Stabilization ..... Natural Resource Protection

**Lightning & Hail**

- Building Construction ..... Property Protection

**High Wind Events**

- Construction Standards and Techniques ..... Property Protection
- Safe Rooms ..... Prevention
- Manufactured Home Tie Downs ..... Property Protection
- Building Codes ..... Property Protection

**Wildfire**

- Building Codes ..... Property Protection
- Defensible Space ..... Prevention
- Forest Fire Fuel Reduction ..... Prevention
- Burning Restriction ..... Property Protection
- Water Resource Plan ..... Prevention
- Firewise® Training & Brochures ..... Public Awareness
- Woods Roads Mapping ..... Prevention

**Extreme Temperatures**

- Warming & Cooling Stations ..... Prevention

**Severe Winter Weather**

- Snow Load Design Standards ..... Property Protection

**Subsidence**

- Open Space ..... Natural Resource Protection
- Acquisition, Demolition & Relocation ..... Structural Project

**Earthquake**

- Construction Standards and Techniques ..... Property Protection
- Building Codes ..... Property Protection
- Bridge Strengthening ..... Structural Project
- Infrastructure Hardening ..... Structural Project

**Drought**

- Water Use Ordinances ..... Prevention

## C. STAPLEE METHODOLOGY

Table 8.1, *Potential Mitigation Items & the STAPLEE*, reflects the newly identified potential hazard mitigation action items and the results of the STAPLEE evaluation, as explained below. Many of these potential mitigation action items overlap. Some areas identified as “All Hazards” would also apply indirectly to wildfire response.

Each proposed mitigation action item aims “to reduce or eliminate the long-term risk to human life and property from hazards”. To determine the effectiveness of each mitigation action item in accomplishing this goal, a set of criteria that was developed by FEMA, the STAPLEE method, was applied to each proposed action item.

The STAPLEE method analyzes a project's social, technical, administrative, political, legal, economic, and environmental characteristics; public administration officials and planners commonly use it to make planning decisions. The following questions were asked about the proposed mitigation action items discussed in Table 8.1.

**Social**..... Is the proposed action item socially acceptable to the community? Is there an equity issue involved that would result in one segment of the community being treated unfairly?

**Technical**..... Will the proposed action item work? Will it create more problems than it solves?

**Administrative**..... Can the community implement the action item? Is there someone to coordinate and lead the effort?

**Political**..... Is the action item politically acceptable? Is there public support both to implement and maintain the project?

**Legal**..... Is the community authorized to implement the proposed action item? Is there a clear legal basis or precedent for this activity?

**Economic**..... What are the costs and benefits of this action item? Does the cost seem reasonable for the size of the problem and the potential benefits?

**Environmental**..... How will the action item impact the environment? Will it need environmental regulatory approvals?

Each proposed mitigation action item was evaluated and scored based on the above criteria. Each of the STAPLEE categories was discussed and was awarded one of the following scores:

**1 - Poor .....2 - Average..... 3 - Good**

An evaluation chart with total scores for each new action item is shown in Table 8.1.

The “Type” of Action Item was also considered (see section A of this chapter for reference):

- **Prevention**
- **Public Education & Awareness**
- **Emergency Service Protection**
- **Property Protection**
- **Natural Resource Protection**
- **Structural Projects**



### D. TEAM'S UNDERSTANDING OF HAZARD MITIGATION ACTION ITEMS

The team determined that any strategy designed to reduce personal injury or damage to property that could be done before an actual disaster would be listed as a potential mitigation action item. This decision was made even though not all projects listed in Table 8.1 and *Table 9.1, The Mitigation Action Plan*, are fundable under FEMA pre-mitigation guidelines. The team determined that this plan was primarily a management document designed to assist the Select Board and other town officials in all aspects of managing and tracking potential emergency planning action items. For instance, the team knew that some of these action items were more appropriately identified as preparedness or readiness issues. As no other established planning mechanisms recognize some of these issues, the team did not want to lose the ideas discussed during these planning sessions and thought this method was the best way to achieve that objective.

The town understands that the action items for a town of 200 may not be the same as those for 30,000. Also, the action items for a town in the middle of predominantly hardwood forests are not the same as those for a town on the Jersey Shore. Therefore, the Town of Bristol has accepted the **Mitigation Action Items** in Tables 8.1 and 9.1 as the complete list of action items for this town and only this town. Furthermore, the Town of Bristol indicates that having considered a comprehensive list of possible mitigation action items (see sections A & B of this chapter) for this plan, there are no additional action items to add now.

**TABLE 8.1: POTENTIAL MITIGATION ACTION ITEMS & THE STAPLEE**

Potential mitigation action items in Table 8.1 are listed in numerical order and indicate if they were derived from prior tables in this plan, i.e., (Table 7.1). Items in green, such as (MU14) represent mitigation action items taken from Mitigation Ideas, A Resource for Reducing Risk to Natural Hazards, FEMA, January 2013; see *Appendix F: Potential Mitigation Ideas*, for more information.

Proposed Mitigation Action Items	Type of Activity	S	T	A	P	L	E	E	TTL
<b>Action Item #1:</b> In addition to work done by and with local utility companies, monitor and maintain brush cutting, drainage system maintenance, and tree removal as part of a tree maintenance program. Create defensible space around power lines, oil and gas lines, and other infrastructure. Work to reduce the effects of the Emerald Ash Borer, high wind events, ice storms, wildfires, and other natural hazards by clearing dead vegetation and cutting the community's high grass and other fuel loads. (SW4, WF7, WF9 & F14) (Tables 6.1 & 7.1)	<b>Affected Location</b> -Townwide	3	3	2	2	2	3	2	17
	<b>Type of Activity</b> -Prevention -Emergency Service Protection -Property Protection -Natural Resource Protection	<b>Administrative:</b> The town must hire outside contractors <b>Political:</b> Some people may not want their dangerous trees removed <b>Legal:</b> Must adhere to scenic road regulations (4) <b>Environmental:</b> Some people may not want their dangerous trees removed							
<b>Action Item #2:</b> Maintain the community's stormwater plan, culvert, and drainage systems. Develop Access GIS through CAI. (F5)	<b>Affected Location</b> -Culverts & Ditches	3	3	3	3	3	3	3	21
	<b>Type of Activity</b> -Prevention -Emergency Service Protection -Property Protection -Natural Resource Protection	No apparent difficulty with this action item							

Proposed Mitigation Action Items	Type of Activity	S	T	A	P	L	E	E	TTL
<b>Action Item #3:</b> Consider ways to get this signage more compliant so that emergency responders can better assist the public in their time of need. Use public outreach opportunities such as the Emergency Notices webpage or available social media to promote better compliance and develop other means of increasing compliance. The town could purchase and install signage, improve their ordinance and fine, or provide signs for residents to install themselves to promote compliance better. (MU14)	<b>Affected Location</b> -Townwide	3	3	3	2	3	3	3	20
	<b>Type of Activity</b> -Prevention -Public Education & Awareness -Emergency Service Protection -Property Protection -Natural Resource Protection	<b>Political:</b> Some people want their signs, and some do not want any sign							
<b>Action Item #4:</b> Maintain the pressurized hydrants (Water & Sewer), the dry hydrants, and other water resources (Fire Department) in the community to help mitigate the effects of structure fires and wildfires. Identify locations in town that would benefit from installing dry hydrants, drafting sites, cisterns, or fire ponds. Work with local landowners to gain access to available water resources to help mitigate the effects of wildfires. (WF8) (Table 6.1)	<b>Affected Location</b> -Areas of town with or without water resources	3	3	3	3	3	3	3	21
	<b>Type of Activity</b> -Prevention -Emergency Service Protection -Property Protection -Natural Resource Protection	No apparent difficulty with this action item							
<b>Action Item #5:</b> The Fire Chief, the Police Chief, and the EMD to provide ongoing training for all emergency responders. Training will include the many aspects of emergency response, including EMS, wildfire suppression, confined spaces, HazMat, active shooter, and terrorism. Training is done locally or through the Lakes Region Fire Mutual Aid and the State of New Hampshire at the NH Fire and Police Academies. (Table 6.1) (Emergency Preparedness)	<b>Affected Location</b> -Townwide	3	3	3	3	3	3	3	21
	<b>Type of Activity</b> -Prevention -Emergency Service Protection	No apparent difficulty with this action item							
<b>Action Item #6:</b> The Emergency Management Director (EMD) to encourage all town officials who may be required to respond to an emergency and any new emergency responders to take NIMS 700 (S-700) & ICS (ISC100 & ISC200). Additionally, the EMD should encourage key personnel to learn about and become adept with WEB-EOC. (Emergency Preparedness)	<b>Affected Location</b> -Townwide	3	3	3	3	3	3	3	21
	<b>Type of Activity</b> -Prevention -Emergency Service Protection	No apparent difficulty with this action item							
<b>Action Item #7:</b> Provide robust information on the emergency management tab and social media platforms to educate the public on hazard mitigation and preparedness measures. Include preparedness information such as shelter locations, evacuation routes, methods of emergency alerting, and 911 compliance. Also include mitigation strategies such as mitigation techniques for earthquakes, tornadoes, severe winter weather, lightning, and climate change. Provide information on infectious diseases, encourage homeowners to install carbon monoxide monitors and alarms, and monitor radon in their homes. Offer residents and business owners reminders to clear snow from roofs during high accumulation snow years. (MU14, SW7, WF11, D9, T3, EQ7, ET1, ET4, L2, HA3, WW5) (Tables 6.1 & 7.1)	<b>Affected Location</b> -Townwide	3	3	3	3	3	3	3	21
	<b>Type of Activity</b> -Prevention -Public Education & Awareness	No apparent difficulty with this action item							

Proposed Mitigation Action Items	Type of Activity	S	T	A	P	L	E	E	TTL
<b>Action Item #8:</b> Provide public outreach to encourage all residents to contact CodeRED and CivicReady to add cell numbers, unlisted numbers, and emails and to verify their information. Use the community website, a possible brochure, available social media platforms, local newsletters, or a sign-up at Town Meeting. (MU14) (Table 6.1)	<b>Affected Location</b> -Townwide	3	3	3	3	3	3	3	21
	<b>Type of Activity</b> -Prevention -Public Education & Awareness -Emergency Service Protection	No apparent difficulty with this action item							
<b>Action Item #9:</b> Advise the public about the local flood hazard, flood insurance, and flood protection measures by obtaining and keeping a supply of NFIP brochures in the Town Offices. When proposing new development or substantial improvements, give NFIP materials to homeowners and builders. Encourage property owners to purchase flood insurance, whether or not they are in the flood zone, and provide appropriate links to the NFIP and Ready.gov on an emergency webpage or available social media platforms. Through Public Outreach, educate homeowners regarding the risks of building in the flood zone and measures to reduce flooding. Actively work with residents and builders to ensure they comply with the town's Floodplain Ordinance. (F10, F22 & F23) (Tables 6.1)	<b>Affected Location</b> -Areas prone to flooding	3	3	3	3	3	3	3	21
	<b>Type of Activity</b> -Prevention -Public Education & Awareness -Property Protection	No apparent difficulty with this action item							
<b>Action Item #10:</b> Post important information on the town's Emergency Management webpage and notices of red flag burning days. Obtain and have available Firewise® brochures to educate homeowners on methods to reduce fire risk around their homes (WF10) and provide a link to Firewise® on the emergency page of the town's website. Provide Firewise® brochures to those residents seeking burn permits (if not obtained online); advise residents of the importance of maintaining defensible space, the safe disposal of household waste, and the removal of dead or dry leaves, needles, twigs, and combustible materials from roofs, decks, eaves, porches, and yards. (WF12)	<b>Affected Location</b> -Townwide	3	3	3	3	3	3	3	21
	<b>Type of Activity</b> -Prevention -Public Education & Awareness -Emergency Service Protection -Property Protection -Natural Resource Protection	No apparent difficulty with this action item							
<b>Action Item #11:</b> To promote private mitigation efforts, provide public outreach to the citizens of Bristol on the importance of maintaining private roads to allow for safe access for fire apparatus into wildland-urban interface neighborhoods and properties. This education will help to ensure accessibility for emergency response and decrease the risk of wildfire. (MU16)	<b>Affected Location</b> -Private Roads	3	3	3	2	3	2	3	19
	<b>Type of Activity</b> -Prevention -Public Education & Awareness -Emergency Service Protection -Property Protection -Natural Resource Protection	<b>Political:</b> Some people may not want to be told what to do <b>Economical:</b> There may not be money for the upkeep							
<b>Action Item #12:</b> Review the Bristol Subdivision, Zoning, and Site Plan Regulations to consider changes that will enhance mitigation efforts across the community. Update these planning mechanisms and integrate elements from this hazard mitigation plan where possible. (WF2, F1 & MU6)	<b>Affected Location</b> -Townwide	3	3	3	3	3	3	3	21
	<b>Type of Activity</b> -Prevention -Emergency Service Protection -Property Protection -Natural Resource Protection	No apparent difficulty with this action item							

Proposed Mitigation Action Items	Type of Activity	S	T	A	P	L	E	E	TTL
<b>Action Item #13:</b> Integrate the 2024 hazard mitigation plan with other documents in the future. (MU6) (Table 7.1)	<u><b>Affected Location</b></u> -Townwide	3	3	3	3	3	3	3	21
	<u><b>Type of Activity</b></u> -Prevention	No apparent difficulty with this action item							
<b>Action Item #14:</b> Educate the public about the CIP and how it helps the community. (MU6)	<u><b>Affected Location</b></u> -Townwide	3	3	3	3	3	3	3	21
	<u><b>Type of Activity</b></u> -Prevention -Emergency Service Protection	No apparent difficulty with this action item							
<b>Action Item #15:</b> Request a copy of the EAP for the Newfound Lake Dam. (F7)	<u><b>Affected Location</b></u> -Newfound Lake Dam	3	3	3	3	3	3	3	21
	<u><b>Type of Activity</b></u> -Prevention -Emergency Service Protection	No apparent difficulty with this action item							
<b>Action Item #16:</b> Obtain and install permanent generators at the high school, the middle school, the Fire Station, the Highway Garage, and the Central Street Pump Station (upgrade) to improve the effectiveness of these facilities during a disaster. (MU13) (Tables 6.1 & 7.1)	<u><b>Affected Location</b></u> -High School -Middle School -Fire Station -Highway Garage -Central Street Pump Station	3	3	3	3	3	2	3	20
	<u><b>Type of Activity</b></u> -Emergency Service Protection	<b>Economical:</b> Budget constraints							
<b>Action Item #17:</b> Improve water protection and security at the Fowler and Danforth wellhead sites. Review the wellhead protection plan to ensure compliance with state regulations. (MU13) (Tables 6.1 & 7.1)	<u><b>Affected Location</b></u> -Wells & Water Sources	3	3	3	3	3	3	3	21
	<u><b>Type of Activity</b></u> -Prevention -Emergency Service Protection -Property Protection -Natural Resource Protection	No apparent difficulty with this action item							
<b>Action Item #18:</b> Replace the aging pumping station and 125' of the main water line for the Central Street to the Summer Street area. (MU13)	<u><b>Affected Location</b></u> -Central Street Pumping Station	3	3	3	3	3	3	3	21
	<u><b>Type of Activity</b></u> -Prevention -Structural Project	No apparent difficulty with this action item							
<b>Action Item #19:</b> Replace the 20' metal culvert with a 30-35' plastic culvert to alleviate flooding and improve the stormwater flow on Hemlock Brook Road. (F13)	<u><b>Affected Location</b></u> -Hemlock Brook Road	3	3	3	3	3	3	3	21
	<u><b>Type of Activity</b></u> -Prevention -Property Protection -Natural Resource Protection -Structural Project	No apparent difficulty with this action item							
<b>Action Item #20:</b> Obtain approval of this hazard mitigation plan as a Community Wildfire Protection Plan (CWPP) to enable potential assistance from the state and federal governments for future wildfire mitigation projects. (WF2)	<u><b>Affected Location</b></u> -Townwide	3	3	3	3	3	3	3	21
	<u><b>Type of Activity</b></u> -Prevention -Property Protection -Natural Resource Protection	No apparent difficulty with this action item							

Proposed Mitigation Action Items	Type of Activity	S	T	A	P	L	E	E	TTL
<b>Action Item #21:</b> Provide an annual review of the Bristol Hazard Mitigation Plan Update 2024, including the status of the "Action Items" listed in this plan to encourage completion. Obtain approval from the local elected body annually and provide a complete plan update in five years. (MU11) (Tables 6.1 & 7.1)	<u><b>Affected Location</b></u> -Townwide	3	3	3	3	3	3	3	21
	<u><b>Type of Activity</b></u> -Prevention	No apparent difficulty with this action item							
<b>Action Item #22:</b> Complete the storm drain system project on the remaining sections of Fourth Street; the aging galvanized piping will be upgraded to improve stormwater flow. (F13) (Table 7.1)	<u><b>Affected Location</b></u> -Fourth Street	3	3	3	3	3	3	3	21
	<u><b>Type of Activity</b></u> -Prevention -Property Protection -Natural Resource Protection -Structural Project	No apparent difficulty with this action item							
<b>Action Item #23:</b> Install storm drains on Timber Lane to improve stormwater flow. (F13) (Table 7.1)	<u><b>Affected Location</b></u> -Timber Lane	3	3	3	3	3	3	3	21
	<u><b>Type of Activity</b></u> -Prevention -Property Protection -Natural Resource Protection -Structural Project	No apparent difficulty with this action item							
<b>Action Item #24:</b> To alleviate the erosion issues on Smith River Road, install rip rap or vegetation planting. (ER5)	<u><b>Affected Location</b></u> -Smith River Road	3	3	3	3	3	2	2	19
	<u><b>Type of Activity</b></u> -Prevention -Property Protection	<b>Economical:</b> Budget constraints <b>Environmental:</b> DES approvals will be needed							
<b>Action Item #25:</b> Work with the owner of the Lake Street dam and HSEM to develop a plan and funding solution to repair the dam to diminish the risk to infrastructure downstream. (MU13)	<u><b>Affected Location</b></u> -Lake Street Dam	3	3	3	3	2	2	2	18
	<u><b>Type of Activity</b></u> -Prevention -Property Protection	<b>Legal:</b> The owner of the dam would have to agree to take action <b>Economical:</b> Budget constraints <b>Environmental:</b> DES approvals will be needed							
<b>Action Item #26:</b> Update the Bristol Emergency Operations Plan to coincide with the new state 18-ESF format. Include an analysis of the impact of natural hazards on Critical Infrastructure & Key Resources that may be needed during an emergency. The EOP should include an EOC Call Alert List, a detailed Resource Inventory List, and Player Packets. (MU6)	<u><b>Affected Location</b></u> -Townwide	3	3	3	3	3	3	3	21
	<u><b>Type of Activity</b></u> -Prevention -Emergency Service Protection	No apparent difficulty with this action item							
<b>Action Item #27:</b> With the assistance of qualified personnel, inspect all town facilities to determine if an investment in lightning rods would be beneficial. Install lightning rods as recommended. (L1)	<u><b>Affected Location</b></u> -Buildings townwide	3	3	3	3	3	3	3	21
	<u><b>Type of Activity</b></u> -Prevention -Emergency Service Protection -Property Protection	No apparent difficulty with this action item							

Proposed Mitigation Action Items	Type of Activity	S	T	A	P	L	E	E	TTL
<b>Action Item #28:</b> Although this is on the state's 10-year plan, lobby the state to prioritize the project to lessen the curve on NH Route 104, Summer Street, to allow for sidewalks and pedestrians.	<b>Affected Location</b> -NH Route 104	3	3	3	3	3	3	3	21
	<b>Type of Activity</b> -Prevention -Emergency Service Protection -Property Protection -Natural Resource Protection -Structural Project	No apparent difficulty with this action item							
<b>Action Item #29:</b> Work with local contractors to assist with installing repeaters to improve townwide radio communications. (MU13) (Tables 6.1 & 7.1)	<b>Affected Location</b> -Location of new repeater(s)	3	3	3	3	3	3	3	21
	<b>Type of Activity</b> -Prevention -Emergency Service Protection	No apparent difficulty with this action item							
<b>Action Item #30:</b> Review this plan, the Bristol Hazard Mitigation Plan Update 2024, whenever working on the Master Plan, and consider incorporating a discussion on climate change, natural hazards, and mitigation action items from this plan. (MU6)	<b>Affected Location</b> -Townwide	3	3	3	3	3	3	3	21
	<b>Type of Activity</b> -Prevention	No apparent difficulty with this action item							
<b>Action Item #31:</b> Install snow fencing on Shore Drive to strategically alleviate the snow drifting on the road. (WW4)	<b>Affected Location</b> -Shore Drive	3	3	3	3	3	3	3	21
	<b>Type of Activity</b> -Prevention -Emergency Service Protection	No apparent difficulty with this action item							
<b>Action Item #32:</b> Lobby the state to install rumble strips on Route 104 to alleviate high traffic and increase driver awareness.	<b>Affected Location</b> -Route 104	3	3	3	3	3	3	3	21
	<b>Type of Activity</b> -Prevention -Emergency Services Protection	No apparent difficulty with this action item							
<b>Action Item #33:</b> Repair and upgrade the single town-owned red-listed Danforth Brook Road bridge. Start a CIP fund for this bridge while waiting for the state bridge aid. (MU13) Table 6.1)	<b>Affected Location</b> -Danforth Road Bridge	3	3	3	3	3	3	3	21
	<b>Type of Activity</b> -Prevention -Emergency Service Protection -Property Protection -Natural Resource Protection -Structural Project	No apparent difficulty with this action item							
<b>Action Item #34:</b> Update the aging parts of the air exchange system at the Town Office to circulate air and better diminish the possibility of infectious diseases.	<b>Affected Location</b> -Town Office	3	3	3	2	3	2	3	19
	<b>Type of Activity</b> -Prevention -Emergency Service Protection -Property Protection -Structural Project	<b>Political:</b> General political pushback <b>Economical:</b> Budget constraints							

## Chapter 9: Implementation Schedule for Prioritized Action Items

### A. PRIORITY METHODOLOGY

After reviewing the finalized STAPLEE numerical ratings, the planner and the team developed *Table 9.1, The Mitigation Action Plan*. To do this, the planner created four categories in which to place the potential mitigation action items.

