

BETHLEHEM, New Hampshire

Hazard Mitigation Plan Update 2026



This Plan integrates the following:

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

June 19, 2026
Draft for Town Review

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

By

The Bethlehem Hazard Mitigation Planning Team

With assistance from Mapping and Planning Solutions

"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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Cover Photos:

Tree across Route 302 (Long Hill) - <https://www.facebook.com/groups/101197703295876/media>

Lightning over Bethlehem - <https://www.facebook.com/groups/101197703295876/media>

Fatal House Fire - <https://www.wcvb.com/article/investigation-underway-after-fatal-house-fire-in-bethlehem-new-hampshire/62519003>

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Acknowledgments

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

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

This Plan is an update to the most recent Bethlehem hazard mitigation plan, which was approved on July 2, 2021

This Plan was funded under the Building Resilient Infrastructure & Communities Grant Program (BRIC2023)

Approval Notification Dates for 2026 Update

Approved Pending Adoption (APA)....., 2026
Jurisdiction Adoption:, 2026
CWPP Approval:, 2026
***Plan Approval Date (FEMA):, 2026**
Receipt of FEMA Letter, 2026
Plan Distribution (MAPS):....., 2026
**The start of the next five-year clock*

TOWN OF BETHLEHEM HAZARD MITIGATION PLANNING TEAM (HMPT)

The Town of Bethlehem would like to thank the following individuals for the time and effort they spent completing this Plan. The following people have attended meetings or been instrumental in completing this Plan:

- John Galloway Bethlehem Fire Chief & Emergency Management Director
- Mary Moritz Town Administrator
- Mike Bruno Bethlehem Select Board Member
- Brett Jackson Bethlehem Road Agent
- Jeff Dube Bethlehem Police Chief
- Sean Gawlik Bethlehem Planning Board
- Derek Brown Bethlehem Village District Supervisor
- Brian Charland Bethlehem Deputy Fire Chief
- Kevin Partington NH HSEM Stakeholder Liaison
- Peter Llewelyn NH HSEM Stakeholder Liaison
- Lynne Ryan NH HSEM State Hazard Mitigation Planner
- June Garneau MAPS Owner/Planner
- Olin Garneau MAPS Senior Planner

Many thanks for all the hard work and effort you provided. This Plan would not exist without your knowledge and experience. Bethlehem would also like to thank FEMA and NH HSEM as the primary funding sources for this Plan.

Executive Summary

The Bethlehem, NH Hazard Mitigation Plan Update 2021 was compiled to assist the Town in reducing and mitigating future losses from natural and other hazardous events. The Bethlehem Hazard Mitigation Planning Team (HMPT) developed the Plan in collaboration with interested stakeholders, the 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 Bethlehem Hazard Mitigation Plan Update 2021. To produce an accurate and current planning document, the HMPT used the 2021 plan as a foundation, building upon that plan to provide more timely information.

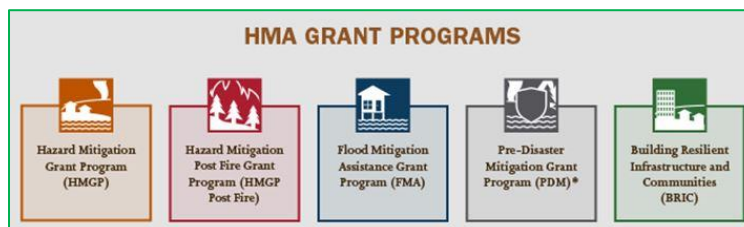
This Plan focuses on mitigation action items for natural hazards. NH Homeland Security & Emergency Management (HSEM) determined the natural hazards when writing the 2023 NH Hazard Mitigation Plan. However, this Plan also addresses technological and human-caused hazards, as shown below.

NATURAL HAZARDS – AS DETERMINED BY NH HSEM AND THE TOWN

- | | |
|------------------------------------|----------------------------------|
| 1) High Wind Events | 8) Lightning |
| 2) Severe Winter Weather | 9) Dam Failure |
| 3) Inland Flooding | 10) Wildfire |
| 4) Extreme Temperatures | 11) Earthquake |
| 5) Infectious Disease | 12) Solar Storms & Space Weather |
| 6) Drought | 13) Landslides |
| 7) Tropical/Post Tropical Cyclones | |

TECHNOLOGICAL & HUMAN-CAUSED HAZARDS

- | | |
|-------------------------|----------------------------------|
| 1) Hazardous Materials | 6) Long-Term Utility Outage |
| 2) Transport Accidents | 7) Mass Casualty Incidents |
| 3) Cyber Events | 8) Known & Emerging Contaminants |
| 4) Terrorism & Violence | 9) Conflagration |
| 5) Aging Infrastructure | |



Some hazards listed in the 2023 New Hampshire Hazard Mitigation Plan were excluded from this Plan because the team deemed them unlikely to occur in Bethlehem or not applicable. An explanation for excluding these hazards from this Plan can be found 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). It also 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 a common hazard in the State, most New Hampshire communities handle two- to three-foot snowstorms with little to 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, trimming trees, opening shelters, and possibly burying overhead power lines are a few actions that could 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 Bethlehem 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:

Bethlehem, NH Hazard Mitigation Plan Update 2026	the Plan or this Plan
Bethlehem	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 Bethlehem 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 Bethlehem 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 International Organization for Standardization (ISO) rating may be improved.

Chapter 1: Hazard Mitigation Planning Process

A. AUTHORITY & FUNDING

The Bethlehem, NH Hazard Mitigation Plan Update 2026 was prepared following the Disaster Mitigation Act of 2000 (DMA), specifically Section 322 Mitigation Planning, which was signed into law by President Clinton on October 30, 2000. This hazard mitigation plan was prepared by the Bethlehem 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".¹*

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."²

HSEM's goal is 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 Bethlehem, NH Hazard Mitigation Plan Update 2026 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 annually and update it every five years to maintain program eligibility.

¹ Disaster Mitigation Act (DMA) of 2000, Section 101, b1 & b2

² Disaster Mitigation Act (DMA) of 2000, Section 322a

C. JURISDICTION

This Plan addresses one jurisdiction – the Town of Bethlehem, Grafton County, New Hampshire.

D. SCOPE OF THE PLAN AND FEDERAL & STATE PARTICIPATION

A community's hazard mitigation plan typically identifies numerous natural hazards and is generally broad in scope and outline. The scope and effects of this Plan were assessed based on the impact of hazards 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 the Federal Emergency Management Agency (FEMA), NH Homeland Security & Emergency Management (HSEM), the United States Department of Agriculture-Forest Service (USDA-FS), and the NH Department of Natural & Cultural Resources (DNCR), as well as routine notification of upcoming meetings to other state and federal entities. Designation as a CWPP may enable a community to secure state or federal funding for hazardous fuel reduction and other mitigation projects, as 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 USDA-Forest Service to consider local communities as it develops 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, recommending the types and treatment methods 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.³

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, or its lack of membership. The Plan must address NFIP-insured structures and repetitive loss as part of a vulnerability assessment.

³ Healthy Forest Restoration Act; HR 1904, 2003; Section 101-3-a.b.c; <https://www.govinfo.gov/content/pkg/BILLS-108hr1904enr/pdf/BILLS-108hr1904enr.pdf>

E. PUBLIC & STAKEHOLDER INVOLVEMENT

Public and stakeholder involvement was emphasized during the initial meeting, and community officials were provided with a list of potential team members (see below). Community officials were encouraged to reach out to as many people as possible to participate in the planning process, including residents, local officials, and representatives from surrounding communities. The Town of Bethlehem 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 Bethlehem. A press release (see below) was posted on the Town Office bulletin board, on the Town's website, and on the Town's calendar. The press release was used to notify academia, businesses, and private and nonprofit organizations that work with underserved communities and socially vulnerable populations about upcoming meetings, inviting them to attend. Local school officials were also invited to attend meetings.

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

*Mapping and Planning Solutions
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Press Release

FOR IMMEDIATE RELEASE
Updated: September 16, 2025

Contact: June Garneau
603-991-9664

THE TOWN OF BETHLEHEM COMMENCES HAZARD MITIGATION PLANNING

The Bethlehem Emergency Management Director (EMD) will meet with June Garneau of Mapping and Planning Solutions and other Community members to work on the required five-year update to the **2021 Bethlehem 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 Hazard Mitigation Planning Team (HMPT) will address natural, technological, and human-caused hazards such as Inland Flooding, Long-Term Utility Outages, and Transport Accidents; the Team will also 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. FEMA grants make the planning processes possible.

The Hazard Mitigation Planning Team (HMPT) is currently being formed. Bethlehem citizens and any interested stakeholders are invited to participate. The first meeting is scheduled for **Wednesday, October 15, 2025, from 10:00 AM to 12:00 PM** via Zoom. The public is encouraged to attend all meetings. To be included in the process, all interested parties should contact John Galloway, Fire Chief and Emergency Management Director, by email at firechief@bethlehemnh.org; interested parties will be added to the Zoom meeting invitation list. Future meetings are scheduled for November 12, December 17, January 14, and February 11, 2026.

More information on the hazard mitigation planning process is available from June Garneau at jgarneau@mappingandplanning.com.

Lastly, the Planner sent a monthly calendar (see below) and an email inviting stakeholders to participate in MAPS' planning meetings. Emergency Management Directors (EMDs), Police Chiefs, Fire Chiefs, Rangers, and other state, federal, and private officials were included in this email blast. Bethlehem's neighbors, Dalton, Whitefield, Carroll, Hart's Location, Lincoln, Franconia, Sugar Hill, Lisbon, and Littleton, are also part of MAPS' monthly email.