#### CATEGORY A

Category A includes those items that are being done and will continue to be done in the future.

#### CATEGORY B

Category B includes those items under the direct control of town officials within the financial capability of the town using only town funding, those already being done or planned, and those that could generally be completed within one year.

#### CATEGORY C

Category C includes those items that the town does not have sole authority to act upon, those for which funding might be beyond the town's capability, and those generally taking 13-36 months to complete.

#### CATEGORY D

Category D includes those items that would take a significant funding effort, those that the town has little control over the final decision, and those that would take more than 37 months to complete.

Each potential mitigation action item was placed in one of these four categories. Then, those action items were prioritized within each category according to cost-benefit, time frame, and STAPLEE scores. Actual cost estimates were unavailable during the planning process. However, the team could agree on the cost-benefit for each proposed action item using the STAPLEE process and a Very Low Cost to High-Cost estimate (see the following page).

The following criteria were considered while ranking and prioritizing each action item:

- *Does the action reduce damage?*
- *Does the action contribute to community objectives?*
- *Does the action meet existing regulations?*
- *Does the action protect historic structures?*
- *Does the action keep in mind future development?*
- *Can the action be implemented quickly?*

The prioritization exercise helped the committee evaluate the new hazard mitigation action items they brainstormed throughout the planning process. While all actions would improve the town's hazard and wildfire responsiveness capability, funding availability will be a driving factor in determining what and when new mitigation action items are implemented.



## B. WHO, WHEN, HOW?

Once this was completed, the team developed an action plan to outline responsibilities, time frames, and methods for implementing each action item. The following questions were asked to develop a schedule for the identified mitigation action items.

**WHO?** Who will lead the implementation efforts? Who will put together funding requests and applications?

**WHEN?** When will these actions be implemented, and in what order?

**HOW?** How will the community fund these projects? How will the community implement these projects? What resources will be needed to implement these projects?

In addition to the prioritized mitigation action items, *Table 9.1, The Mitigation Action Plan*, includes the responsible party (WHO), how the project will be supported (HOW), and what the time frame is for implementation of the project (WHEN).

Once the plan is approved, the community will begin working on the action items listed in *Table 9.1, The Mitigation Action Plan* (see below and on the following pages). An estimation of completion for each action item is noted in the “Time Frame” column of Table 9.1. Some projects, including most training and education of residents on emergency and evacuation procedures, could be tied into the emergency operations plan and implemented through that planning effort.

### TABLE 9.1: THE MITIGATION ACTION PLAN

Table 9.1, *The Mitigation Action Plan*, beginning on the following page, includes problem statements expressed by the planning team. These action items are listed by priority and indicate if they were derived from other tables in this plan.

#### Key to the Estimated Cost

<b>Very Low Cost</b> .....	\$0-\$1,000 or staff time only
<b>Low Cost</b> .....	\$1,000-\$20,000
<b>Medium Cost</b> .....	\$20,000-\$100,000
<b>High Cost</b> .....	\$100,000 or more

#### Key to the Time Frame

<b>Life of Plan</b> .....	Starting on Plan adoption 2024-2029 (0-60 months)
<b>Short Term</b> .....	1 year 2024-2025 (0-12 months)
<b>Medium Term</b> .....	2 years starting in 2025 – 2027 (12 – 36 months)
<b>Long-term</b> .....	3 years starting in 2026 – 2029 (36 -60 months)

In the following table, “Final R/P” means final rate and priority. Items in green, such as (MU14), represent mitigation action items taken from Mitigation Ideas, A Resource for Reducing Risk to Natural Hazards, FEMA, January 2013; see *Appendix F: Potential Mitigation Ideas* for more information.

Mitigation Action Items are listed in order of priority.

Final R/P	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
A-1	<p><b>Problem Statement:</b> As trees become damaged and threaten structures and town roads, the Highway Department removes them. NH DOT does this for state roads along with NH Electric Coop and Eversource as needed. There is a need to continue to work to keep this hazard to a minimum.</p> <p><b>Action Item #1:</b> In addition to work done by and with local utility companies, monitor and maintain brush cutting, drainage system maintenance, and tree removal as part of a tree maintenance program. Create defensible space around power lines, oil and gas lines, and other infrastructure. Work to reduce the effects of the Emerald Ash Borer, high wind events, ice storms, wildfires, and other natural hazards by clearing dead vegetation and cutting the community's high grass and other fuel loads. (SW4, WF7, WF9 &amp; F14) (Tables 6.1 &amp; 7.1)</p>	High Wind Events, Wildfire, Severe Winter Weather-Ice Storms & Inland Flooding	Highway Department	Local	Life of the Plan	Low Cost
A-2	<p><b>Problem Statement:</b> The Bristol Highway Department does a good job cleaning and repairing drainage basins and culverts and has a written inventory of storm drains in the downtown area. Continued maintenance and upkeep of the community's stormwater plan and the culvert and drainage systems are important for the future.</p> <p><b>Action Item #2:</b> Maintain the community's stormwater plan, culvert, and drainage systems. Develop Access GIS through CAI. (F5)</p>	Inland Flooding	Highway Department	Local	Life of the Plan	Very Low Cost
A-3	<p><b>Problem Statement:</b> The town has continuously used public outreach to remind residents of the need for proper E911 signage. However, the town is only about 70% compliant with the proper E911 signage.</p> <p><b>Action Item #3:</b> Consider ways to get this signage more compliant so that emergency responders can better assist the public in their time of need. Use public outreach opportunities such as the Emergency Notices webpage or available social media to promote better compliance and develop other means of increasing compliance. The town could purchase and install signage, improve their ordinance and fine, or provide signs for residents to install themselves to promote compliance better. (MU14)</p>	All Hazards	Emergency Management Director	Local	Life of the Plan	Very Low Cost

Final R/P	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
A-4	<p><b>Problem Statement:</b> <i>Pressurized hydrants, dry hydrants, and drafting sites throughout Bristol provide water resources for firefighting. This maintenance of these hydrants needs to continue.</i></p> <p><b>Action Item #4:</b> Maintain the pressurized hydrants (Water &amp; Sewer), the dry hydrants, and other water resources (Fire Department) in the community to help mitigate the effects of structure fires and wildfires. Identify locations in town that would benefit from installing dry hydrants, drafting sites, cisterns, or fire ponds. Work with local landowners to gain access to available water resources to help mitigate the effects of wildfires. <b>(WF8) (Table 6.1)</b></p>	Wildfire & Conflagration	Water & Sewer Department & Fire Department	Local	Life of the Plan	Low Cost
A-5	<p><b>Problem Statement:</b> <i>Training of all responders is coordinated by the Fire Chief, Police Chief, and the EMD and includes the many aspects of emergency response. This training needs to continue.</i></p> <p><b>Action Item #5:</b> The Fire Chief, the Police Chief, and the EMD to provide ongoing training for all emergency responders. Training will include the many aspects of emergency response, including EMS, wildfire suppression, confined spaces, HazMat, active shooter, and terrorism. Training is done locally or through the Lakes Region Fire Mutual Aid and the State of New Hampshire at the NH Fire and Police Academies. <b>(Table 6.1) (Emergency Preparedness)</b></p>	All Hazards Wildfires, Conflagration, Hazardous Materials, Terrorism & Violence	Fire Chief, Police Chief & Emergency Management Director	Local & Grants	Life of the Plan	Low Cost
A-6	<p><b>Problem Statement:</b> <i>Although first responders, including firefighters, have received NIMS &amp; ICS training, not all of Bristol's town officials have.</i></p> <p><b>Action Item #6:</b> The Emergency Management Director (EMD) to encourage all town officials who may be required to respond to an emergency and any new emergency responders to take NIMS 700 (S-700) &amp; ICS (ISC100 &amp; ISC200). Additionally, the EMD should encourage key personnel to learn about and become adept with WEB-EOC.</p>	All Hazards	Emergency Management Director	Local	Life of the Plan	Very Low Cost

Final R/P	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
A-7	<p><b>Problem Statement:</b> The town's website has an emergency management tab on the Fire Department webpage with some emergency-related links. The town has continuously provided the residents with emergency preparedness and mitigation techniques; this practice is ongoing.</p> <p><b>Action Item #7:</b> Provide robust information on the emergency management tab and social media platforms to educate the public on hazard mitigation and preparedness measures. Include preparedness information such as shelter locations, evacuation routes, methods of emergency alerting, and 911 compliance. Also include mitigation strategies such as mitigation techniques for earthquakes, tornadoes, severe winter weather, lightning, and climate change. Provide information on infectious diseases, encourage homeowners to install carbon monoxide monitors and alarms, and monitor radon in their homes. Offer residents and business owners reminders to clear snow from roofs during high accumulation snow years. (MU14, SW7, WF11, D9, T3, EQ7, ET1, ET4, L2, HA3, WW5) (Tables 6.1 &amp; 7.1)</p>	All hazards including Severe Wind, Drought, Earthquake, Extreme Temperatures, Hail, Lightning, Severe Winter Weather, Tornado, Wildfire & Infectious Disease	Emergency Management Director & Department Heads & the Media Manager	Local	Life of the Plan	Very Low Cost
A-8	<p><b>Problem Statement:</b> CodeRED and CivicReady are excellent warning systems but only store resident landline phone numbers. Residents may not be aware that they can add cell numbers, emails, and unlisted numbers.</p> <p><b>Action Item #8:</b> Provide public outreach to encourage all residents to contact CodeRED and CivicReady to add cell numbers, unlisted numbers, and emails and to verify their information. Use the community website, a possible brochure, available social media platforms, local newsletters, or a sign-up at Town Meeting. (MU14) (Table 6.1)</p>	All Hazards	Emergency Management Director	Local	Life of the Plan	Very Low Cost
A-9	<p><b>Problem Statement:</b> Residents and Builders may not be aware of flood regulations and the availability of flood insurance through the NFIP. They also may not be aware of the risk of building in the floodplain and the steps they can take to reduce flooding.</p> <p><b>Action Item #9:</b> Advise the public about the local flood hazard, flood insurance, and flood protection measures by obtaining and keeping a supply of NFIP brochures in the Town Offices. When proposing new development or substantial improvements, give NFIP materials to homeowners and builders. Encourage property owners to purchase flood insurance, whether or not they are in the flood zone, and provide appropriate links to the NFIP and Ready.gov on an emergency webpage or available social media platforms. Through Public Outreach, educate homeowners regarding the risks of building in the flood zone and measures to reduce flooding. Actively work with residents and builders to ensure they comply with the town's Floodplain Ordinance. (F10, F22 &amp; F23) (Tables 6.1)</p>	Inland Flooding	Planning Board & Floodplain Administrator	Local	Life of the Plan	Very Low Cost

Final R/P	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
A-10	<p><b>Problem Statement:</b> Although the town does a great job using its Emergency Management webpage to promote preparedness, residents may not be aware of the steps they can take to reduce the fire risk at their homes.</p> <p><b>Action Item #10:</b> Post important information on the town's Emergency Management webpage and notices of red flag burning days. Obtain and have available Firewise® brochures to educate homeowners on methods to reduce fire risk around their homes (WF10) and provide a link to Firewise® on the emergency page of the town's website. Provide Firewise® brochures to those residents seeking burn permits (if not obtained online); advise residents of the importance of maintaining defensible space, the safe disposal of household waste, and the removal of dead or dry leaves, needles, twigs, and combustible materials from roofs, decks, eaves, porches, and yards. (WF12)</p>	Wildfire & Conflagration	Fire Chief	Local	Life of the Plan	Very Low Cost
A-11	<p><b>Problem Statement:</b> Residents may not be aware of the importance of maintaining their private roads to allow access to emergency responders and to prevent wildfires.</p> <p><b>Action Item #11:</b> To promote private mitigation efforts, provide public outreach to the citizens of Bristol on the importance of maintaining private roads to allow for safe access for fire apparatus into wildland-urban interface neighborhoods and properties. This education will help to ensure accessibility for emergency response and decrease the risk of wildfire. (MU16)</p>	Wildfire & Conflagration	Emergency Management Director, Planning Board, Land Use Department	Local	Life of the Plan	Very Low Cost
A-12	<p><b>Problem Statement:</b> The Bristol Subdivision, Zoning, and Site Plan Regulations have been recently updated and are in good shape. However, they should be reviewed when this plan is completed to integrate action items and mitigation ideas into future planning.</p> <p><b>Action Item #12:</b> Review the Bristol Subdivision, Zoning, and Site Plan Regulations to consider changes that will enhance mitigation efforts across the community. Update these planning mechanisms and integrate elements from this hazard mitigation plan where possible. (WF2, F1 &amp; MU6)</p>	All Hazards	Planning Board & Staff	Local	Life of the Plan	Very Low Cost
A-13	<p><b>Problem Statement:</b> Past hazard mitigation plans have been integrated into other planning mechanisms in Bristol. This hazard mitigation plan should be integrated with all other planning mechanisms in Bristol.</p> <p><b>Action Item #13:</b> Integrate the 2024 hazard mitigation plan with other documents in the future. (MU6) (Table 7.1)</p>	All Hazards	Emergency Management Director, Select Board, and other Department Heads	Local	Life of the Plan	Very Low Cost

Final R/P	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
A-14	<p><b>Problem Statement:</b> The Bristol Capital Improvement Program is a ten-year program that works excellently for the Town of Bristol. However, the public may not be aware of the CIP and how it helps the community.</p> <p><b>Action Item #14:</b> Educate the public about the CIP and how it helps the community. (MU6)</p>	All Hazards	Select Board, CIP Committee, Planning Board & other Department Heads	Local	Life of the Plan	Very Low Cost
B-1	<p><b>Problem Statement:</b> High-hazard dams in NH require the development of a Dam Emergency Action (Operations) Plan. Bristol has two high-hazard dams, the Newfound Lake Dam and the Ayers Island Dam. The EMD/Fire Chief has a copy of the Ayers Island Dam EAP but not the Newfound Lake Dam EAP (2004).</p> <p><b>Action Item #15:</b> Request a copy of the EAP for the Newfound Lake Dam. (F7)</p>	Inland Flooding	Emergency Management Director	Local	Short Term	Very Low Cost
B-2	<p><b>Problem Statement:</b> Bristol has emergency backup power at the Town Offices and the Police Station and partial generators at the middle and high schools; other key resources could benefit from permanent generators.</p> <p><b>Action Item #16:</b> Obtain and install permanent generators at the high school, the middle school, the Fire Station, the Highway Garage, and the Central Street Pump Station (upgrade) to improve the effectiveness of these facilities during a disaster. (MU13) (Tables 6.1 &amp; 7.1)</p> <p>Short Term: Highway Garage &amp; Central Street Pump Station Medium Term: New Public Safety Building &amp; High School Long Term: Middle School</p>	All Hazards	Emergency Management Director & Select Board	Local & Grants	Short Term, Medium Term, & Long Term	Medium Cost
B-3	<p><b>Problem Statement:</b> The Bristol Water &amp; Sewer Department has established a source and wellhead protection area. The wellhead protection plan should be reviewed to ensure compliance with current state wellhead regulations. Improvements to security should be made at the Fowler and Danforth sites.</p> <p><b>Action Item #17:</b> Improve water protection and security at the Fowler and Danforth wellhead sites. Review the wellhead protection plan to ensure compliance with state regulations. (MU13) (Tables 6.1 &amp; 7.1)</p>	Known & Emerging Contaminants & Aging Infrastructure	Water & Sewer Department & Fire Department	Local & Grants	Short Term	Low Cost

Final R/P	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
B-4	<p><b>Problem Statement:</b> The sewer pumping station for Central Street to Summer Street and the main water line in this area need replacement. (Reference the Capital Improvement Plan, a CDBG grant, and other funding.)</p> <p><b>Action Item #18:</b> Replace the aging pumping station and 125' of the main water line for the Central Street to the Summer Street area. <b>(MU13)</b></p>	All Hazards	Sewer & Water Department	Local & Grants	Short Term	High Cost
B-5	<p><b>Problem Statement:</b> The culvert on Hemlock Brook Road is undersized, metal, and aging, creating flooding issues during heavy rain events.</p> <p><b>Action Item #19:</b> Replace the 20' metal culvert with a 30-35' plastic culvert to alleviate flooding and improve the stormwater flow on Hemlock Brook Road. <b>(F13)</b></p>	Inland Flooding	Highway Department	Local & Grants	Short Term	Low Cost
B-6	<p><b>Problem Statement:</b> This plan, the Bristol Hazard Mitigation Plan Update, 2024, will need to be approved as a Community Wildfire Protection Plan (CWPP).</p> <p><b>Action Item #20:</b> Obtain approval of this hazard mitigation plan as a Community Wildfire Protection Plan (CWPP) to enable potential assistance from the state and federal governments for future wildfire mitigation projects. <b>(WF2)</b></p>	Wildfire & Conflagration	Mapping & Planning Solutions	Local	Short Term	Very Low Cost
B-7	<p><b>Problem Statement:</b> The Bristol Hazard Mitigation Plan Update 2024 plan will require an annual review and a complete update in five years.</p> <p><b>Action Item #21:</b> Provide an annual review of the Bristol Hazard Mitigation Plan Update 2024, including the status of the "Action Items" listed in this plan to encourage completion. Obtain approval from the local elected body annually and provide a complete plan update in five years. <b>(MU11) (Tables 6.1 &amp; 7.1)</b></p>	All Hazards	Emergency Management Director	Local	Short Term & Long Term	Very Low Cost
C-1	<p><b>Problem Statement:</b> A short section of drainage improvement on Fourth Street has been done; however, the remaining sections still need drainage improvement.</p> <p><b>Action Item #22:</b> Complete the storm drain system project on the remaining sections of Fourth Street; the aging galvanized piping will be upgraded to improve stormwater flow. <b>(F13) (Table 7.1)</b></p>	Inland Flooding	Highway Department	Local & Grants	Medium Term	Medium Cost



Final R/P	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
C-2	<p><b>Problem Statement:</b> The storm drains on Timber Lane need to be installed to contain the stormwater run-off in the ditch lines.</p> <p><b>Action Item #23:</b> Install storm drains on Timber Lane to improve stormwater flow. (F13) (Table 7.1)</p>	Inland Flooding	Highway Department	Local & Grants	Medium Term	Medium Cost
C-3	<p><b>Problem Statement:</b> There are erosion issues on the Smith River and Smith River Road.</p> <p><b>Action Item #24:</b> To alleviate the erosion issues on Smith River Road, install rip rap or vegetation planting. (ER5)</p>	Landslide & Erosion	Highway Department	Local	Medium Term	High Cost
C-4	<p><b>Problem Statement:</b> The protection of the dam on Lake Street is essential for the infrastructure downstream. Working with the dam owner and HSEM to develop a grant to fix the dam is important.</p> <p><b>Action Item #25:</b> Work with the owner of the Lake Street dam and HSEM to develop a plan and funding solution to repair the dam to diminish the risk to infrastructure downstream. (MU13)</p>	Dam Failure	Emergency Management Director, Select Board & HSEM	Local & Grants	Medium Term	Very Low Cost
C-5	<p><b>Action Item #26:</b> Update the Bristol Emergency Operations Plan to coincide with the new state 18-ESF format. Include an analysis of the impact of natural hazards on Critical Infrastructure &amp; Key Resources that may be needed during an emergency. The EOP should include an EOC Call Alert List, a detailed Resource Inventory List, and Player Packets. (MU6)</p>	All Hazards	Emergency Management Director	Local & Grants	Medium Term	Low Cost
C-6	<p><b>Problem Statement:</b> Lightning has struck town buildings in the past and has caused damage to electronics and power outages.</p> <p><b>Action Item #27:</b> With the assistance of qualified personnel, inspect all town facilities to determine if an investment in lightning rods would be beneficial. Install lightning rods as recommended. (L1)</p>	Lightning	Emergency Management Director	Local	Medium Term	Low Cost
C-7	<p><b>Problem Statement:</b> The curve on NH Route 104, Summer Street, does not allow for sidewalks and safe pedestrian passage.</p> <p><b>Action Item #28:</b> Although this is on the state's 10-year plan, lobby the state to prioritize the project to lessen the curve on NH Route 104, Summer Street, to allow for sidewalks and pedestrians.</p>	Landslide & Erosion	Select Board	Local	Medium Term	Very Low Cost

Final R/P	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
C-8	<p><b>Problem Statement:</b> The town's emergency radio capabilities do not reach the entire community. Communications "dead spots" remain.</p> <p><b>Action Item #29:</b> Work with local contractors to assist with installing repeaters to improve townwide radio communications. (MU13) (Tables 6.1 &amp; 7.1)</p>	All Hazards	Emergency Management Director	Local	Medium Term	Low Cost
C-9	<p><b>Problem Statement:</b> The Bristol Master Plan is updated regularly. Sections of the plan are worked on and adopted one at a time. The Master Plan does not have a natural hazards section.</p> <p><b>Action Item #30:</b> Review this plan, the Bristol Hazard Mitigation Plan Update 2024, whenever working on the Master Plan, and consider incorporating a discussion on climate change, natural hazards, and mitigation action items from this plan. (MU6)</p>	All Hazards	Planning Board & Staff	Local	Medium Term	Very Low Cost
C-10	<p><b>Problem Statement:</b> Severe Winter Weather can cause snow to drift into the road on Shore Drive, creating hazardous conditions for drivers.</p> <p><b>Action Item #31:</b> Install snow fencing on Shore Drive to strategically alleviate the snow drifting on the road. (WW4)</p>	Severe Winter Weather	Highway Department	Local	Medium Term	Low Cost
C-11	<p><b>Problem Statement:</b> Traffic speed and driver awareness are concerns on Route 104.</p> <p><b>Action Item #32:</b> Lobby the state to install rumble strips on Route 104 to alleviate high traffic and increase driver awareness.</p>	Transport Accidents	Police Department & Select Board	Local	Medium Term	Low Cost
D-1	<p><b>Problem Statement:</b> The Bristol Highway Department has established a short and long-term bridge maintenance and replacement schedule. There is one red-listed town-owned bridge, the Danforth Brook Road bridge.</p> <p><b>Action Item #33:</b> Repair and upgrade the single town-owned red-listed Danforth Brook Road bridge. Start a CIP fund for this bridge while waiting for the state bridge aid. (MU13) Table 6.1)</p>	Aging Infrastructure	Highway Department	Local & Grants	Long Term	High Cost
D-2	<p><b>Problem Statement:</b> Part of the air exchange system at the Town Office is aging and does not effectively circulate air.</p> <p><b>Action Item #34:</b> Update the aging parts of the air exchange system at the Town Office to circulate air and better diminish the possibility of infectious diseases.</p>	Aging Infrastructure	Select Board	Local	Long Term	Medium Cost

## **Chapter 10: Adopting, Monitoring, Evaluating, and Updating the Plan**

### ***A. HAZARD MITIGATION PLAN MONITORING, EVALUATION, AND UPDATES***

A good mitigation plan must allow for updates where and when necessary. It will incorporate periodic monitoring and evaluation mechanisms to review successes and failures or simple updates.

The Bristol Hazard Mitigation Plan Update 2024 is considered a work in progress. Three situations will prompt revisiting this plan:

- First, at minimum, it will be reviewed annually or after a disaster to assess whether the existing and suggested mitigation action items were successful. This review will assess the Plan's effectiveness, accuracy, and completeness in achieving its stated purpose and goals. The review will also address recommended improvements to the Plan as contained in the FEMA plan review checklist and any weaknesses the Town identified that the Plan did not adequately address.
- Second, the Plan will be thoroughly updated every five years. This review will assess the Plan in the same manner that it is assessed annually, but it will undergo a thorough update based on changing conditions, development, and climate change. The five-year update will use the same planning process used to develop this Plan.
- Third, if the Town adopts any significant modifications to its land-use planning documents, the jurisdiction will conduct a plan review and make changes as applicable.

The Emergency Management Director is responsible for initiating plan reviews and will consult with the hazard mitigation planning team identified in this plan. In keeping with the adoption process, the public and stakeholders will have the opportunity for future involvement as they will be invited to participate in future reviews or updates. Before any review or update, public notice will be given through press releases in local papers, listservs, or social media platforms; public notice will ensure that all comments and revisions from the public and stakeholders will be considered.

Review forms for post-hazard or annual reviews are available in Chapter 11 of this plan. After this plan's approval, the town is encouraged to use these forms to document changes and accomplishments. Forms are available for years 1-4, expecting the five-year annual update to be in process during the fifth year.

### ***B. INTEGRATION WITH OTHER PLANS***

This plan will only enhance mitigation if balanced with all other town plans. Bristol completed its last hazard mitigation plan in 2016 and has completed some projects from that plan. Examples in Table 7.1 include completing the road drainage project on High Street, integrating and cross-referencing the hazard mitigation plan with other town planning and operational mechanisms, and providing ongoing fire and flood education. As a result, the town was able to integrate these actions into other town activities, budgets, plans, and mechanisms.

The Town of Bristol has agreed to incorporate a Community Wildfire Protection Plan (CWPP) into this planning document, the Bristol Hazard Mitigation Plan Update 2024. As part of this plan, the town will adopt the CWPP, which will be approved by the Department of Natural and Cultural Resources (DNCR).

The town will incorporate elements from this plan into the following documents:

### BRISTOL MASTER PLAN

Traditionally, Master Plans are updated every 5 to 10 years; another method of Master Plan maintenance is to update one chapter or section of the plan annually. Bristol updates sections of the Master Plan each year before adopting them. The last update of the Master Plan did not include a Natural Hazards section or integrate elements of the 2016 HMP. Future reviews and updates of the Master Plan will consider integrating concepts, ideas, and action items from this hazard mitigation plan **(Action Item #30)**.

### BRISTOL EMERGENCY OPERATIONS PLAN 2013 (EOP)

The EOP is designed to allow the town to respond more effectively to disasters and mitigate the risk to people and property. EOPs are generally reviewed after each hazardous event and updated on a five-year basis. The last Bristol EOP was completed in 2013. An update for the Emergency Operations Plan is expected to be completed after completing this hazard mitigation plan. The new EOP will incorporate elements from this hazard mitigation plan **(Action Items #26)**.

### TOWN BUDGET, CAPITAL IMPROVEMENT PLAN & CAPITAL RESERVE FUNDS

The Town of Bristol maintains a Capital Improvement Plan (CIP) and Capital Reserve Funds (CRFs) for major expenditures. The CRFs and the CIP are adjusted annually in coordination with the Select Board and other town department heads and committees at budget time. The budget is then voted on at the annual Town Meeting. During the annual budget planning process, specific mitigation actions identified in this plan that require town fiscal support will be reviewed for incorporation into the budget. **Refer to those Action Items that require local money or match money (multiple Action Items) or address the CIP and CRF.**

### THE BRISTOL ORDINANCES & SUBDIVISION REGULATIONS

As time goes by and the needs of the town change, the town's planning mechanisms will be reviewed and updated. In coordination with these actions, the Planning Board will review this plan and incorporate any changes that help mitigate the community's susceptibility to the dangers of natural, technical, or human-caused disasters. An example of this integration can be seen in this plan's mitigation action item **(Action Item #12)**.

The local government will modify other plans and actions to incorporate hazard or wildfire issues. The Select Board ensures this process will be followed in the future.

## **C. PLAN APPROVAL & ADOPTION**

This plan was completed in a series of open meetings beginning May 26, 2022. The plan was presented to the town for review, submitted to HSEM/FEMA for Conditional Approval (*APA, Approved Pending Adoption*), formally adopted by the Select Board, and resubmitted to HSEM/FEMA for Final Approval. Once Final Approval from HSEM/FEMA was met, copies of the plan were distributed to the town, HESM, FEMA, DNCR, and the USDA-FS; the plan was then distributed as these entities saw fit. Copies of the plan remain on file at Mapping and Planning Solutions (MAPS) in digital format.

## Chapter 11: Signed Community Documents and Approval Letters

### A. PLANNING SCOPE OF WORK & AGREEMENT

#### PLANNING SCOPE OF WORK & AGREEMENT

#### BRISTOL HAZARD MITIGATION PLAN UPDATE



##### PARTIES TO THE AGREEMENT

Mapping and Planning Solutions  
Town of Bristol, NH

Current Plan Expiration: 6/23/2021  
PDM19 Grant Expiration: 5/29/2023

This agreement between the Town of Bristol (the town) or its official designee and Mapping and Planning Solutions (MAPS) outlines the town's desire to engage the services of MAPS to assist in planning and technical services to produce the Bristol Hazard Mitigation Plan Update (the plan).

##### **Agreement**

This agreement outlines the responsibilities that will ensure that the plan is developed in a manner that involves town members and local, federal and state emergency responders and organizations. The agreement identifies the work to be done by detailing the specific tasks, schedules and finished products resulting from the planning process.

The goal of this agreement is that the plan and planning process be consistent with town policies and that it accurately reflects the values and individuality of the town; this is accomplished by forming a working relationship between the town's citizens, the planning team and MAPS.

The plan created as a result of this agreement will be presented to the town for adoption once conditional approval (also known as Approved Pending Adoption or APA) is received from NH Homeland Security (HSEM) on behalf of FEMA. When adopted, the plan guides the town, commissions and departments; adopted plans do not include any financial commitments by the town. Additionally, all adopted plans should address mitigation strategies for reducing the risk of natural, technological, human-caused and wildfire disasters on life and property and written so that they may be integrated within other town planning initiatives.

##### **Scope of Work**

**MAPS - Responsibilities include, but are not limited to, the following:**

- MAPS will collect data that is necessary to complete the plan and meet the requirements of the FEMA Plan Review Tool by working with the planning team (the team) and taking public input.
- With the team's assistance, MAPS will coordinate and facilitate six to seven two-hour meetings and provide any materials, handouts and maps necessary to provide a full understanding of each step in the planning process. These meetings may be held online or in-person, depending on COVID-19 or other unforeseen conditions at the time.
- MAPS will assist the team in developing goals, objectives and action items and will clearly define the processes needed for plan monitoring, educating the public, and integrating the plan with other town plans and activities.
- MAPS will coordinate and collaborate with other federal, state and local agencies throughout the process.
- MAPS will explain and delineate the town's Wildland Urban Interface (WUI) and working with the team, will establish a list of potential hazards and analyze the risk severity of each.
- MAPS will author, edit and prepare the plan for review by the team before submitting the plan to HSEM for conditional approval. Upon conditional approval by HSEM, MAPS will provide the planning team with the necessary documents for plan adoption by the Bristol Select Board and continue to work with the town until final approval and distribution of the plan are complete.



- At its office, MAPS shall provide all supplies and space necessary to complete the Bristol Hazard Mitigation Plan.
- Once final documents are received, the plan will be printed and distributed by MAPS. The final documents include the HSEM formal approval email, the FEMA formal letter of approval, and the approved Community Wildfire Protection Plan (CWPP) documents. MAPS will provide the town one hard copy of the plan containing all signed documents and approvals and CDs containing these same documents in digital form for distribution by the town as it sees fit. Additional CDs may be requested at no additional cost. Copies of the plan will be distributed by MAPS to collaborating agencies, including, but not limited to, HSEM, FEMA, the Department of Natural and Cultural Resources (DNCR) and the US Forest Service.
- MAPS will provide all "Quarterly Reports" required by HSEM for this project's duration. These quarterly reports will be done online and a copy of the report will be forwarded to the primary contact for Bristol.
- MAPS will provide annual plan maintenance reminders leading up to the next five-year plan update, as long as MAPS is in operation.
- Understanding that emergencies can and do happen, MAPS will make every effort to proceed with meetings. However, the town shall ensure that attendance at any given meeting is adequate to proceed with the meeting. Mapping and Planning Solutions reserves the right to invoice the town for travel, meal expenses and staff costs that are incurred when meeting attendance is inadequate.

***The Town - Responsibilities include, but are not limited to the following:***

- The town shall ensure that the planning team includes members who can support the planning process by identifying available town resources, including people who can access and provide pertinent data. The planning team should include, but not be limited to, such town members as the local Emergency Management Director, the Fire, Ambulance and Police Chiefs, members of the Select Board and the Planning Board, the Public Works Director or Road Agent, representatives from relevant federal and state organizations, other local officials, property owners and relevant businesses or organizations.
- The town shall determine a principal contact to work with MAPS. This contact shall assist with recruiting participants for planning meetings, including the development of mailing lists when and if necessary, distribution of handouts and placement of meeting announcements. This contact shall also assist MAPS with organizing public meetings to develop the plan and offer assistance to MAPS in developing the work program, which will produce the plan.
- The town shall gain the support of stakeholders for the recommendations found within the plan.
- The town shall provide public access for all meetings and provide public notice at the start of the planning process and at the time of adoption, as required by FEMA and the Code of Federal Regulations (CFRs).
- The proposed plan shall be submitted to the Select Board for consideration and adoption.
- After adoption and final approval from HSEM is received, the town will:
  - *Distribute copies of the plan as it sees fit throughout the local community.*
  - *Develop a team to monitor and work toward plan implementation.*
  - *Publicize the plan to the community and ensure citizen awareness.*
  - *Encourage the integration of priority projects into the town's Capital Improvement Plan (if available).*
  - *Integrate mitigation strategies and priorities from the plan into other town planning documents.*

## Terms

- **Fees & Payment Schedule:** The contract price is limited to \$7,500.00; an invoice will be sent to the town for each payment as outlined below.

▪ 1. Initial payment upon receipt of the first invoice, one week before the first meeting .....	\$3,500.00
▪ 2. Second payment upon plan submittal to HSEM for APA (Approve Pending Adoption) .....	\$3,700.00
▪ 3. Final payment upon project completion and receipt of final hard-copy of the plan .....	<u>\$300.00</u>
Total Fees .....	\$7,500.00

- **Payment Procedures:** The payment procedure is as follows:

- MAPS will invoice the town according to the schedule above
- The town will pay MAPS
- The town will forward the MAPS invoice along with an invoice from the town on letterhead to HSEM
- HSEM will reimburse the town for the monies paid to MAPS

All payments to MAPS are fully reimbursable to the town by Homeland Security & Emergency Management, provided prescribed match amounts have been met.

- **Required Matching Funds:** This project's total cost under PDM19 is \$10,000, with a federal share of \$7,500 and a matching amount of \$2,500 (75%/25% split). Matching funds are the responsibility of the Town of Bristol, not MAPS. The town will be responsible for providing and documenting all resources used to meet the FEMA required match. However, Mapping and Planning Solutions will assist the town with attendance tracking by asking meeting attendees to sign in at all meetings and to log any time spent outside of the meetings working on this project. MAPS will provide the town with final attendance records in spreadsheet form at the project's end for the town to use in its match fulfillment.

- **Project Period:** This project shall begin upon grant approval from HSEM and signing this agreement with MAPS and continue through a date yet to be determined or whenever the planning process is complete. The project period may be extended by mutual written agreement between the town, MAPS and Homeland Security if required. The actual project end date depends on timely adoptions and approvals, which may be outside of the control of MAPS and the town.

The grant provided for this project is funded through PDM19. Per the grant agreement between the town and HSEM, all work must be completed by May 29, 2023. It is expected that this project will be completed well before the grant expiration date of May 29, 2023.

- **Ownership of Material:** The town shall own all maps, reports, documents and other materials produced during the project period; each party may keep file copies of any generated work. MAPS shall have the right to use work products collected during the planning process; however, MAPS shall not use any data in such a way as to reveal personal or public information about individuals or groups, which could reasonably be considered confidential.

- **Termination:** This agreement may be terminated if both parties agree in writing. In the event of termination, MAPS shall forward all information prepared to date to the town. MAPS shall be entitled to recover its costs for any work that was completed.

- **Limit of Liability:** MAPS agrees to perform all work diligently and efficiently according to the terms of this agreement. MAPS' responsibilities under this agreement depend upon the cooperation of the Town of Bristol. MAPS and its employees, if any, shall not be liable for opinions rendered, advice, or errors resulting from the quality of data that is supplied. Adoption of the plan by the town and final approval of the plan by HSEM and FEMA relieve Mapping and Planning Solutions of content liability. MAPS carries general liability insurance.



Town of Bristol, NH & Mapping and Planning Solutions  
Hazard Mitigation Plan Update, PDM19, HMP-Level2, Scope/Agreement  
Page 4

- **Amendments:** Changes, alterations, or additions to this agreement may be made if agreed to in writing between both the Town of Bristol and Mapping and Planning Solutions.
- **About Mapping and Planning Solutions:** Mapping and Planning Solutions provides hazard mitigation and emergency operations planning throughout New Hampshire. Mapping and Planning Solutions has developed more than 80 Hazard Mitigation Plans, more than 75 Emergency Operations Plans and has completed the following FEMA courses in emergency planning and operations:
  - Introduction to Incident Command System, IS-100.a
  - ICS Single Resources and Initial Action Incidents, IS-200.a
  - National Incident Management System (NIMS) An Introduction, IS-700.a
  - National Response Framework, An Introduction, IS 800.b
  - Emergency Planning, IS-235
  - Homeland Security Exercise & Evaluation Program (HSEEP)
  - IS-547.a – Introduction to Continuity Operations
  - IS-546.a – Continuity of Operations (COOP) Awareness Course
  - G-318; Preparing & Review Hazard Mitigation Plans
  - Climate Change Adaptation Planning, AWR-347
  - ALICE; School Shooting Workshop, Littleton High School
  - L0550 Continuity Planners Workshop (2320EM1216)
- **Contacts:**

**For Mapping & Planning Solutions**

June Garneau  
Mapping and Planning Solutions  
105 Union Street  
Whitefield, NH 03598  
jgarneau@mappingandplanning.com  
(603) 837-7122; (603) 991-9664 (cell)

**For the town**

Benjamin LaRoche  
Fire Chief & EMD  
Bristol Fire Department  
85 Lake Street  
Bristol, NH 03222  
(603) 744-2632  
blaroche@townofbristolnh.org

SIGNATURES BELOW INDICATE ACCEPTANCE OF AND AGREEMENT TO DETAILS OUTLINED IN THIS AGREEMENT

**FOR THE TOWN OF BRISTOL, NH**



Signature

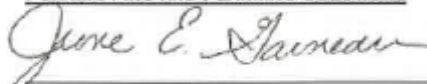
Benjamin LaRoche, Fire Chief/EMD

Printed Name/Title

11/15/2021

Date

**FOR MAPPING AND PLANNING SOLUTIONS**




Signature

June Garneau, Owner  
December 28, 2020


*Signatures are scanned facsimiles; original signatures are on file.*


**B. APPROVED PENDING ADOPTION (APA) FROM FEMA**

**HMP Approvable Pending Adoption (APA) Notice: Bristol, ...**

 Neiderbach, Josiah <josiah.n  
 To blaroche@bristolnh.gov;  
 townadmin@bristolnh.gov  
 Cc Bogdan, Kerry;  
 jgarneau@mappingandplanning.com; **+5 others**

Thu 1:56 PM

 This message was sent with High importance.

 Bristol NH APA Review.docx 91 KB ▾

Reference: Adoption Required to Finish Local Mitigation Plan Process

Dear Officials:

The Risk Analysis Branch of the FEMA Region 1 Mitigation Division has determined the *Bristol, NH Hazard Mitigation Plan Update 2024* meets all applicable FEMA Mitigation Planning requirements (Local Mitigation Planning Policy Guide, effective April 19, 2023), except its adoption by: Town of Bristol, NH.

**This status is "Approvable Pending Adoption" (APA). Plan adoption is required to receive formal FEMA approval.**

Local governments, including special districts, with a plan status of "Approvable Pending Adoption" are not eligible for FEMA mitigation grant programs with a mitigation plan requirement.

The next step in the approval process is to formally adopt the mitigation plan and send a resolution or adoption documentation in accordance with Element F1 of the [Local Mitigation Planning Policy Guide](#) on pages 31-32, to the State for submission to FEMA. A sample adoption resolution can also be found in Appendix B of the Policy Guide.

**It is critical for the jurisdiction to adopt the plan as soon as possible.** Jurisdictions that adopt the plan more than one year after APA status has been issued must either:

- Validate that their information in the plan remains current with respect to both the risk assessment (no recent hazard events, no changes in development) and their mitigation strategy (no changes necessary); or
- Make the necessary updates before submitting the adoption resolution to FEMA.

An approved local mitigation plan, including adoption by the local government, is one of the conditions for applying for and/or receiving FEMA mitigation grants from the following programs:

- Building Resilient Infrastructure and Communities (BRIC)
- Flood Mitigation Assistance (FMA)
- Hazard Mitigation Grant Program (HMGP)
- HMGP Post-Fire
- If applicable, High Hazard Potential Dams Grant Program (HHPD)

If a plan does not meet the HHPD requirements, then the jurisdiction is not eligible for assistance from the HHPD Grant Program. If any jurisdiction with HHPDs is interested in this assistance, they should contact the FEMA Regional Mitigation Planner listed below to learn more about how to include all dam risks in the plan, or at least their portion of the plan.

We look forward to receiving the adoption resolution/documentation soon and discussing options for implementing this mitigation plan. If we can assist in any way, please contact Jay Neiderbach at 202-285-7769 and [josiah.neiderbach@fema.dhs.gov](mailto:josiah.neiderbach@fema.dhs.gov).

Sincerely,

Jay

**Josiah (Jay) Neiderbach**, Mitigation Planner  
 Risk Analysis Branch | Mitigation Division | DHS / FEMA, Region 1  
 Mt. 202.285.7769 E: [josiah.neiderbach@fema.dhs.gov](mailto:josiah.neiderbach@fema.dhs.gov)

Attachment: FEMA Local Mitigation Plan Review Tool

**Signatures are scanned facsimiles; original signatures are on file.**

***C. FORMAL APPROVAL LETTER FROM FEMA***

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INSERTION OF FINAL APPROVAL LETTER

***Signatures are scanned facsimiles; original signatures are on file.***

***D SIGNED CERTIFICATE OF ADOPTION***

**CERTIFICATE OF ADOPTION**

**BRISTOL, NH**

**SELECT BOARD**

**A RESOLUTION ADOPTING THE BRISTOL, NH HAZARD MITIGATION PLAN UPDATE 2024**

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

WHEREAS, the Town of Bristol has received Approved Pending Adoption (APA) status from the Federal Emergency Management Agency (FEMA) for its Hazard Mitigation Plan Update 2024 under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held between May 26, 2022, and January 5, 2023, regarding the development and review of the Hazard Mitigation Plan Update 2024 and

WHEREAS, the plan specifically addresses hazard mitigation strategies and plan maintenance procedures for the Town of Bristol; and

WHEREAS, the plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the Town of Bristol 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 Bristol eligible for funding to alleviate the impacts of future hazards; now, therefore, be it

RESOLVED by the Select Board:

1. The plan is hereby adopted as an official plan of the Town of Bristol;
2. The respective officials identified in the mitigation action items of the plan are hereby directed to pursue the implementation of the recommended actions assigned to them;

**Bristol, Hazard Mitigation Plan Update Certificate of Adoption, page two**

1. Future revisions and plan maintenance required by 44 CFR 201.6 and FEMA are hereby adopted as a part of this resolution for five (5) years from the date of this resolution;
2. The Emergency Management Director shall present an annual report on the progress of the plan's action items to the Select Board.

Adopted this day, the \_\_\_\_\_ of \_\_\_\_\_, 2024

**Select Board Chair**

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Print Name

**Member of the Select Board**

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Print Name

**Member of the Select Board**

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Print Name

**Select Boar Vice-Chair**

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Print Name

**Emergency Management Director**

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Print Name

**Emergency Management Director**

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Print Name

**IN WITNESS WHEREOF**, the undersigned has affixed their signature and the corporate seal of the Town of Bristol on this day, \_\_\_\_\_, 2024

\_\_\_\_\_  
Notary

\_\_\_\_\_  
Expiration

\_\_\_\_\_  
Dates

***Signatures are scanned facsimiles; original signatures are on file.***

***E. CWPP APPROVAL LETTER FROM DNCR***

**Bristol, NH  
A Resolution Approving the  
Bristol NH, Hazard Mitigation Plan Update 2024  
As a Community Wildfire Protection Plan**

Several public meetings and committee meetings were held between May 26, 2022, and January 5, 2023, regarding the development and review of the Bristol Hazard Mitigation Plan Update 2024. The Bristol Hazard Mitigation Plan Update 2024 contains potential future projects to mitigate hazard and wildfire damage in the Town of Bristol.

The Fire Chief/Emergency Management Director, along with the Select Board, requests that this plan be accepted by the Department of Natural and Cultural Resources (DNCR) as a Community Wildfire Protection Plan, having adhered to the requirements of said plan.

The Fire Chief/Emergency Management Director and the Select Board approve the Bristol Hazard Mitigation Plan Update 2024 and understand that with approval by DNCR, this plan will also serve as a Community Wildfire Protection Plan.

**For the Town of Bristol**

APPROVED and SIGNED this day, \_\_\_\_\_, 2024.

\_\_\_\_\_  
Chairman of the Select Board

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Fire Chief/Emergency Management Director

\_\_\_\_\_  
Printed Name

**For the Department of Natural & Cultural Resources (DNCR)**

APPROVED and SIGNED this day, \_\_\_\_\_, 2024.

\_\_\_\_\_  
Forest Ranger – NH Division of Forest and Lands, DNCR

APPROVED and SIGNED this day, \_\_\_\_\_, 2024.

\_\_\_\_\_  
Steve Sherman, Chief, Forest Protection Bureau – NH Division of Forests & Lands, DNCR

***Signatures are scanned facsimiles; original signatures are on file.***

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**F. ANNUAL OR POST HAZARD REVIEW FORMS**

**YEAR ONE - Annual or Post Hazard Review Form**

CHECK ALL THAT APPLY

- ☐ Annual Review - **Year One:** \_\_\_\_\_ (Date)
- ☐ Annual Review – Post Hazardous Event: \_\_\_\_\_ (Event/Date)
- ☐ Annual Review – Post Hazardous Event: \_\_\_\_\_ (Event/Date)

After inviting the public and stakeholders to hearings, the town's governing body and the designated Emergency Management Director shall execute this page annually.

Bristol, NH  
Hazard Mitigation Plan Update

REVIEWED AND APPROVED

DATE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

PRINTED NAME: \_\_\_\_\_

Emergency Management Director

CONCURRENCE OF APPROVAL

SIGNATURE: \_\_\_\_\_

PRINTED NAME: \_\_\_\_\_

Chairman of the Select Board

Changes and notes regarding the 2024 Hazard Mitigation Plan Update

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**Please use the reverse side for additional notes** 

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YEAR TWO - Annual or Post Hazard Review Form

CHECK ALL THAT APPLY

☐ Annual Review - **Year Two**: \_\_\_\_\_ (Date)

☐ Annual Review – Post Hazardous Event: \_\_\_\_\_ (Event/Date)

☐ Annual Review – Post Hazardous Event: \_\_\_\_\_ (Event/Date)

After inviting the public and stakeholders to hearings, the town's governing body and the designated Emergency Management Director shall execute this page annually.

Bristol, NH  
Hazard Mitigation Plan Update

REVIEWED AND APPROVED

DATE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

PRINTED NAME: \_\_\_\_\_

Emergency Management Director

CONCURRENCE OF APPROVAL

SIGNATURE: \_\_\_\_\_

PRINTED NAME: \_\_\_\_\_

Chairman of the Select Board

Changes and notes regarding the 2024 Hazard Mitigation Plan Update

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YEAR THREE - Annual or Post Hazard Review Form

CHECK ALL THAT APPLY

☐ Annual Review - **Year Three:** \_\_\_\_\_ (Date)

☐ Annual Review – Post Hazardous Event: \_\_\_\_\_ (Event/Date)

☐ Annual Review – Post Hazardous Event: \_\_\_\_\_ (Event/Date)

After inviting the public and stakeholders to hearings, the town's governing body and the designated Emergency Management Director shall execute this page annually.

Bristol, NH  
Hazard Mitigation Plan Update

REVIEWED AND APPROVED

DATE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

PRINTED NAME: \_\_\_\_\_

Emergency Management Director

CONCURRENCE OF APPROVAL

SIGNATURE: \_\_\_\_\_

PRINTED NAME: \_\_\_\_\_

Chairman of the Select Board

Changes and notes regarding the 2024 Hazard Mitigation Plan Update

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**YEAR FOUR - Annual or Post Hazard Review Form**

CHECK ALL THAT APPLY

☐ Annual Review - **Year Four**: \_\_\_\_\_ (Date)

☐ Annual Review – Post Hazardous Event: \_\_\_\_\_ (Event/Date)

☐ Annual Review – Post Hazardous Event: \_\_\_\_\_ (Event/Date)

After inviting the public and stakeholders to hearings, the town's governing body and the designated Emergency Management Director shall execute this page annually.

Bristol, NH  
Hazard Mitigation Plan Update

REVIEWED AND APPROVED

DATE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

PRINTED NAME: \_\_\_\_\_

Emergency Management Director

CONCURRENCE OF APPROVAL

SIGNATURE: \_\_\_\_\_

PRINTED NAME: \_\_\_\_\_

Chairman of the Select Board

Changes and notes regarding the 2024 Hazard Mitigation Plan Update

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*Please use the reverse side for additional notes* 



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## Chapter 12: Appendices

- Appendix A: Bibliography
- Appendix B: Technical and Financial Assistance for Hazard Mitigation
  - *Hazard Mitigation Grant Program (HMGP)*
  - *Hazard Mitigation Grant Program Post Fire (HMGMP-Post Fire)*
  - *Flood Mitigation Assistance (FMA)*
  - *Building Resilient Infrastructure and Communities (BRIC)*
  - *Pre-Disaster Mitigation (PDM)*
- Appendix C: The Extent of Hazards
- Appendix D: Major Disaster & Emergency Declarations
- Appendix E: Acronyms
- Appendix F: Potential Mitigation Ideas

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## **APPENDIX A: BIBLIOGRAPHY**

### **Documents**

- **Local Hazard Mitigation Planning Police Guide**, FEMA, April 19, 2023
- **Mitigation Ideas, A Resource for Reducing Risk to Natural Hazards**, FEMA, January 2013
- **Hazard Mitigation Unified Guidance**, FEMA, July 12, 2013
- **Hazard Mitigation Assistance Guidance**, FEMA, February 27, 2015
- **Hazards Mitigation Plans**
  - Bristol Hazard Mitigation Plan, 2016
  - New Hampton Hazard Mitigation Plan, 2023
  - Woodstock Hazard Mitigation Plan, 2021
  - Bethlehem Hazard Mitigation Plan, 2021
- **NH State Multi-Hazard Mitigation Plan**, 2018
  - [https://prd.blogs.nh.gov/dos/hsem/wp-content/uploads/2015/11/State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018\\_FINAL.pdf](https://prd.blogs.nh.gov/dos/hsem/wp-content/uploads/2015/11/State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018_FINAL.pdf)
- **NH Division of Forests and Lands Quarterly Update**
  - <http://www.nhdfi.org/fire-control-and-law-enforcement/fire-statistics.aspx>
- **Disaster Mitigation Act (DMA) of 2000**, Section 101, b1 & b2 and Section 322a
  - <http://www.fema.gov/library/viewRecord.do?id=1935>
- **Economic & Labor Market Information Bureau**, NH Employment Security, October 2022; Community Response for Bristol, Received, 5/10/2022, Census 2000 and Revenue Information derived from this site;
  - <http://www.nhes.nh.gov/elmi/products/cp/profiles-htm/Bristol.htm>

### **Photos**

- Photos are taken by MAPS unless otherwise noted.

### **Map Snips (images)**

- Map snips are created by MAPS using readily available data from NH Granit, unless otherwise indicated

**Wildfire Links**

- US Forest Service; <http://www.fs.fed.us>
- US Fire Administration; <http://www.usfa.dhs.gov/>
- US Department of Agriculture Wildfire Programs: <http://www.wildfireprograms.usda.gov/>
- Firewise®; <http://www.firewise.org/>
- Fire Adapted Communities; [www.fireadapted.org](http://www.fireadapted.org)
- Wildfire Preparedness Guide to Forest Wardens; [www.quickseries.com](http://www.quickseries.com)
- Ready Set Go; [www.wildlandfires.org](http://www.wildlandfires.org)
- Fire education for children; [www.smokeybear.com](http://www.smokeybear.com)

**Additional Websites**

- NH Homeland Security & Emergency Management; <http://www.nh.gov/safety/divisions/hsem/>
- US Geological Society; <http://water.usgs.gov/ogw/subsidence.html>
- Department Environmental Services;  
<http://des.nh.gov/organization/divisions/water/dam/drought/documents/historical.pdf>
- The Disaster Center (NH); <http://www.disastercenter.com/newhamp/tornado.html>
- Floodsmart, about the NFIP; [http://www.floodsmart.gov/floodsmart/pages/about/nfip\\_overview.jsp](http://www.floodsmart.gov/floodsmart/pages/about/nfip_overview.jsp)
- NOAA, National Weather Service; <http://www.nws.noaa.gov/glossary/index.php?letter=w>
- NOAA, Storm Prediction Center; <http://www.spc.noaa.gov/faq/tornado/beaufort.html>
- National Weather Service; [http://www.nws.noaa.gov/om/cold/wind\\_chill.shtml](http://www.nws.noaa.gov/om/cold/wind_chill.shtml)
- Center for Disease Control; <https://www.cdc.gov/disasters/winter/index.html>
- Slate; <http://www.slate.com/id/2092969/>
- NH Bureau of Economic Affairs; <http://www.nh.gov/osi/planning/index.htm>
- Code of Federal Regulations; Title 14, Aeronautics and Space; Part 1, Definitions and Abbreviations;  
[https://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title14/14tab\\_02.tpl](https://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title14/14tab_02.tpl)
- Federal Aviation Administration; <http://faa.custhelp.com>
- US Legal, Inc.; <http://definitions.uslegal.com/v/violent-crimes/>

## APPENDIX B: HAZARD MITIGATION ASSISTANCE (HMA)

The Federal Emergency Management Agency's (FEMA's) HMA programs promote funding for mitigation measures that reduce or eliminate long-term risk to people and property from future disasters. These programs allow communities across the nation to enhance mitigation and take steps that will foster greater resilience and reduce disaster suffering<sup>40</sup>.

### HAZARD MITIGATION GRANT PROGRAM (HMGP)

HMGP provides funding to rebuild communities in a way that mitigates future disaster losses in those communities. Funding is made available after the President issues a major disaster declaration. It is based on up to 15% or 20% of the estimated federal assistance provided.

### HAZARD MITIGATION GRANT PROGRAM POST FIRE (HMGP POST FIRE)

The HMGP Post Fire program provides funding after a Fire Management Assistance Grant (FMAG) is declared, and helps communities implement hazard mitigation measures after wildfire disasters. State, local tribal, and territorial governments are eligible to apply for funding. The funding amount is pre-calculated and based on historical FMAG declarations and is reassessed every fiscal year.

### FLOOD MITIGATION ASSISTANCE (FMA)

FMA is a competitive grant program that provides funding to states, local communities, tribes, and territories. Funds can be used for projects that reduce or eliminate the risk of repetitive flood damage to buildings insured by the National Flood Insurance Program (NFIP). The program is funded by an annual congressional appropriation and since 2016 has made \$160 million available for mitigation projects.

## HMA Eligible Activities

MITIGATION PROJECTS	HMGP	HMGP POST FIRE	BRIC	FMA
Property Acquisition	Yes	Yes	Yes	Yes
Structure Elevation	Yes	Yes	Yes	Yes
Mitigation Reconstruction	Yes	Yes	Yes	Yes
Flood Risk Reduction Measures	Yes	Yes	Yes	Yes
Dry Floodproofing Non-Residential Buildings	Yes	Yes	Yes	Yes
Tsunami Vertical Evacuation	Yes	Yes	Yes	–
Safe Rooms Construction	Yes	Yes	Yes	–
Wildfire Mitigation	Yes	Yes	Yes	–
Retrofitting	Yes	Yes	Yes	Yes
Generators	Yes	Yes	Yes	–
Earthquake Early Warning System	Yes	Yes	Yes	–
CAPABILITY AND CAPACITY BUILDING				
New Plan Creation and Updates	Yes	Yes	Yes	Yes
Planning-Related Activities	Yes	Yes	Yes	Yes
Project Scoping/Advance Assistance	Yes	Yes	Yes	Yes
Financial Technical Assistance	–	–	–	Yes

Note: The table above is not an exhaustive list of eligible activities. Please see program guidance or Notice of Funding Opportunity (NOFO) for more information on eligible activities.

<sup>40</sup> [https://www.fema.gov/sites/default/files/documents/fema\\_hma-trifold\\_2021.pdf](https://www.fema.gov/sites/default/files/documents/fema_hma-trifold_2021.pdf); sections of this appendix are taken directly from this Hazard Mitigation Assistance flier, although not all sections are quoted

### **BUILDING RESILIENT INFRASTRUCTURE AND COMMUNITIES (BRIC)**

BRIC is a competitive grant program that provides funding for mitigation projects to reduce the risks from disasters and natural hazards. The amount of funding is based on a 6% set-aside of the assistance FEMA provides following major disaster declarations through the Public Assistance and Individuals and Households Program. The BRIC program was designed to foster innovation and provides a yearly grant cycle, offering applicants a consistent source of funding.

### **PRE-DISASTER MITIGATION (PDM)**

PDM is a grant program that helped state, local, tribal, and territorial governments plan and implement hazard mitigation projects. For 20 years, PDM funded mitigation projects, but in FY 2020 BRIC replaced PDM for any new funding. Any grant awarded in FY 2019 will continue to be managed under PDM for any new funding.

### **ROLES OF APPLICANTS AND SUBAPPLICANTS**

Mitigation project subapplications are developed by local governments (subapplicants) and submitted to their state, territory, or tribal government (applicant). States, territories, and tribes are responsible for selecting the subapplications that align with their mitigation priorities and submit these in an application to FEMA. FEMA conducts a final eligibility review of all subapplications to ensure compliance with federal regulations. For competitive mitigation grants, FEMA will select projects for funding. All HMA grants have programmatic and administration requirements that are the responsibility of the applicant and subapplicant.

### **ADDITIONAL RESOURCES**

For general questions about the HMA programs, please contact your State Hazard Mitigation Officer or FEMA Region. Other resources are available; see the Hazard Mitigation Assistance flier, FEMA, or go to [www.fema.gov/hazard-mitigation-assistance](https://www.fema.gov/hazard-mitigation-assistance).<sup>41</sup>

#### **Who is eligible to apply?**

APPLICANTS	HMGP	HMGP POST FIRE	BRIC	FMA
State/territorial agencies	Yes	Yes	Yes	Yes
Federally recognized tribes	Yes	Yes	Yes	Yes

SUBAPPLICANT	HMGP	HMGP POST FIRE	BRIC	FMA
State agencies	Yes	Yes	Yes	Yes
Federally recognized tribes	Yes	Yes	Yes	Yes
Local governments/ communities	Yes	Yes	Yes	Yes
Private nonprofit organizations	Yes	Yes	–	–

#### **Cost-share requirements**

PROGRAM	COST SHARE*
<b>HMGP</b>	75 / 25
<b>HMGP Post Fire</b>	75 / 25
<b>BRIC</b>	75 / 25
<b>BRIC</b> (Economically Disadvantaged Rural Communities**)	90 / 10
<b>FMA</b> (Community Flood Mitigation, Project Scoping, Individual Mitigation of Insured Properties, and Planning Grants)	75 / 25
<b>FMA</b> (Repetitive loss properties)	90 / 10
<b>FMA</b> (Severe repetitive loss properties)	100 / 0

\* Percent of federal/non-federal cost share

\*\* Economically Disadvantaged Rural Communities" is synonymous with small impoverished communities as used in the Stafford Act.

<sup>41</sup> [https://www.fema.gov/sites/default/files/documents/fema\\_hma-trifold\\_2021.pdf](https://www.fema.gov/sites/default/files/documents/fema_hma-trifold_2021.pdf)



## APPENDIX C: THE EXTENT OF NATURAL HAZARDS

Hazards indicated with an asterisk \* are included in this plan.

### \*SEVERE WINTER WEATHER

Ice and snow events typically occur during winter and can cause loss of life, property damage, and tree damage.

#### Snowstorms

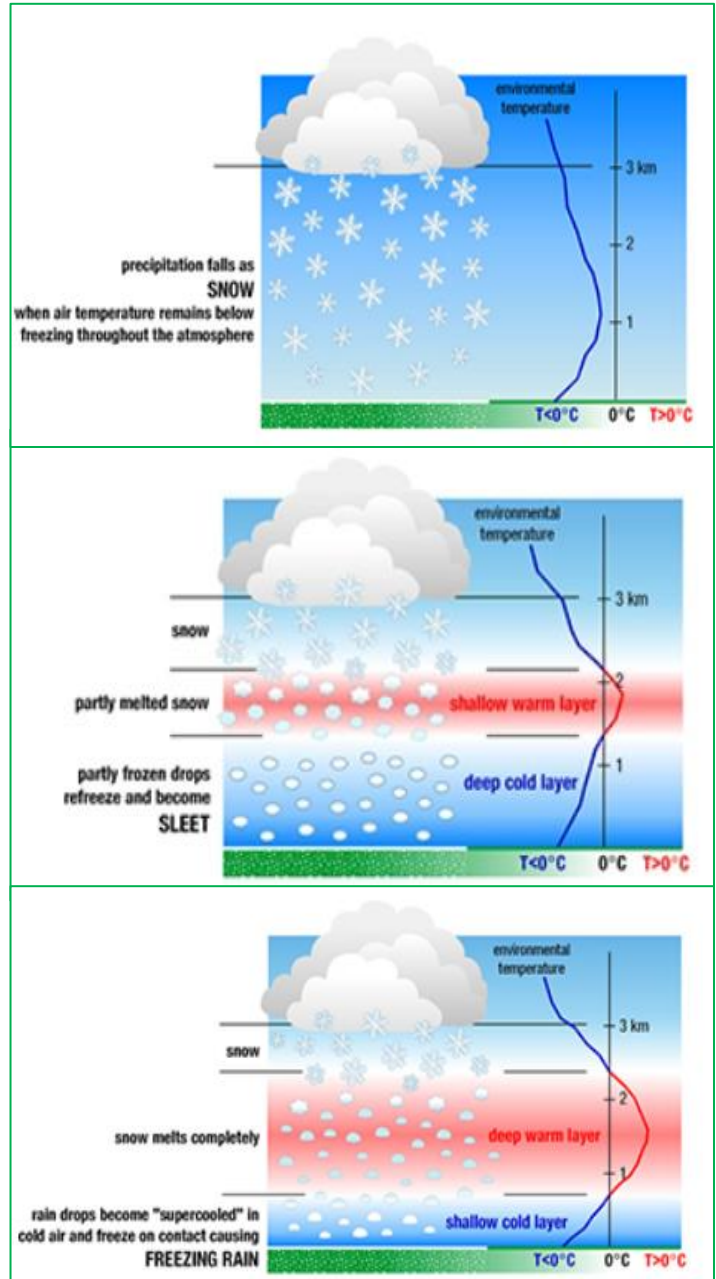
A winter storm can range from moderate snow to blizzard conditions. Blizzard conditions are considered blinding wind-driven snow over 35 mph that lasts several days. A severe winter storm deposits four or more inches of snow for 12 hours or six inches for 24 hours.

#### Sleet

Snowflakes melt as they fall through a small band of warm air and refreeze when passing through a wider band of cold air. These frozen raindrops then fall to the ground as “sleet”.

#### Freezing Rain & Ice Storms

Snowflakes melt as they fall through a warm band of air and then fall through a shallow band of cold air close to the ground to become “supercooled”. These supercooled raindrops instantly freeze upon contact with the ground and anything else below 32 degrees Fahrenheit. This freezing accumulates ice on roads, trees, utility lines, and other objects, resulting in an “ice storm”. “Ice coating at least one-fourth inch in thickness is heavy enough to damage trees, overhead wires, and similar objects.”<sup>42</sup>



Types of Severe Winter Weather  
NOAA – National Severe Storms Laboratory

<sup>42</sup> NOAA, National Severe Storms Laboratory, <https://www.nssl.noaa.gov/education/svrwx101/winter/types/>

The Sperry-Piltz Ice Accumulation Index (SPIA) (below) is designed to help utility companies better prepare for predicated ice storms.<sup>43</sup>

**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
<b>0</b>	< 0.25	< 15	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
<b>1</b>	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	
<b>2</b>	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	
<b>3</b>	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	
<b>4</b>	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	
<b>5</b>	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	

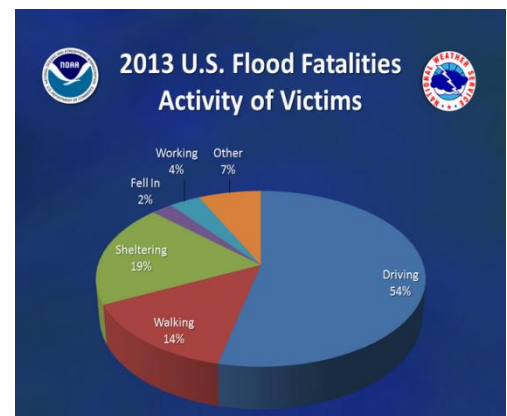
(Categories of damage are based upon combinations of precipitation totals, temperatures and wind speeds/directions.)

## \*INLAND FLOODING

### General Flooding Conditions

Floods are defined as a temporary overflow of water onto lands that are not usually covered by water. Flooding results from the overflow of major rivers and tributaries, storm surges, or inadequate local drainage. Floods can cause loss of life, property damage, crop/livestock damage, and water supply contamination. Floods can also disrupt travel routes on roads and bridges.

Inland floods are most likely to occur in the spring due to increased rainfall and snowmelt; however, floods can occur anytime. A sudden thaw in the winter or a major downpour in the summer can cause flooding because there is suddenly a lot of water in one place with nowhere to go; warm temperatures and heavy rains cause rapid snowmelt, producing prime flood conditions. Also, rising waters in early spring often break the ice into chunks that float downstream and pile up, causing flooding behind them. Small rivers and streams pose unique flooding risks because jams easily block them. Ice in riverbeds and against structures presents a significant flooding threat to bridges, roads, and the surrounding lands.



<sup>43</sup> The Weather Channel, <http://www.weather.com/news/weather-winter/rating-ice-storms-damage-sperry-piltz-20131202>

### ***Flooding (Dam Failure)***

Flooding due to dam failure can be small enough to affect the immediate area of the dam or large enough to cause catastrophic results to cities, towns, and human life below the dam. The amount of flooding depends mainly on the dam's size and the water held by the dam. The size of the breach, the amount of water flowing from the dam, and the amount of human habitation downstream are also factors.

A "Dam" means any artificial barrier, including appurtenant works, which impounds or diverts water, has a height of 4 feet or more, or a storage capacity of two acres or more, or is located at the outlet of a great pond<sup>44</sup>. A dam failure occurs when water overtops the dam or there is a structural failure of the dam, which causes there to be a breach and an unintentional release of water. Dams are classified in the following manner<sup>45</sup>:

Classification	Description	Inspection Intervals
<b>Non-Menace</b>	A dam is not a menace because it is in a location and size that failure or misoperation of the dam would not result in probable loss of life or property. The dam must be less than six feet in height if the storage capacity is greater than 50 acre-feet or less than 25 feet if it has a storage capacity of 15-50 acre-feet.	Every six years
<b>Low Hazard</b>	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 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 contained sediment if the storage capacity is less two-acre-feet and is located more than 250 feet from a water body or watercourse, and/or reversible environmental losses to environmentally-sensitive sites.	Every six years
<b>Significant Hazard</b>	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 no probable loss of lives; however, there would be a 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 pro-public health losses including one or more of the following: damages to a public water system (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 two acre-feet or more; or damage to an environmentally-sensitive site that does not meet the definition of reversible environmental losses.	Every four years
<b>High Hazard</b>	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 well as a result of water levels and velocities causing the structural failure of a foundation of a habitable residential structure or commercial or industrial structure which is occupied under normal conditions; water levels rising above the first floor elevation of a habitable residential structure or a commercial or industrial structure, which is occupied under normal conditions when the rise due to a 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; or any other circumstance that would more likely than not cause one or more deaths.	Every two years

<sup>44</sup> NH DES [http://des.nh.gov/organization/divisions/water/dwgb/wrpp/documents/primer\\_chapter11.pdf](http://des.nh.gov/organization/divisions/water/dwgb/wrpp/documents/primer_chapter11.pdf)

<sup>45</sup> <http://des.nh.gov/organization/commissioner/pip/factsheets/db/documents/db-15.pdf>

### Flooding (local, road erosion)

Today, the risk of flooding is a serious concern with changes in land use, aging roads, and designs that are no longer effective and undersized culverts. Heavy rain, rapid snowmelt, and stream flooding often cause culverts to be overwhelmed and roads to wash out. In addition, inadequate and aging stormwater drainage systems create local flooding on asphalt and gravel roads.

### Flooding (Riverine)

Floodplains are usually located in lowlands near rivers; floodplains experience flooding regularly. The term 100-year flood does not mean that floods will occur once every 100 years. It is a statement of probability that scientists and engineers use to describe how one flood compares to others that are likely to occur. Using “1% annual chance of flood” is more accurate. Flooding is often associated with hurricanes, heavy rains, ice jams, and rapid snowmelt in the spring.

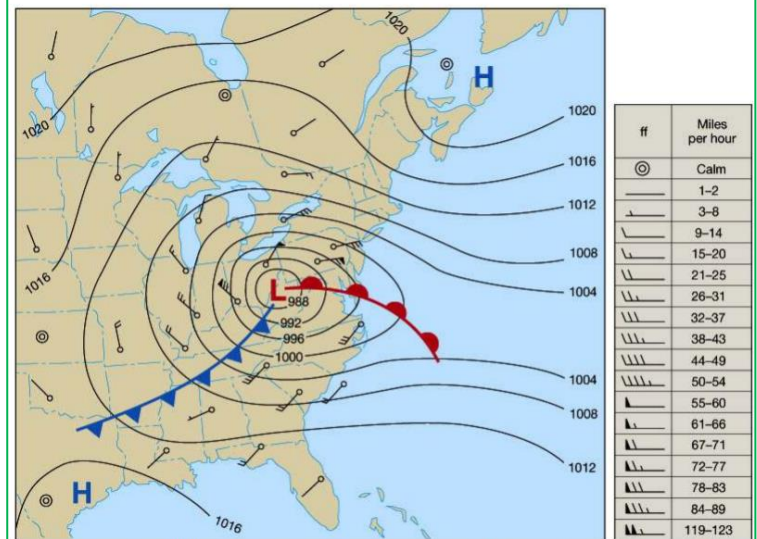
### \*HIGH WIND EVENTS

#### Windstorm

NOAA (National Oceanic & Atmospheric Administration) stated that wind is “*The horizontal motion of the air past a given point.*” Winds begin with differences in air pressures. Air pressures higher in one place than another set up a force pushing from the high pressure toward the low pressure. The more significant the difference in pressures, the stronger the force. The distance between high and low pressure also determines how fast the moving air is accelerated. Meteorologists refer to the force that starts the wind flowing as the “pressure gradient force.” High and low pressures are relative. No set number divides high and low pressure. Wind is used to describe the prevailing direction from which the wind is blowing with speed given usually in miles per hour or knots.” Also, NOAA’s issuance of a Wind Advisory occurs when sustained winds reach 25 to 39 mph and gusts to 57 mph.<sup>46 47</sup>

#### Pressure Gradient Force, PGF

The Pressure Gradient Force (PGF) is the direct result of different air pressures. As we have done for temperature by drawing isothermal maps, we can do for pressure and draw isobaric maps. Lines on these maps connect points of equal pressure.



Pressure Gradient Force (PGF) resulting in winds generated between pressure differences. Solid lines are isobars - lines of constant pressure.

Figure 6.9 in *The Atmosphere*, 8th edition, Lutgens and Tarbuck, 8th edition, 2001.

<sup>46</sup> NOAA; <http://www.nws.noaa.gov/glossary/index.php?letter=w>

<sup>47</sup> Pressure Gradient Force Chart “snipped” from *Air Pressure and Wind*; [https://www.weather.gov/media/zhu/ZHU\\_Training\\_Page/winds/pressure\\_winds/pressure\\_winds.pdf](https://www.weather.gov/media/zhu/ZHU_Training_Page/winds/pressure_winds/pressure_winds.pdf)



## Tornado

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud. The atmospheric conditions required to form a tornado include significant thermal instability, high humidity, and the convergence of warm, moist air at low levels with cooler, drier air aloft. Tornadoes develop when cold air overrides a layer of warm air, causing the warm air to rise rapidly. Most tornadoes remain suspended in the atmosphere but become a force of destruction if they touch down.

Tornadoes produce the most violent winds on Earth at 280 mph or more speeds. Also, tornadoes can travel at a forward speed of up to 70 mph. Damage paths can be more than one mile wide and 50 miles long. Violent winds and debris slamming into buildings cause the most structural damage.

The Fujita Scale is the standard scale for rating the severity of a tornado as measured by the damage it causes. A tornado is usually accompanied by thunder, lightning, heavy rain, and a loud “freight train” noise. A tornado covers a much smaller area than a hurricane but can be more violent and destructive.

*“Dr. T. Theodore Fujita developed the Fujita Tornado Damage Scale (F-Scale) to provide estimates of tornado strength based on damage surveys. Since it's practically impossible to make direct measurements of tornado winds, an estimate of the winds based on damage is the best way to classify a tornado. The new Enhanced Fujita Scale (EF-Scale) addresses some of the limitations identified by meteorologists and engineers since introducing the Fujita Scale in 1971. The new scale identifies 28 different free-standing structures most affected by tornadoes considering construction quality and maintenance. The range of tornado intensities remains as before, zero to five, with 'EF-0' being the weakest, associated with very little damage and 'EF-5' representing complete destruction, which was the case in Greensburg, Kansas on May 4th, 2007, the first tornado classified as 'EF-5'. The EF scale was adopted on February 1, 2007.”<sup>48</sup>* The chart (right), adapted from wunderground.com, compares the Fujita Scale to the Enhanced Fujita Scale.

EF SCALE	OLD F-SCALE	TYPICAL DAMAGE
<b>EF-0</b> (65-85mph)	<b>F0</b> (65-73 mph)	<b>Light damage.</b> Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
<b>EF-1</b> (86-110 mph)	<b>F1</b> (74-112 mph)	<b>Moderate damage.</b> Roofs are severely stripped; mobile homes are overturned or badly damaged; loss of exterior doors; windows and other glass is broken.
<b>EF-2</b> (111-135 mph)	<b>F2</b> (113-157 mph)	<b>Considerable damage.</b> Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light object missiles generated; cars lifted off the ground.
<b>EF-3</b> (136-165 mph)	<b>F3</b> (158-206 mph)	<b>Severe damage.</b> Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
<b>EF-4</b> (166-200 mph)	<b>F4</b> (207-260 mph)	<b>Devastating damage.</b> Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
<b>EF-5</b> (>200 mph)	<b>F5</b> (261-318 mph)	<b>Incredible damage.</b> Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (109 yards); high-rise buildings have significant structural deformation; incredible phenomena will occur.
EF No rating	<b>F6-F12</b> (319 mph to speed of sound)	<b>Inconceivable damage.</b> Should a tornado with a maximum wind speed in excess of EF5 occur, the extent and types of damage may not be conceivable. A number of missiles, such as iceboxes, water heaters, storage tanks, automobiles, etc., will create secondary damage to structures.

<sup>48</sup> Enhance Fujita Scale, [http://www.wunderground.com/resources/severe/fujita\\_scale.asp](http://www.wunderground.com/resources/severe/fujita_scale.asp)

## Downburst

According to NOAA, a downburst is a strong downdraft that causes damaging winds on or near the ground. Not to be confused with a downburst, the term "microburst" describes the size of the downburst. Comparing a microburst and the larger macroburst shows that both can cause extreme winds.

A microburst is a downburst with winds extending 2 ½ miles or less, lasting 5 to 15 minutes, and causing damaging winds as high as 168 MPH. A macroburst is a downburst with winds extending more than 2 ½ miles and lasting 5 to 30 minutes. Damaging winds, causing widespread, tornado-like damage, could be as high as 134 MPH.<sup>49</sup>

Below is the Beaufort Wind Scale, showing expected damage based on the wind (knots), developed in 1805 by Sir Francis Beaufort of England and posted on NOAA's Storm Prediction Center website.<sup>50</sup>

Force	Wind (Knots)	WMO Classification	The appearance of Wind Effects	
			On the Water	On Land
0	Less than 1	Calm	Sea surface smooth and mirror-like	Calm, smoke rises vertically
1	1-3	Light Air	Scaly ripples, no foam crests	Smoke drift indicates wind direction; still wind vanes
2	4-6	Light Breeze	Small wavelets, crests glassy, no breaking	Wind felt on face, leaves rustle, vanes begin to move
3	7-10	Gentle Breeze	Large wavelets, crests begin to break, scattered whitecaps	Leaves and small twigs constantly moving, light flags extended
4	11-16	Moderate Breeze	Small waves 1-4 ft. becoming longer, numerous whitecaps	Dust, leaves, and loose paper lifted; small tree branches move
5	17-21	Fresh Breeze	Moderate waves 4-8 ft. taking longer form, many whitecaps, some spray	Small trees in leaf begin to sway
6	22-27	Strong Breeze	Larger waves 8-13 ft., whitecaps common, more spray	Larger tree branches moving, whistling in wires
7	28-33	Near Gale	Sea heaps up, waves 13-20 ft., white foam streaks off breakers	Whole trees moving, resistance felt walking against the wind
8	34-40	Gale	Moderately high (13-20 ft.) waves of greater length, edges of crests begin to break into spindrift, foam blown in streaks	Whole trees in motion, resistance felt walking against the wind
9	41-47	Strong Gale	High waves (20 ft.), the sea begins to roll, dense streaks of foam, the spray may reduce visibility	Slight structural damage occurs, slate blows off roofs
10	48-55	Storm	Very high waves (20-30 ft.) with overhanging crests, sea white with densely blown foam, heavy rolling, lowered visibility	Seldom experienced on land, trees broken or uprooted, "considerable structural damage."
11	56-63	Violent Storm	Exceptionally high (30-45 ft.) waves, foam patches cover the sea, visibility more reduced	
12	64+	Hurricane	Air-filled with foam, waves over 45 ft., sea completely white with driving spray, visibility greatly reduced	

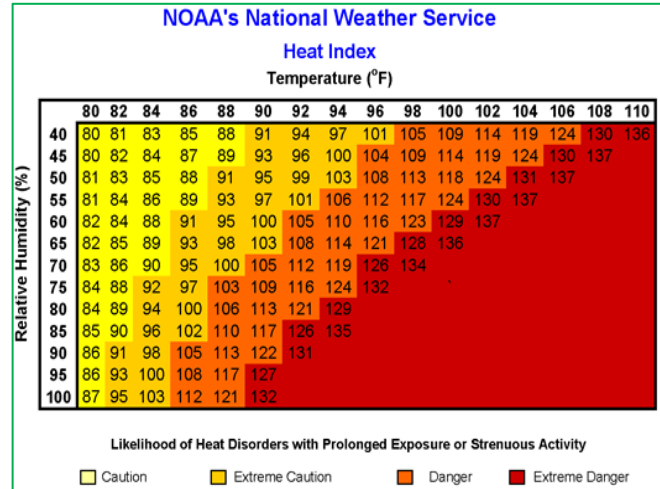
<sup>49</sup> NOAA - <http://www.srh.noaa.gov/jetstream/tstorms/wind.html>

<sup>50</sup> NOAA, Storm Prediction Center, <http://www.spc.noaa.gov/faq/tornado/beaufort.html>

**\*EXTREME TEMPERATURES****Extreme Heat**

A heatwave is a “prolonged period of excessive heat, often combined with excessive humidity.” Heat kills by pushing the human body beyond its limits. In extreme heat and high humidity, evaporation is slowed, and the body must work extra hard to maintain a normal temperature.

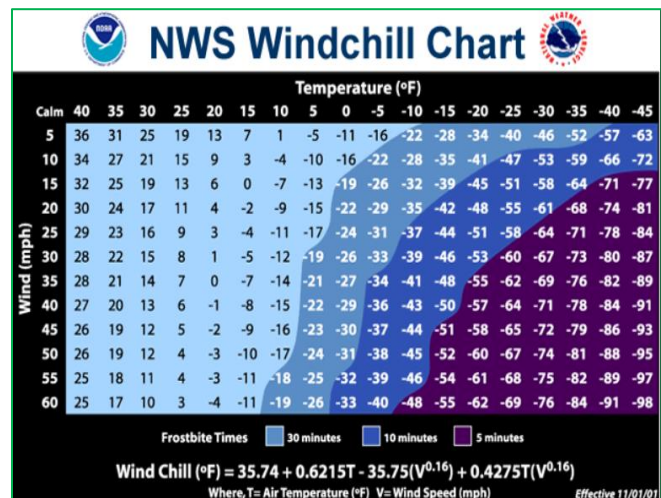
Most heat disorders occur when a victim is overexposed to heat or has over-exercised for their age and physical condition. Older adults, young children, and those who are sick or overweight are more likely to succumb to extreme heat.



Conditions that can induce heat-related illnesses include stagnant atmospheric conditions and poor air quality. Consequently, people living in urban areas may be at greater risk from a prolonged heat wave than those in rural areas. Also, asphalt and concrete store heat longer and gradually release heat at night, producing higher nighttime temperatures known as the “urban heat island effect.”<sup>51</sup> The chart above explains the likelihood of heat disorders that may result from high heat.<sup>52</sup>

**Extreme Cold**

What constitutes extreme cold and its effects can vary across different areas of the country. In regions relatively unaccustomed to winter weather, near-freezing temperatures are considered “extreme cold.” Whenever temperatures drop decidedly below average and wind speed increases, heat can leave your body more rapidly; these weather-related conditions may lead to serious health problems. Extreme cold is dangerous; it can bring on health emergencies in susceptible people without shelter, those stranded, or those living in poorly insulated homes or without heat.<sup>53</sup> The National Weather Service Chart (to the right) shows windchill due to wind and temperature.<sup>54</sup>



<sup>51</sup> NOAA, Index/Heat Disorders; <http://www.srh.noaa.gov/ssd/html/heatwv.htm>

<sup>52</sup> NOAA; <http://www.nws.noaa.gov/os/heat/index.shtml>

<sup>53</sup> CDC; <http://www.bt.cdc.gov/disasters/winter/guide.asp>

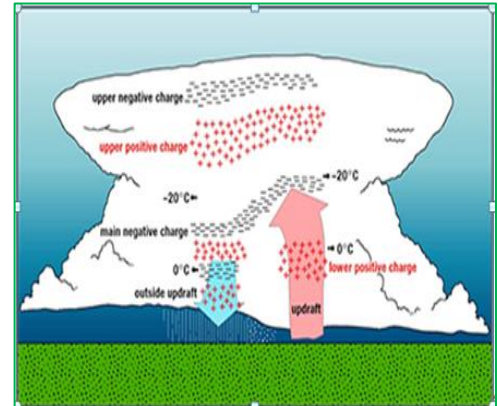
<sup>54</sup> National Weather Service; <http://www.nws.noaa.gov/om/windchill/>



**\*LIGHTNING & HAIL****Lightning**

The NOAA National Severe Storms Laboratory (NSSL) stated, “Lightning is a giant spark of electricity in the atmosphere between clouds, the air, or the ground. In the early stages of development, air acts as an insulator between the positive and negative charges in the cloud and between the cloud and the ground. When the opposite charges build up enough, this insulating capacity of the air breaks down, and there is a rapid discharge of electricity that we know as lightning. The flash of lightning temporarily equalizes the charged regions in the atmosphere until the opposite charges build up again.”<sup>55</sup>

Thunder, a result of lightning, is created when the “lightning channel heats the air to around 18,000 degrees Fahrenheit...”<sup>56</sup> thus causing the rapid expansion of the air and the sounds we hear as thunder. Although thunder heard during a storm cannot hurt you, the lightning associated with the thunder can strike people and strike homes, outbuildings, grass, and trees, sparking disaster. In addition, wildfires and structure loss are at high risk during severe lightning events.



*“A conceptual model shows the electrical charge distribution inside deep convection (thunderstorms), developed by NSSL and university scientists. In the main updraft (in and above the red arrow), there are four main charge regions. In the convective region but outside the out draft (in and above the blue arrow), there are more than four charge regions.” - NOAA*

Although thunderstorms and their associated lightning can occur any time of year, in New England, they are most likely to occur in the summer and late afternoon or early evening; they may even occur during a winter snowstorm. Trees, tall buildings, and mountains are often lightning targets because their tops are closer to the cloud; however, lightning is unpredictable and does not always strike the tallest thing in the area.

Thunderstorms and lightning occur most commonly in moist, warm climates. Data from the National Lightning Detection Network shows that an average of 20,000,000 cloud-to-ground flashes occur annually over the continental US. Around the world, lightning strikes the ground about 100 times each second, or 8 million times a day.

In general, lightning decreases across the US mainland toward the northwest. Over the entire year, the highest frequency of cloud-to-ground lightning is in Florida between Tampa and Orlando. This phenomenon is due to the presence, on many days during the year, of significant moisture content in the atmosphere at low levels (below 5,000 feet) and high surface temperatures that produce strong sea breezes along the Florida coasts. The western mountains of the US also produce strong upward motions and contribute to frequent cloud-to-ground lightning. There are also high frequencies along the Gulf of Mexico, the Atlantic coast, and the southeast United States. US regions along the Pacific west coast have the least cloud-to-ground lightning.”<sup>57</sup>

<sup>55</sup> NOAA National Severe Storms Laboratory, <https://www.nssl.noaa.gov/education/svrwx101/lightning>

<sup>56</sup> Ibid

<sup>57</sup> Ibid

## Hailstorm

### Lightning Activity Level (LAL) Grid

The lightning activity level is a common parameter in fire weather forecasts nationwide. LAL is a measure of the amount of lightning activity using values 1 to 6 where:

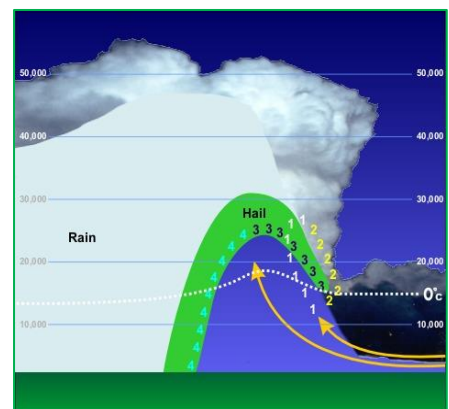
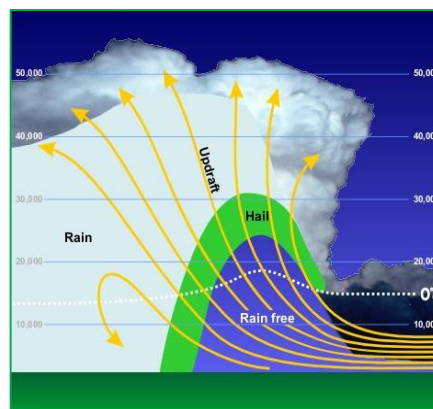
LAL	Cloud & Storm Development	Lightning Strikes 15 Minutes
1	No thunderstorms	-
2	Cumulus clouds are common, but only a few reach the towering cumulus stage. A single thunderstorm must be confirmed in the observation area. The clouds produce mainly virga, but light rain will occasionally reach the ground. Lightning is very infrequent.	1-8
3	Towering cumulus covers less than two-tenths of the sky. Thunderstorms are few, but two to three must occur within the observation area. Light to moderate rain will reach the ground, and lightning is infrequent.	9-15
4	Towering cumulus covers two to three-tenths of the sky. Thunderstorms are scattered, and more than three must occur within the observation area. Moderate rain is common, and lightning is frequent.	16-25
5	Towering cumulus and thunderstorms are numerous. They cover more than three-tenths and occasionally obscure the sky. Rain is moderate to heavy, and lightning is frequent and intense.	>25
6	Similar to LAL 3, except thunderstorms are dry.	

<http://www.prh.noaa.gov/hnl/pages/LAL.php>

Hailstones are balls of ice that grow as they are held up by winds, known as updrafts, that blow upwards in thunderstorms. The updrafts carry droplets of supercooled water, water at a below-freezing temperature that is not yet ice. The supercooled water droplets freeze into ice balls and grow to become hailstones. The faster the updraft, the bigger the stones can grow. Most hailstones are smaller in diameter than a dime, but stones weighing more than a pound have been recorded. "The largest hailstone recovered in the US fell in Vivian, SD on June 23, 2010, with a diameter of 8 inches and a circumference of 18.62 inches. It weighed 1 lb. 15 oz."<sup>58</sup>

Dime/Penny	0.75
Nickel	0.88
Quarter	1.00
Half Dollar	1.25
Ping Pong	1.50
Golf Ball	1.75
Hen Egg	2.00
Tennis Ball	2.50
Baseball	2.75
Tea Cup	3.00
Grapefruit	4.00
Softball	4.50

How hailstones grow is complicated, but the results are irregular balls of ice that can be as large as baseballs. The chart above shows the relative size differences and a common way to "measure" the size of hail based on diameter.<sup>59</sup> The charts to the right show how hail is formed.<sup>60</sup>



### \*WILDFIRES

<sup>58</sup> NOAA National Severe Storms Laboratory; <https://www.nssl.noaa.gov/education/svrwx101/hail/>

<sup>59</sup> <http://www.pinterest.com/pin/126171227030590678/>

<sup>60</sup> <http://oceanservice.noaa.gov/education/yos/resource/JetStream/tstorms/hail.htm#hail>

The National Wildfire Coordinating Group (NWCG) states that wildfires are designated into seven categories, as seen in the top chart to the right.<sup>61</sup> For statistical analysis, the US Forest Service recognizes the cause of fires according to the bottom chart to the right:<sup>62</sup>

According to the International Wildland-Urban Interface Code (IWUIC), the definition of wildfire is “an uncontrolled fire spreading through vegetative fuels exposing and possibly consuming structures”. In addition, the IWUIC defines the Wildland Urban Interface (WUI) area as “that geographical area where structures and other human development meets or intermingles with wildland or vegetative fuels.”<sup>63</sup>

There are two major potential losses with a wildfire: the forest and the threat to the built-up human environment. In many cases, the only time it is feasible for a community to control a wildfire is when it threatens the built-up human environment.

### **\*TROPICAL & POST-TROPICAL CYCLONES**

#### ***Cyclones (Hurricanes)***

A hurricane is a tropical cyclone with 74 miles per hour or more winds that blow in a large spiral around a relatively calm center. The storm's eye is usually 20-30 miles wide, and the storm may extend over 400 miles. High winds are a primary cause of hurricane-inflicted loss of life and property damage.

“The Saffir-Simpson Hurricane Wind Scale” (on the following page<sup>64</sup>) is a 1 to 5 rating based on a hurricane's sustained wind speed. This scale estimates potential property damage. Hurricanes reaching Category 3 and higher are considered major hurricanes because of their potential for significant loss of life and damage. Category 1 and 2 storms are still dangerous and require preventative measures. In the western North Pacific, the term “super typhoon” is used for tropical cyclones with sustained winds exceeding 150 mph.”<sup>65</sup>

Flooding is often caused by the coastal storm surge of the ocean and torrential rains, both of which may accompany a hurricane; these floods can result in the loss of lives and property.

#### ***Post-Tropical Cyclones***

A tropical depression becomes a tropical storm with maximum sustained winds between 39-73 mph. Although tropical storms have less than 74 miles per hour winds, they can do significant damage like hurricanes. The damage most felt by tropical storms is from the torrential rains, which cause rivers and streams to flood and overflow their banks.

Rainfall from tropical storms has been reported at up to 6 inches per hour; 43 inches of rain in 24 hours was reported in Alvin, TX, due to Tropical Storm Claudette.<sup>66</sup>

Class	Acres Burned
Class A	0 to .25 acres
Class B	.26 to 9 acres
Class C	10 to 99 acres
Class D	100 to 299 acres
Class E	300 to 999 acres
Class F	1,000 to 4,999 acres
Class G	5,000 acres or more
Code	Statistical Cause
1	Lightning
2	Equipment Use
3	Smoking
4	Campfire
5	Debris Burning
6	Railroad
7	Arson
8	Children
9	Miscellaneous

<sup>61</sup> <http://www.nwcg.gov/pms/pubs/glossary/s.htm>

<sup>62</sup> [https://www.fs.fed.us/cgi-bin/Directives/get\\_dirs/fsh?5109.14](https://www.fs.fed.us/cgi-bin/Directives/get_dirs/fsh?5109.14)

<sup>63</sup> International Wildland-Urban Interface Code, 2012, International Code Council, Inc.

<sup>64</sup> National Hurricane Center; <http://www.nhc.noaa.gov/aboutsshws.php>

<sup>65</sup> National Hurricane Center, NOAA; <http://www.nhc.noaa.gov/aboutsshws.php>

<sup>66</sup> [http://www.wpc.ncep.noaa.gov/research/mcs\\_web\\_test\\_test\\_files/Page1637.htm](http://www.wpc.ncep.noaa.gov/research/mcs_web_test_test_files/Page1637.htm)

Category	Sustained Winds	Types of Damage Due to Hurricane Winds
1	74-95 mph 64-82 kt. 119-153 km/h	<b>Very dangerous winds will produce some damage:</b> Well-constructed frame homes could have damage to the roof, shingles, vinyl siding, and gutters. Large branches of trees will snap, and shallowly rooted trees may be toppled. Extensive damage to power lines and poles will likely result in power outages that could last several days.
2	96-110 mph 83-95 kt. 154-177 km/h	<b>Extremely dangerous winds will cause extensive damage:</b> Well-constructed frame homes could sustain significant roof and siding damage. In addition, many shallowly rooted trees will be snapped or uprooted, blocking numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3 (major)	111-129 mph 96-112 kt. 178-208 km/h	<b>Devastating damage will occur:</b> Well-built frame homes may incur significant damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4 (major)	130-156 mph 113-136 kt. 209-251 km/h	<b>Catastrophic damage will occur:</b> Well-built frame homes can sustain severe damage by losing most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted, and power poles will be downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5 (major)	157 mph or higher 137 kt. or higher 252 km/h or higher	<b>Catastrophic damage will occur:</b> A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

### \*EARTHQUAKES

An earthquake is a rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric, and phone lines, and often cause landslides, flash floods, fires, and avalanches. More significant earthquakes usually begin with slight tremors but rapidly take the form of one or more violent shocks and end in vibrations of gradually diminishing force called aftershocks. An earthquake's underground point of origin is called its focus; the point on the surface directly above the focus is the epicenter.

Using the commonly used scales, the Richter scale (which measures strength or magnitude) and the Mercalli Scale (which measures intensity or severity), the magnitude and intensity of an earthquake are determined. The chart to the right shows the two scales relative to one another. The Richter scale measures earthquakes starting at one as the lowest, with each successive unit being about ten times stronger and more severe than the previous one.<sup>67</sup>

It is well documented that fault lines run throughout New Hampshire, but high-magnitude earthquakes have not been common in NH history. Four earthquakes occurred in New Hampshire between 1924 and 1989, having a magnitude of 4.2 or more. Two occurred in Ossipee, one west of Laconia and one near the Quebec border.

Modified Mercalli Scale		Richter Magnitude Scale
I	Detected only by sensitive instruments	1.5
II	Felt by few persons at rest, especially on upper floors; delicately suspended objects may swing	2
III	Felt noticeably indoors, but not always recognized as earthquake; standing autos rock slightly, vibration like passing truck	2.5
IV	Felt indoors by many, outdoors by few, at night some may awaken; dishes, windows, doors disturbed; autos rock noticeably	3
V	Felt by most people; some breakage of dishes, windows, and plaster; disturbance of tall objects	3.5
VI	Felt by all, many frightened and run outdoors; falling plaster and chimneys, damage small	4
VII	Everybody runs outdoors; damage to buildings varies depending on quality of construction; noticed by drivers of autos	4.5
VIII	Panel walls thrown out of frames; fall of walls, monuments, chimneys; sand and mud ejected; drivers of autos disturbed	5
IX	Buildings shifted off foundations, cracked, thrown out of plumb; ground cracked; underground pipes broken	5.5
X	Most masonry and frame structures destroyed; ground cracked, rails bent, landslides	6
XI	Few structures remain standing; bridges destroyed, fissures in ground, pipes broken, landslides, rails bent	6.5
XII	Damage total; waves seen on ground surface, lines of sight and level distorted, objects thrown up in air	7
		7.5
		8

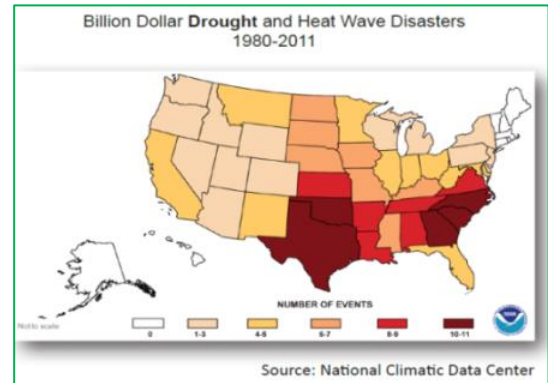
<sup>67</sup> Modified Mercalli Scale/Richter Scale Chart; MO DNR, [http://www.dnr.mo.gov/geology/geosrv/geores/richt\\_mercalli\\_relation.htm](http://www.dnr.mo.gov/geology/geosrv/geores/richt_mercalli_relation.htm)

**\*DROUGHT**

A drought is a long period of abnormally low precipitation that adversely affects the growing season or living conditions of plants and animals. Droughts are rare in New Hampshire. They are generally less damaging and disruptive than floods and are more difficult to define. The effect of drought is indicated through measurements of soil moisture, groundwater levels, and streamflow.

However, not all of these indicators will be minimal during a drought. For example, frequent minor rainstorms can replenish the soil moisture without raising groundwater levels or increasing streamflow. Low stream flow also correlates with low groundwater levels because groundwater discharge to streams and rivers maintains streamflow during extended dry periods. Low streamflow and low groundwater levels commonly cause diminished water supply.

The US Drought Monitor provides an intensity scale, as shown below, to indicate the “Category” of drought at any given time. During the peak months of the 2016 drought in New Hampshire, the southern part of the state was in Category D3 or Extreme Drought.



Category	Description	Possible Impacts	Ranges				
			Palmer Drought Severity Index (PDSI)	CPC Soil Moisture Model (Percentiles)	USGS Weekly Streamflow (Percentiles)	Standardized Precipitation Index (SPI)	Objective Drought Indicator Blends (Percentiles)
D0	Abnormally Dry	<ul style="list-style-type: none"> <li>Going into drought: <ul style="list-style-type: none"> <li>short-term dryness slowing planting, growth of crops or pastures</li> </ul> </li> <li>Coming out of drought: <ul style="list-style-type: none"> <li>some lingering water deficits</li> <li>pastures or crops not fully recovered</li> </ul> </li> </ul>	-1.0 to -1.9	21 to 30	21 to 30	-0.5 to -0.7	21 to 30
D1	Moderate Drought	<ul style="list-style-type: none"> <li>Some damage to crops, pastures</li> <li>Streams, reservoirs, or wells low, some water shortages developing or imminent</li> <li>Voluntary water-use restrictions requested</li> </ul>	-2.0 to -2.9	11 to 20	11 to 20	-0.8 to -1.2	11 to 20
D2	Severe Drought	<ul style="list-style-type: none"> <li>Crop or pasture losses likely</li> <li>Water shortages common</li> <li>Water restrictions imposed</li> </ul>	-3.0 to -3.9	6 to 10	6 to 10	-1.3 to -1.5	6 to 10
D3	Extreme Drought	<ul style="list-style-type: none"> <li>Major crop/pasture losses</li> <li>Widespread water shortages or restrictions</li> </ul>	-4.0 to -4.9	3 to 5	3 to 5	-1.6 to -1.9	3 to 5
D4	Exceptional Drought	<ul style="list-style-type: none"> <li>Exceptional and widespread crop/pasture losses</li> <li>Shortages of water in reservoirs, streams, and wells creating water emergencies</li> </ul>	-5.0 or less	0 to 2	0 to 2	-2.0 or less	0 to 2

<https://droughtmonitor.unl.edu/AboutUSDM/AbouttheData/DroughtClassification.aspx>



### **\*LANDSLIDE & EROSION**

Erosion is the wearing away of lands, such as riverbank loss, beach, shoreline, or dune material. It is measured as the rate of change in the position or displacement of a riverbank or shoreline over a period of time. Short-term erosion typically results from periodic natural events, such as flooding, hurricanes, storm surges, and windstorms, but may be intensified by human activities. Long-term erosion results from multi-year impacts such as repetitive flooding, wave action, sea-level rise, sediment loss, subsidence, and climate change. Death and injury are not typically associated with erosion; however, erosion can destroy buildings and infrastructure.<sup>68</sup>

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

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

There are also multiple types of landslides:

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

Like flooding, landslides are unique in how they affect different geographic, topographic, and geologic areas. Therefore, consideration of many measurements is required to determine the severity of the landslide event.<sup>69</sup>

### **\*INFECTIOUS DISEASES**

#### ***Bacterial & Viral Infections***

Many organisms live inside our bodies and on our skin. Although these organisms are generally harmless and sometimes helpful, they can cause illnesses. Infectious diseases can be transmitted from one person to another by bites from animals or insects (zoonotic), from the environment, or by consuming food or water that has been contaminated. In addition, infectious diseases may be caused by bacteria, viruses, fungi, and parasites.<sup>70</sup>

Some of the more common infectious diseases include Lyme disease, HIV/AIDS, Tuberculosis, Rabies, West Nile Virus, Eastern Equine Encephalitis (EEE), Ebola, Avian Flu, Enterovirus D-68, Influenza, Hepatitis A, Zika Virus, Meningitis, Legionella, Sexually Transmitted Diseases (STD), Hepatitis C, Salmonella, SARS and Staph.<sup>71</sup>

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<sup>68</sup> Mitigation Ideas, A Resource for Reducing Risk to Natural Hazards, FEMA, January 2013

<sup>69</sup> State of New Hampshire Multi-Hazard Mitigation Plan Update 2018 & <https://oas.org/dsd/publications/Unit/oea66e/ch10.htm>

<sup>70</sup> <https://www.mayoclinic.org/diseases-conditions/infectious-diseases/symptoms-causes/syc-20351173>

<sup>71</sup> <https://www.dhhs.nh.gov/dphs/cdcs/index.htm>

*“Throughout history, millions of people have died of diseases such as bubonic plague or the Black Death, which is caused by Yersinia pestis bacteria, and smallpox, which is caused by the variola virus. In recent times, viral infections have been responsible for two major pandemics: the 1918-1919 “Spanish Flu” epidemic that killed 20-40 million people, and the ongoing HIV/AIDS epidemic that killed an estimated 1.5 million people worldwide in 2013 alone.*

*Bacterial and viral infections can cause similar symptoms such as coughing and sneezing, fever, inflammation, vomiting, diarrhea, fatigue, and cramping – all of which are ways the immune system tries to rid the body of infectious organisms. But bacterial and viral infections are dissimilar in many other important respects, most of them due to the organisms’ structural differences and the way they respond to medications.”<sup>72</sup>*

In early 2020, a novel coronavirus emerged in China, spreading worldwide to become the worst pandemic since the 1918 Spanish Flu. Known as COVID-19, this novel coronavirus had infected 676,609,955 people and caused the deaths of 6,881,955 individuals worldwide as of March 20, 2023, the final day that Johns Hopkins collected COVID-19 data, after three years. As of this date, confirmed cases in the US were reported to be 103,804,263, with 1,123,836 reported deaths.<sup>73</sup> As of June 2021, mitigation, testing, and vaccination efforts appeared to work in much of the United States. However, the Delta and Omicron variants appeared in the US in December 2021, causing critical concerns about the possibility of overwhelming the country’s hospital systems.

The pandemic remains an evolving worldwide crisis, affecting millions of workers in the United States and presenting significant economic results. Although most people confirmed with Covid-19 eventually recover, and many have been vaccinated, the virus remains a risk for the elderly and compromised individuals.

The extent of infectious diseases is generally described by the level and occurrence of a particular disease as follows<sup>74</sup>:

- Endemic ..... Disease with a constant presence or usual prevalence in a population within a geographic area
- Sporadic ..... Disease that occurs infrequently and irregularly
- Hyperendemic ..... Disease that is persistent and has high levels of occurrence
- Epidemic..... Disease that shows an increase, often sudden, in the number of cases of a disease above what is normally expected in that population in that area
- Outbreak..... Disease that has the same definition as an epidemic but is often used for a more limited geographic area
- Cluster ..... Refers to an aggregation of cases grouped in place and time that are suspected to be greater than the number expected, even though the expected number may not be known.
- Pandemic ..... An epidemic that has spread over several countries or continents, usually affecting a large number of people

<sup>72</sup> <https://www.webmd.com/a-to-z-guides/bacterial-and-viral-infections#1>

<sup>73</sup> <https://coronavirus.jhu.edu/map.html>

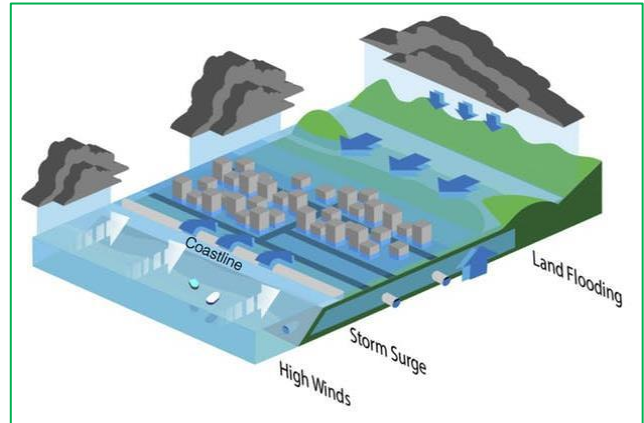
<sup>74</sup> <https://www.cdc.gov/ophs/csels/dsepd/ss1978/lesson1/section11.html>



### COASTAL FLOODING

Coastal areas are particularly susceptible to flooding, erosion, storm surge, and sea-level rise due to tropical and post-tropical cyclones, heavy rain events, gale-force winds, and other natural phenomena. The flooding that results is “determined by a combination of several factors such as storm intensity, forward speed, storm area size, coastline characteristics, angle of approach to the coast, tide height.”<sup>75</sup>

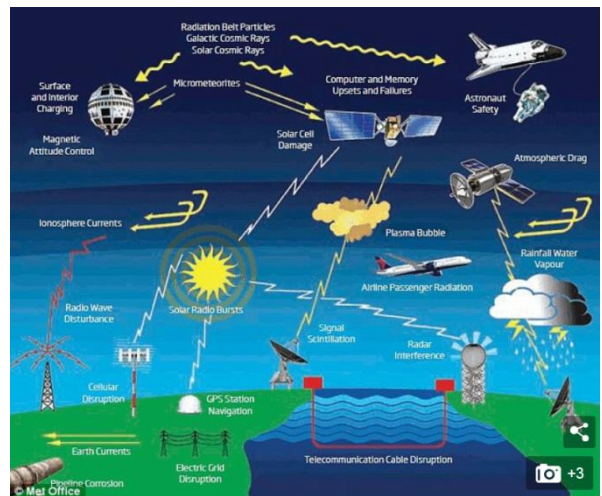
The severity of the flooding can vary depending on “both the speed of onset (how quickly the floodwaters rise) and the flood duration. Nor’easters can impact the region for several days and produce storm surge with or without the addition of inland runoff from heavy precipitation.”<sup>76</sup> As shown in the image below, storm surge and inland flooding can affect the severity of flooding along the shore.<sup>77</sup>



### SOLAR STORM & SPACE WEATHER

When sudden amounts of stored magnetic energy and ions are discharged from the Sun’s surface, solar flares, high-speed solar wind streams, solar energetic particles, and coronal mass ejections (CMEs) are possible. This magnetic energy sometimes finds its way to Earth by following the Sun’s magnetic field. Then, upon collision with the Earth’s magnetic field, these charged particles enter the Earth’s upper atmosphere, causing Auroras.

Charged magnetic particles can produce their own magnetic field, disrupting navigation, communication systems, and GPS satellites. In addition, they can potentially produce Geomagnetic Induced Currents (GICs), affecting the power grid and pipelines. In addition, an electromagnetic surge from a solar storm can produce an Electromagnetic Pulse (EMP). An EMP could cause significant damage to infrastructures such as nuclear power plants, banking systems, the electrical grid, sewage treatment facilities, cell phones, landlines, and even vehicles. The image above shows the potential impacts of solar storms and space weather.<sup>78</sup>



<sup>75</sup> NH Multi-hazard Mitigation Plan-2018, page 55

<sup>76</sup> Ibid

<sup>77</sup> Ibid, page 53, “Understanding compound flooding from land and ocean sources”, Theodore Scontras, University of Maine)

<sup>78</sup> <https://www.dailymail.co.uk/sciencetech/article-3764842/A-solar-storm-destroy-planet-unless-create-massive-magnetic-shield-protect-Earth-warns-expert.html>

**Solar Storm & Space Weather Extent<sup>79</sup>**

Geomagnetic Storms				
Scale	Description	Effect	Physical Measure	Average Frequency (1 cycle = 11 years)
G 5	Extreme	<b>Power systems:</b> Widespread voltage control problems and protective system problems can occur; some grid systems may experience complete collapse or blackouts. Transformers may experience damage. <b>Spacecraft operations:</b> May experience extensive surface charging, problems with orientation, uplink/downlink, and tracking satellites. <b>Other systems:</b> Pipeline currents can reach hundreds of amps, HF (high frequency) radio propagation may be impossible in many areas for one to two days, satellite navigation may be degraded for days, low-frequency radio navigation can be out for hours, and aurora has been seen as low as Florida and southern Texas (typically 40° geomagnetic lat.).	Kp. = 9	4 per cycle (4 days per cycle)
G 4	Severe	<b>Power systems:</b> Possible widespread voltage control problems and some protective systems will mistakenly trip out key assets from the grid. <b>Spacecraft operations:</b> May experience surface charging and tracking problems; corrections may be needed for orientation problems. <b>Other systems:</b> Induced pipeline currents affect preventive measures, HF radio propagation is sporadic, satellite navigation is degraded for hours, low-frequency radio navigation is disrupted, and aurora has been seen as low as Alabama and northern California (typically 45° geomagnetic lat.).	Kp. = 8, including a 9-	100 per cycle (60 days per cycle)
G 3	Strong	<b>Power systems:</b> Voltage corrections may be required; false alarms are triggered on some protection devices. <b>Spacecraft operations:</b> Surface charging may occur on satellite components, drag may increase on low-Earth-orbit satellites, and corrections may be needed for orientation problems. <b>Other systems:</b> Intermittent satellite navigation and low-frequency radio navigation problems may occur, HF radio may be intermittent, and aurora has been seen as low as Illinois and Oregon (typically 50° geomagnetic lat.).	Kp. = 7	200 per cycle (130 days per cycle)
G 2	Moderate	<b>Power systems:</b> High-latitude power systems may experience voltage alarms; long-duration storms may cause transformer damage. <b>Spacecraft operations:</b> Corrective actions to orientation may be required by ground control; possible changes in drag affect orbit predictions. <b>Other systems:</b> HF radio propagation can fade at higher latitudes, and aurora has been seen as low as New York and Idaho (typically 55° geomagnetic lat.).	Kp. = 6	600 per cycle (360 days per cycle)
G 1	Minor	<b>Power systems:</b> Weak power grid fluctuations can occur. <b>Spacecraft operations:</b> Minor impact on satellite operations possible. <b>Other systems:</b> Migratory animals are affected at this and higher levels; aurora is commonly visible at high latitudes (northern Michigan and Maine).	Kp. = 5	1700 per cycle (900 days per cycle)

Solar Radiation Storms				
Scale	Description	Effect	Physical Measure (Flux level of $\geq 10$ MeV particles)	Average Frequency (1 cycle = 11 years)
S 5	Extreme	<b>Biological:</b> Unavoidable high radiation hazard to astronauts on EVA (extra-vehicular activity); passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk. <b>Satellite operations:</b> Satellites may be rendered useless, memory impacts can cause loss of control, may cause serious noise in image data, star-trackers may be unable to locate sources, permanent damage to solar panels is possible. <b>Other systems:</b> Complete blackout of HF (high frequency) communications possible through the polar regions and position errors make navigation operations extremely difficult.	$10^5$	Fewer than 1 per cycle
S 4	Severe	<b>Biological:</b> Unavoidable radiation hazard to astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk. <b>Satellite operations:</b> May experience memory device problems and noise on imaging systems; star-tracker problems may cause orientation problems, and solar panel efficiency can be degraded. <b>Other systems:</b> Blackout of HF radio communications through the polar regions and increased navigation errors over several days are likely.	$10^4$	3 per cycle

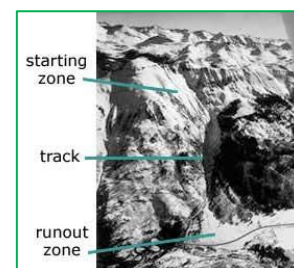
<sup>79</sup> Extent charts taken from <https://www.weather.gov/akq/SpaceWeather>

Solar Radiation Storms				
S 3	Strong	<b>Biological:</b> Radiation hazard avoidance is recommended for astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk. <b>Satellite operations:</b> Single-event upsets, noise in imaging systems, and a slight reduction of efficiency in solar panels are likely. <b>Other systems:</b> Degraded HF radio propagation through the polar regions and navigation position errors likely.	$10^{-3}$	10 per cycle
S 2	Moderate	<b>Biological:</b> Passengers and crew in high-flying aircraft at high latitudes may be exposed to elevated radiation risk. <b>Satellite operations:</b> Infrequent single-event upsets are possible. <b>Other systems:</b> minor effects on HF propagation through the polar regions and navigation at polar cap locations possibly affected.	$10^{-2}$	25 per cycle
S 1	Minor	<b>Biological:</b> None. <b>Satellite operations:</b> None. <b>Other systems:</b> Minor impacts on HF radio in the polar regions.	10	50 per cycle

Radio Blackout				
Scale	Description	Effect	Physical Measure	Average Frequency (1 cycle = 11 years)
R 5	Extreme	<b>HF Radio:</b> Complete HF (high frequency) radio blackout on the entire sunlit side of the Earth lasting for a number of hours. This results in no HF radio contact with mariners and on-route aviators in this sector. <b>Navigation:</b> Low-frequency navigation signals used by maritime and general aviation systems experience outages on the sunlit side of the Earth for many hours, causing loss in positioning. Increased satellite navigation errors in positioning for several hours on the sunlit side of Earth, which may spread into the night side.	$X20 (2 \times 10^{-3})$	Less than 1 per cycle
R 4	Severe	<b>HF Radio:</b> HF radio communication blackouts on most of the sunlit side of Earth for one to two hours. HF radio contact lost during this time. <b>Navigation:</b> Outages of low-frequency navigation signals cause increased errors in positioning for one to two hours. Minor disruptions of satellite navigation possible on the sunlit side of Earth.	$X10 (10^{-3})$	8 per cycle (8 days per cycle)
R 3	Strong	<b>HF Radio:</b> Wide area blackout of HF radio communication, loss of radio contact for about an hour on sunlit side of Earth. <b>Navigation:</b> Low-frequency navigation signals degraded for about an hour.	$X1 (10^{-4})$	175 per cycle (140 days per cycle)
R 2	Moderate	<b>HF Radio:</b> Limited blackout of HF radio communication on the sunlit side, loss of radio contact for tens of minutes. <b>Navigation:</b> Degradation of low-frequency navigation signals for tens of minutes.	$M5 (5 \times 10^{-5})$	350 per cycle (300 days per cycle)
R 1	Minor	<b>HF Radio:</b> Weak or minor degradation of HF radio communication on sunlit side, occasional loss of radio contact. <b>Navigation:</b> Low-frequency navigation signals are degraded for brief intervals.	$M1 (10^{-6})$	2000 per cycle (950 days per cycle)



## AVALANCHES

According to the National Snow & Ice Data Center, an avalanche is a rapid flow of snow down a hill or mountainside. Although avalanches can occur on any slope given the right conditions, certain times of the year and specific locations are naturally more dangerous than others. Most avalanches tend to happen during winter, particularly from December to April. However, avalanche fatalities have been recorded for every month of the year.<sup>80</sup>



<sup>80</sup> Copyright Richard Armstrong, NSIDC, <http://nsidc.org/cryosphere/snow/science/avalanches.html>

“All that is necessary for an avalanche is a mass of snow and a slope for it to slide down...A large avalanche in North America might release 230,000 cubic meters (300,000 cubic yards) of snow. That is the equivalent of 20 football fields filled 3 meters (10 feet) deep with snow. However, such large avalanches are often naturally released, when the snowpack becomes unstable and layers of snow fail. Skiers and recreationists usually trigger smaller, but often more deadly avalanches.”

North American Public Avalanche Danger Scale				
Avalanche danger is determined by the likelihood, size and distribution of avalanches.				
Danger Level		Travel Advice	Likelihood of Avalanches	Avalanche Size and Distribution
5 Extreme		Avoid all avalanche terrain.	Natural and human-triggered avalanches certain.	Large to very large avalanches in many areas.
4 High		Very dangerous avalanche conditions. Travel in avalanche terrain <i>not</i> recommended.	Natural avalanches likely; human-triggered avalanches very likely.	Large avalanches in many areas; or very large avalanches in specific areas.
3 Considerable		Dangerous avalanche conditions. Careful snowpack evaluation, cautious route-finding and conservative decision-making essential.	Natural avalanches possible; human-triggered avalanches likely.	Small avalanches in many areas; or large avalanches in specific areas; or very large avalanches in isolated areas.
2 Moderate		Heightened avalanche conditions on specific terrain features. Evaluate snow and terrain carefully; identify features of concern.	Natural avalanches unlikely; human-triggered avalanches possible.	Small avalanches in specific areas; or large avalanches in isolated areas.
1 Low		Generally safe avalanche conditions. Watch for unstable snow on isolated terrain features.	Natural and human-triggered avalanches unlikely.	Small avalanches in isolated areas or extreme terrain.
Safe backcountry travel requires training and experience. You control your own risk by choosing where, when and how you travel.				

An avalanche has three main parts (see the image above). The first and most unstable is the “starting zone”, where the snow can “fracture” and slide. “Typical starting zones are higher up on slopes. However, given the right conditions, snow can fracture at any point on the slope.”<sup>81</sup>

The second part is the “avalanche track”, or the downhill path the avalanche follows. The avalanche is evident where large swaths of trees are missing or where there are large pile-ups of rock, snow, trees, and debris at the bottom of an incline.

The third part of an avalanche is the “runout zone”. The avalanche has stopped in the runout zone, leaving the most extensive and highest pile of snow and debris.

“Several factors may affect the likelihood of an avalanche, including weather, temperature, slope steepness, slope orientation (whether the slope is facing north or south), wind direction, terrain, vegetation, and general snowpack conditions. Different combinations of these factors can create low, moderate, or extreme avalanche conditions. In addition, some of these conditions, such as temperature and snowpack, can change on a daily or hourly basis.”<sup>82</sup>

When an avalanche is possible, an “avalanche advisory” is issued. This preliminary notification warns hikers, skiers, snowmobilers, and responders that conditions may be favorable for the development of avalanches. The chart above shows avalanche danger determined by likelihood, size, and distribution.<sup>83</sup>

<sup>81</sup> NSIDC, <http://nsidc.org/cryosphere/snow/science/avalanches.html>; image credit: Betsy Armstrong

<sup>82</sup> Copyright Richard Armstrong, NSIDC, <http://nsidc.org/cryosphere/snow/science/avalanches.html>

<sup>83</sup> [http://www.avalanche.org/danger\\_card.php](http://www.avalanche.org/danger_card.php)

**APPENDIX D: NH MAJOR DISASTER & EMERGENCY DECLARATIONS****Major Disaster (DR) & Emergency Declarations (EM)**

This list includes one Fire Management Assistance Declaration (FM)

Declarations are arranged chronologically; the most recent disaster is listed first

Number	Hazard	Date of Event	Counties	Description
<b>DR-4693</b>	Severe Winter Storm	December 22-25, 2022	Belknap, Grafton, Carroll & Coos	<b>Major Disaster Declaration, DR-4693:</b> A severe winter storm occurred December 22-25, 2022. Heavy, wet snow caused trees and power lines to fall; some roadways were closed. The declaration was declared in four of the state's ten counties.
<b>DR-4624</b>	Inland Flooding	July 29-July 30, 2021	Cheshire & Sullivan	<b>Major Disaster Declaration, DR-4624:</b> The Federal Emergency Management Agency announced a major disaster declaration and notification of individual and public assistance on October 4, 2021, for two NH Counties.
<b>DR-4622</b>	Inland Flooding	July 17-19, 2021	Cheshire	<b>Major Disaster Declaration, DR-4622:</b> The Federal Emergency Management Agency announced a major disaster declaration during a period of severe storms and flooding from July 17-19, 2021, in one New Hampshire County.
<b>DR-4516</b>	Infectious Disease	January 20, 2020 ongoing	All Ten NH Counties	<b>Major Disaster Declaration, DR-4516:</b> The Federal Emergency Management Agency ("FEMA") within the US Department of Homeland Security is giving public notice of its intent to assist the State of New Hampshire, local and tribal governments, and certain private nonprofit organizations under the major disaster declaration issued by the President on April 3, 2020, as a result of the Coronavirus Disease 2019 (Covid-19).
<b>EM-3445</b>	Infectious Disease	January 20, 2020 ongoing	All Ten NH Counties	<b>Emergency Declaration EM-3445:</b> A ten-county declaration to provide individual assistance and public assistance as a result of the impact of Covid-19
<b>DR-4457</b>	Severe Storm & Flooding	July 11-12, 2019	Grafton	<b>Major Disaster Declaration, DR-4457:</b> The Federal Emergency Management Agency announced a major disaster declaration for a period of severe storms and flooding from July 11-12, 2019, in one New Hampshire County.
<b>DR-4371</b>	Severe Winter Storms	March 13-14, 2018	Carroll, Strafford & Rockingham	<b>Major Disaster Declaration, DR 4371:</b> The Federal Emergency Management Agency announced a major disaster declaration on June 8, 2018, for a period of a severe winter storm from March 13-14, 2018.
<b>DR-4370</b>	Severe Storm & Flooding	March 2-8, 2018	Rockingham	<b>Major Disaster Declaration, DR 4370:</b> The Federal Emergency Management Agency announced a major disaster declaration on June 8, 2018, for a period of severe storms and flooding from March 2-8, 2018.
<b>DR-4355</b>	Severe Storms, Flooding	October 29-November 1, 2017	Sullivan, Grafton, Coos, Carroll, Belknap & Merrimack	<b>Major Disaster Declaration, DR-4355:</b> The Federal Emergency Management Agency (FEMA) announced that federal disaster assistance was available to supplement state and local recovery efforts in areas affected by severe storms and flooding from October 29-November 1, 2017, in five New Hampshire Counties.
<b>DR-4329</b>	Severe Storms, Flooding	July 1-2, 2017	Grafton & Coos	<b>Major Disaster Declaration DR-4329:</b> The Federal Emergency Management Agency (FEMA) announced that federal disaster assistance is available to the state of New Hampshire to supplement state and local recovery efforts in the areas affected by severe storms and flooding from July 1, 2017, to July 2, 2017, in Grafton County



Number	Hazard	Date of Event	Counties	Description
<b>DR-4316</b>	Severe Winter Storms	March 14-15, 2017	Belknap & Carroll	<b>Major Disaster Declaration DR-4316:</b> Severe winter storm and snowstorm in Belknap & Carroll Counties; disaster aid was provided to supplement state and local recovery efforts.
<b>FM-5123</b>	Forest Fire	April 21-23, 2016	Cheshire	<b>Fire Management Assistance Declaration, FM-5123: Stoddard, NH</b>
<b>DR-4209</b>	Severe Winter Storms	January 26-28, 2015	Hillsborough, Rockingham & Stafford	<b>Major Disaster Declaration DR-4209:</b> Severe winter storm and snowstorm in Hillsborough, Rockingham, and Strafford Counties; disaster aid was provided to supplement state and local recovery efforts.
<b>DR-4139</b>	Severe Storms, Flooding	July 9-10, 2013	Cheshire, Sullivan & Grafton	<b>Major Disaster Declaration DR-4139:</b> Severe storms, flooding, and landslides occurred from June 26 to July 3, 2013, in Cheshire, Sullivan, and southern Grafton Counties.
<b>DR-4105</b>	Severe Winter Storm	February 8, 2013	All Ten NH Counties	<b>Major Disaster Declaration DR-4105:</b> Nemo; heavy snow in February 2013.
<b>DR-4095</b>	Hurricane Sandy	October 26-November 8, 2012	Belknap, Carroll, Coos, Grafton, Rockingham & Sullivan	<b>Major Disaster Declaration DR-4095:</b> The declaration covers damage to property from the storm that spawned heavy rains, high winds, high tides, and flooding from October 26-November 8, 2012.
<b>EM-3360</b>	Hurricane Sandy	October 26-31, 2012	All Ten NH Counties	<b>Emergency Declaration EM-3360:</b> Hurricane Sandy came ashore in NJ, bringing NH high winds, power outages, and heavy rain. It was declared in all ten counties in New Hampshire.
<b>DR-4065</b>	Severe Storm & Flooding	May 29-31, 2012	Cheshire	<b>Major Disaster Declaration DR-4065:</b> Severe Storm and Flood Event May 29-31, 2012, in Cheshire County.
<b>DR-4049</b>	Severe Storm & Snowstorm	October 29-30, 2011	Hillsborough & Rockingham	<b>Major Disaster Declaration DR-4049:</b> Severe Storm and Snowstorm Event October 29-30, 2011, in Hillsborough and Rockingham Counties.
<b>EM-3344</b>	Severe Snowstorm	October 29-30, 2011	All Ten NH Counties	<b>Emergency Declaration EM-3344:</b> Severe storm during October 29-30, 2011, in all ten counties in New Hampshire (Snowtober).
<b>DR-4026</b>	Tropical Storm Irene	August 26-September 6, 2011	Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, & Sullivan	<b>Major Disaster Declaration DR-4026:</b> Tropical Storm Irene Aug 26th- Sept 6, 2011, in Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, & Sullivan Counties.
<b>EM-3333</b>	Tropical Storm Irene	August 26-September 6, 2011	All Ten NH Counties	<b>Emergency Declaration EM-3333:</b> An emergency Declaration was declared for Tropical Storm Irene in all ten counties.
<b>DR-4006</b>	Severe Storm & Flooding	May 26-30, 2011	Coos & Grafton Counties	<b>Major Disaster Declaration DR-4006:</b> May flooding event occurred May 26th-30th, 2011, in Coos & Grafton Counties (Memorial Day Weekend Storm).
<b>DR-1913</b>	Severe Storms & Flooding	March 14-31, 2010	Hillsborough & Rockingham	<b>Major Disaster Declaration DR-1913:</b> Flooding in two NH counties occurred, including Hillsborough and Rockingham counties.
<b>DR-1892</b>	Severe Winter Storm, Rain & Flooding	February 23 - March 3, 2010	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan	<b>Major Disaster Declaration: DR-1892:</b> Flood and wind damage to most of southern NH, including six counties; 330,000 homes without power; more than \$2 million obligated by June 2010.
<b>DR-1812</b>	Severe Winter Storm & Ice Storm	December 11-23, 2008	All Ten NH Counties	<b>Major Disaster Declaration DR-1812:</b> Damaging ice storms to the entire state, including all ten NH counties; fallen trees and large-scale power outages; five months after December's ice storm battered the region, nearly \$15 million in federal aid had been obligated.

Number	Hazard	Date of Event	Counties	Description
EM-3297	Severe Winter Storm	December 11, 2008	All Ten NH Counties	<b>Emergency Declaration EM-3297:</b> Severe winter storm beginning on December 11, 2008.
DR-1799	Severe Storms & Flooding	September 6-7, 2008	Hillsborough	<b>Major Disaster Declaration: DR-1799:</b> Severe storms and flooding began on September 6, 2008.
DR-1787	Severe Storms & Flooding	July 24-August 14, 2008	Belknap, Carroll & Grafton & Coos	<b>Major Disaster Declaration DR-1787:</b> Severe storms, a tornado, and flooding occurred on July 24, 2008.
DR-1782	Severe Storms, Tornado, & Flooding	July 24, 2008	Belknap, Carroll, Merrimack, Strafford & Rockingham	<b>Major Disaster Declaration DR-1782:</b> Tornado damage to several NH counties.
DR-1695	Nor'easter, Severe Storms & Flooding	April 15-23, 2007	All Ten NH Counties	<b>Major Disaster Declaration DR-1695:</b> Flood damages; FEMA & SBA obligated more than \$27.9 million in disaster aid following the April nor'easter. (Tax Day Storm)
DR-1643	Severe Storms & Flooding	May 12-23, 2006	Belknap, Carroll, Grafton, Hillsborough, Merrimack, Rockingham & Strafford	<b>Major Disaster Declaration DR-1643:</b> Flooding in most of southern NH; May 12-23, 2006 (aka Mother's Day Storm).
DR-1610	Severe Storms & Flooding	October 7-18, 2005	Belknap, Cheshire, Grafton, Hillsborough, Merrimack & Sullivan	<b>Major Disaster Declaration DR-1610:</b> State and federal disaster assistance reached more than \$3 million to help residents and business owners in New Hampshire recover from losses from severe storms and flooding in October 2005.
EM-3258	Hurricane Katrina Evacuation	August 29-October 1, 2005	All Ten NH Counties	<b>Emergency Declaration EM-3258:</b> Assistance to evacuees from the area struck by Hurricane Katrina and to provide emergency assistance to those areas beginning on August 29, 2005, and continuing. The President's action made federal funding available to the state's ten counties.
EM-3211	Snow	March 11-12, 2005	Carroll, Cheshire, Hillsborough, Rockingham & Sullivan	<b>Emergency Declaration EM-3211:</b> March snowstorm; more than \$2 million has been approved to help pay for costs of the snow removal; Total aid for the March storm is <b>\$2,112,182.01</b> (Carroll: \$73,964.57; Cheshire: \$118,902.51; Hillsborough: \$710,836; Rockingham: \$445,888.99; Sullivan: \$65,088.53; State of NH: \$697,501.41)
EM-3208	Snow	February 10-11, 2005	Carroll, Cheshire, Coos, Grafton & Sullivan	<b>Emergency Declaration EM-3208:</b> FEMA had obligated more than \$1 million by March 2005 to help pay for costs of the heavy snow and high winds; Total aid for the February storm is <b>\$1,121,727.20</b> (Carroll: \$91,832.72; Cheshire: \$11,0021.18; Coos: \$11,6508.10; Grafton: \$213,539.52; Sullivan: \$68,288.90; State of NH: \$521,536.78)
EM 3208-002	Snow	January, February, March 2005	Belknap, Carroll, Cheshire, Grafton, Hillsborough, Rockingham, Merrimack, Strafford & Sullivan	<b>Emergency Declaration EM 3208-002:</b> The Federal Emergency Management Agency (FEMA) has obligated more than \$6.5 million to reimburse state and local governments in New Hampshire for costs incurred in three snowstorms that hit the state earlier this year, according to disaster recovery officials. Total aid for all three storms is \$6,892,023.87 (January: \$3,658,114.66; February: \$1,121,727.20; March: \$2,113,182.01)



Number	Hazard	Date of Event	Counties	Description
EM-3207	Snow	January 22-23, 2005	Belknap, Carroll, Cheshire, Grafton, Hillsborough, Rockingham, Merrimack, Strafford & Sullivan	<b>Emergency Declaration EM-3207:</b> More than \$3.5 million has been approved to help pay for the costs of the heavy snow and high winds; Total aid for the January storm is <b>\$3,658,114.66</b> (Belknap: \$125,668.09; Carroll: \$52,864.23; Cheshire: \$134,830.95; Grafton: \$137,118.71; Hillsborough: \$848,606.68; Merrimack: \$315,936.55; Rockingham: \$679,628.10; Strafford: \$207,198.96; Sullivan: \$48,835.80; State of NH: \$1,107,426.59)
EM-3193	Snow	December 6-7, 2003	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack & Sullivan	<b>Emergency Declaration EM-3193:</b> The declaration covers jurisdictions with record and near-record snowfall that occurred throughout December 6-7, 2003
DR-1489	Severe Storms & Flooding	July 21-August 18, 2003	Cheshire & Sullivan	<b>Major Disaster Declaration DR-1489:</b> Floods stemming from persistent rainfall and severe storms caused damage to public property from July 21 through August 18, 2003.
EM-3177	Snowstorm	February 17-18, 2003	Cheshire, Hillsborough, Merrimack, Rockingham & Strafford	<b>Emergency Declaration EM-3177:</b> Declaration covers jurisdictions with record and near-record snowfall from the snowstorm that occurred February 17-18, 2003
EM-3166	Snowstorm	March 5-7, 2001	Cheshire, Coos, Grafton, Hillsborough, Merrimack, Rockingham & Strafford	<b>Emergency Declaration EM-3166:</b> Declaration covers jurisdictions with record and near-record snowfall from the late winter storm that occurred in March 2001
DR-1305	Tropical Storm Floyd	September 16-18, 1999	Belknap, Cheshire & Grafton	<b>Major Disaster Declaration DR-1305:</b> The declaration covers damage to public property from the storm that spawned heavy rains, high winds, and flooding throughout September 16-18.
DR-1231	Severe Storms & Flooding	June 12-July 2, 1998	Belknap, Carroll, Grafton, Hillsborough, Merrimack & Rockingham	<b>Major Disaster Declaration DR-1231:</b>
DR-1199	Ice Storm	January 7-25, 1998	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, Strafford & Sullivan	<b>Major Disaster Declaration DR-1199:</b>
DR-1144	Severe Storms/Flooding	October 20-23, 1996	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan	<b>Major Disaster Declaration DR-1144:</b>
DR-1077	Storms/Floods	October 20-November 15, 1995	Carroll, Cheshire, Coos, Grafton, Merrimack & Sullivan	<b>Major Disaster Declaration DR-1077:</b>

Number	Hazard	Date of Event	Counties	Description
EM-3101	High Winds & Record Snowfall	March 13-17, 1994	All Ten NH Counties	Emergency Declaration EM-3101:
DR-923	Severe Coastal Storm	October 30-31, 1991	Rockingham	Major Disaster Declaration DR-923:
DR-917	Hurricane Bob, Severe Storm	August 18-20, 1991	Carroll, Hillsborough, Rockingham & Strafford	Major Disaster Declaration DR-917:
DR-876	Flooding, Severe Storm	August 7-11, 1990	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, & Sullivan	Major Disaster Declaration DR-876:
DR-789	Severe Storms & Flooding	March 30-April 11, 1987	Carroll, Cheshire, Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan	Major Disaster Declaration DR-789
DR-771	Severe Storms & Flooding	July 29-August 10, 1986	Cheshire, Hillsborough & Sullivan	Major Disaster Declaration DR-771:
EM-3073	Flooding	March 15, 1979	Coos	Emergency Declaration EM-3073:
DR-549	High Winds, Tidal Surge, Coastal Flooding & Snow	February 16, 1978	All Ten NH Counties	Major Disaster Declaration DR-549: Blizzard of 1978
DR-411	Heavy Rains, Flooding	January 21, 1974	Belknap, Carroll, Cheshire & Grafton	Major Disaster Declaration DR-411:
DR-399	Severe Storms & Flooding	July 11, 1973	All Ten NH Counties	Major Disaster Declaration DR-399:
DR-327	Coastal Storms	March 18, 1972	Rockingham	Major Disaster Declaration DR-327:
DR-11	Forest Fire	July 2, 1953	Carroll	Major Disaster Declaration DR-11:

**Source:**

Disaster Declarations for New Hampshire

[http://www.fema.gov/disasters/grid/state-tribal-government/33?field\\_disaster\\_type\\_term\\_tid\\_1=All](http://www.fema.gov/disasters/grid/state-tribal-government/33?field_disaster_type_term_tid_1=All)

**APPENDIX E: HAZARD MITIGATION PLANNING – LIST OF ACRONYMS**

AAR .....	After Action Report	HSEM .....	Homeland Security Emergency Management
ACS .....	Acute Care Site	HSPD .....	Homeland Security Presidential Directive
ARC .....	American Red Cross	IAP .....	Incident Action Plan
ARES .....	Amateur Radio Emergency Service	IC.....	Incident Commander
BFE .....	Base Flood Elevation	ICC .....	Incident Command Center
BOCA.....	Building Officials and Code Administrators	ICS .....	Incident Command System
CBRNE .....	Chemical, Biological, Radiological,	JIC.....	Joint Information Center
CDC .....	Centers for Disease Control and Prevention	LEOP.....	Local Emergency Operations Plan
CDP .....	Center for Domestic Preparedness	MAPS .....	Mapping and Planning Solutions
CERT .....	Community Emergency Response Team	MCI.....	Mass Casualty Incident
CFR .....	Code of Federal Regulations	MEF.....	Mission Essential Function
CIKR .....	Critical Infrastructure & Key Resources	MOU .....	Memorandum of Understanding
CIP.....	Capital Improvements Program	NAWAS .....	National Warning System
COG .....	Continuity of Government	NEF .....	National Essential Function
COGCON.....	Continuity of Government Readiness Conditions	NERF.....	Non-Emergency Response Facility
COOP .....	Continuity of Operations	NFIP .....	National Flood Insurance Program
CPCC.....	Continuity Policy Coordination Committee	NGVD .....	National Geodetic Vertical Datum of 1929
CWPP .....	Community Wildfire Protection Plan	NIMS .....	National Incident Management System
DBHRT .....	Disaster Behavioral Health Response Team	NOAA .....	National Oceanic and Atmospheric Association
DEMD .....	Deputy Emergency Management Director	NRP.....	National Response Plan
DES .....	Department of Environment Services	NSPD .....	National Security Presidential Directive
DFO .....	Disaster Field Office	NTAS.....	National Terrorism Advisory System Nuclear and Explosive
DHHS .....	Department of Health and Human Services	NWS.....	National Weather Service
DHS .....	Department of Homeland Security	PA .....	Public Assistance
DMCR .....	Disaster Management Central Resource	PDA.....	Preliminary Damage Assessment
DBEA .....	Department of Business & Economic Affairs	PDD.....	Presidential Decision Directive
DNCR .....	Department of Natural & Cultural Resources	PIO .....	Public Information Officer
DOD.....	Department of Defense	PMEF .....	Primary Mission Essential Function
DOE .....	Department of Energy	POD .....	Point of Distribution
DOJ .....	Department of Justice	PPE .....	Personal Protective Equipment
DOT .....	Department of Transportation	PR .....	Potential Resources
DPW .....	Department of Public Works	PSA .....	Public Service Announcement
DRC.....	Disaster Recovery Center	RERP .....	Radiological Emergency Response Plan
EAS .....	Emergency Alert System	RNAT.....	Rapid Needs Assessment Team
EMD.....	Emergency Management Director	SERT.....	State Emergency Response Team
EMS.....	Emergency Medical Services	SITREP .....	Situation Report (Also SitRep)
EO .....	Executive Order	SNS.....	Strategic National Stockpile
EOC.....	Emergency Operations Center	SOG .....	Standard Operating Guidelines
EPA .....	U.S. Environmental Protection Agency	SOP.....	Standard Operating Procedures
EPZ.....	Emergency Planning Zone	SPNHF .....	Society for the Protection of NH Forests
ERF .....	Emergency Response Facility	UC .....	Unified Command
ERG.....	Emergency Relocation Group	USDA-FS .....	US Department of Agriculture – Forest Service
ESF.....	Emergency Support Functions	USGS .....	United States Geological Society
FEMA.....	Federal Emergency Management Agency	VOAD .....	Volunteer Organization Active in Disasters
FIRM.....	Flood Insurance Rate Map	WMD .....	Weapon(s) of Mass Destruction
FPP.....	Facilities & Populations to Protect	WMNF .....	White Mountain National Forest
GIS .....	Geographic Information System	WUI .....	Wildland Urban Interface
HazMat .....	Hazardous Material(s)		
HFRA .....	Healthy Forest Restoration Act		
HMGP .....	Hazard Mitigation Grant Program		
HSAS.....	Homeland Security Advisory System		

**APPENDIX F: POTENTIAL MITIGATION IDEAS<sup>84</sup>****Drought**

- D1 ..... Assess Vulnerability to Drought Risk
- D2 ..... Monitoring Drought Conditions
- D3 ..... Monitor Water Supply
- D4 ..... Plan for Drought
- D5 ..... Require Water Conservation during Drought Conditions
- D6 ..... Prevent Overgrazing
- D7 ..... Retrofit Water Supply Systems
- D8 ..... Enhance Landscaping & Design Measures
- D9 ..... Educate Residents on Water Saving Techniques
- D10 ..... Educate Farmers on Soil & Water Conservation Practices
- D11 ..... Purchase Crop Insurance

**Earthquake**

- EQ1 .... Adopt & Enforce Building Codes
- EQ2 .... Incorporate Earthquake Mitigation into Local Planning
- EQ3 .... Map & Assess Community Vulnerability to Seismic Hazards
- EQ4 .... Conduct Inspections of Building Safety
- EQ5 .... Protect Critical Facilities & Infrastructure
- EQ6 .... Implement Structural Mitigation Techniques
- EQ7 .... Increase Earthquake Risk Awareness
- EQ8 .... Conduct Outreach to Builders, Architects, Engineers, and Inspectors
- EQ9 .... Provide Information on Structural & Non-Structural Retrofitting

**Erosion**

- ER1 .... Map & Assess Vulnerability to Erosion
- ER2 .... Manage Development in Erosion Hazard Areas
- ER3 .... Promote or Require Site & Building Design Standards to Minimize Erosion Risk
- ER4 .... Remove Existing Buildings & Infrastructure from Erosion Hazard Areas
- ER5 .... Stabilize Erosion Hazard Areas
- ER6 .... Increase Awareness of Erosion Hazards

**Extreme Temperatures**

- ET1 ..... Reduce Urban Heat Island Effect
- ET2 ..... Increase Awareness of Extreme Temperature Risk & Safety
- ET3 ..... Assist Vulnerable Populations
- ET4 ..... Educate Property Owners about Freezing Pipes

**Hailstorm**

- HA1 .... Locate Safe Rooms to Minimize Damage
- HA2 .... Protect Buildings from Hail Damage
- HA3 .... Increase Hail Risk Awareness

**Landslide**

- LS1 ..... Map & Assess Vulnerability to Landslides
- LS2 ..... Manage Development in Landslide Hazard Areas
- LS3 ..... Prevent Impacts to Roadways
- LS4 ..... Remove Existing Buildings & Infrastructure from Landslide

**Lightning**

- L1 ..... Protect Critical Facilities
- L2 ..... Conduct Lightning Awareness Programs

**Flood**

- F1 ..... Incorporate Flood Mitigation in Local Planning
- F2 ..... Form Partnerships to Support Floodplain Management
- F3 ..... Limit or Restrict Development in Floodplain Areas
- F4 ..... Adopt & Enforce Building Codes and Development Standards
- F5 ..... Improve Stormwater Management Planning
- F6 ..... Adopt Policies to Reduce Stormwater Runoff
- F7 ..... Improve Flood Risk Assessment
- F8 ..... Join or Improve Compliance with NFIP
- F9 ..... Manage the Floodplain Beyond Minimum Requirements
- F10 ..... Participate in the CRS
- F11 ..... Establish Local Funding Mechanism for Flood Mitigation
- F12 ..... Remove Existing Structures from Flood Hazard Areas
- F13 ..... Improve Stormwater Drainage System Capacity
- F14 ..... Conduct Regular Maintenance for Drainage Systems & Flood Control Structures
- F15 ..... Elevate or Retrofit Structures & Utilities
- F16 ..... Floodproof Residential & Non-Residential Structures
- F17 ..... Protect Infrastructure
- F18 ..... Protect Critical Facilities
- F19 ..... Construct Flood Control Measures
- F20 ..... Protect & Restore Natural Flood Mitigation Features
- F21 ..... Preserve Floodplains as Open Space
- F22 ..... Increase Awareness of Flood Risk & Safety
- F23 ..... Educate Property Owners about Flood Mitigation Techniques

**Severe Wind**

- SW1 ... Adopt & Enforce Building Codes
- SW2 ... Promote or Require Site & Building Design Standards to Minimize Wind Damage
- SW3 ... Assess Vulnerability to Severe Wind
- SW4 ... Protect Power Lines & Infrastructure
- SW5 ... Retrofit Residential Buildings
- SW6 ... Retrofit Public Buildings & Critical Facilities
- SW7 ... Increase Severe Wind Awareness

**Severe Winter Weather**

- WW1 .. Adopt & Enforce Building Codes
- WW2 .. Protect Buildings & Infrastructure
- WW3 .. Protect Power Lines
- WW4 .. Reduce Impacts to Roadways
- WW5 .. Conduct Winter Weather Risk Awareness Activities
- WW6 .. Assist Vulnerable Populations

**Tornado**

- T1 ..... Encourage Construction of Safe Rooms
- T2 ..... Require Wind-Resistant Building Techniques
- T2 ..... Conduct Tornado Awareness Activities

<sup>84</sup> Mitigation Ideas, A Resource for Reducing Risk to Natural Hazards, FEMA, January 2013

**Wildfire**

WF1 ..... Map & Assess Vulnerability to Wildfire  
WF2 ..... Incorporate Wildfire Mitigation in the Comprehensive Plan  
WF3 ..... Reduce Risk through Land Use Planning  
WF4 ..... Develop a Wildland Urban Interface Code  
WF5 ..... Require or Encourage Fire-Resistant Construction  
Techniques  
WF6 ..... Retrofit At-Risk Structure with Ignition-Resistant Materials  
WF7 ..... Create Defensible Space around Structures &  
Infrastructure  
WF8 ..... Conduct Maintenance to Reduce Risk  
WF9 ..... Implement a Fuels Management Program  
WF10 ..... Participate in the Firewise® Program  
WF11 ..... Increase Wildfire Awareness  
WF12 ..... Educate Property Owners about Wildfire Mitigation  
Techniques

**Multi-Hazards**

MU1 ..... Assess Community Risk  
MU2 ..... Map Community Risk  
MU3 ..... Prevent Development in Hazard Areas  
MU4 ..... Adopt Regulations in Hazard Areas  
MU5 ..... Limit Density in Hazard Areas  
MU6 ..... Integrate Mitigation into Local Planning  
MU7 ..... Strengthen Land Use Regulations  
MU8 ..... Adopt & Enforce Building Codes  
MU9 ..... Create Local Mechanisms for Hazard Mitigation  
MU10 ..... Incentivize Hazard Mitigation  
MU11 ..... Monitor Mitigation Plan Implementation  
MU12 ..... Protect Structures  
MU13 ..... Protect Infrastructure & Critical Facilities  
MU14 ..... Increase Hazard Education & Risk Awareness  
MU15 ..... Improve Household Disaster Preparedness  
MU16 ..... Promote Private Mitigation Efforts

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*Photo Credit: <https://www.facebook.com/BristolNHFireDepartment/photos/pb.100064505120090.-2207520000./440212966061264/?type=3>*

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