Upcoming Zoom Meetings

Colored by county – Ordered by Date
November 2025 to April 2026



Day	Date	Time	Town/Location	Plan Type	County
Wednesday	11/12/25	10:00 AM	Bethlehem Zoom Meeting	HMP	Grafton
Wednesday	11/12/25	6:30 PM	Kensington Zoom Meeting	HMP	Rockingham
Tuesday	12/2/25	1:00 PM	Goffstown Zoom Meeting	HMP	Hillsborough
Wednesday	12/10/25	6:30 PM	Kensington Zoom Meeting	HMP	Rockingham
Tuesday	12/16/25	1:00 PM	Campton Zoom Meeting	HMP	Grafton
Wednesday	12/17/25	10:00 AM	Bethlehem Zoom Meeting	HMP	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 senior citizen population, and other economic factors, smaller communities have a dwindling number of young people interested in town planning.

Bethlehem had excellent participation in developing this Plan. The Fire Chief/EMD and Deputy Fire Chief, Police Chief, Bethlehem Village District Supervisor, and Road Agent participated in meetings. Town staff, including the Town Administrator, and members of the Select Board and Planning Board, also attended meetings. Although citizens of Bethlehem were invited, no citizens were able to make it to the meetings. Comments made by all team members were integrated into the narrative discussion and incorporated into the document.

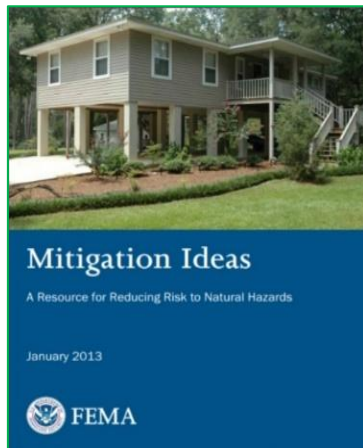
§201.6(b) requires that there be an open public involvement process in the formation of a plan. This process shall provide an opportunity for the public to comment on the Plan during its formation as well as an opportunity for any neighboring communities, businesses, and others to review any existing 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.

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

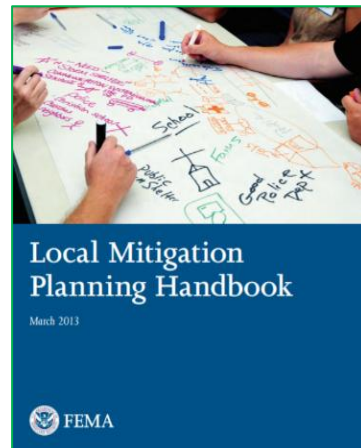
The planning process included a comprehensive review of the Bethlehem Hazard Mitigation Plan Update 2021 for updates, development changes, and accomplishments. The Team worked with the Planner to identify pertinent information from the reviewed documents; this information was then added to the appropriate place in the Plan. Additionally, as noted in the bibliography and footnotes throughout the Plan, numerous other documents were consulted to create this mitigation plan. Some, but not all, of those plans and documents are listed below:

Bethlehem Hazard Mitigation Plan Update 2021	Compare & Contrast
Bethlehem Master Plan (2016)	Community Information
Bethlehem Annual Reports (2025)	Fire Report & Development
Other Hazard Mitigation Plans (Conway, Franconia, Littleton, Carroll)	Formats & Mitigation Ideas
The Bethlehem Subdivision Regulations (2023).....	New Development Regulations
The Bethlehem Site Plan Review Regulations (2024).....	Commercial Regulations
The Bethlehem Zoning Ordinance (2025)	Zoning Regulations
Floodplain Development Ordinance (Part of Zoning)	Floodplain Regulations
Census 2020 Redistricting Data	Population Data
The NH DRA Summary of Inventory of Valuation MS-1 2025 for Bethlehem	Structure Evaluation
The Economic & Labor Market Information Bureau Community Profile	Population Trends
The American Community Survey (ACS 2024, 2020-2024).....	Population Trends
Mitigation Ideas, FEMA, January 2013	Mitigation Strategies
The Department of Cultural & Natural Resources (DNCR)	DNCR Fire Report
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.



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-local-mitigation-planning-handbook_03-2013.pdf

G. HAZARD MITIGATION GOALS

Before identifying new mitigation action items, the Team reviewed and agreed to the State of New Hampshire Multi-Hazard Mitigation Plan Update 2023 goals.⁴ The goals below have been modified for grammatical purposes but are otherwise quoted directly from the State plan.

OVERARCHING GOALS

1. Minimize loss and disruption of human life, property, the environment, and the economy due to natural hazards and high-hazard potential dam failure through coordinated and collaborative efforts between federal, state, and local authorities to implement appropriate and cost-effective hazard mitigation measures.
2. Enhance the protection of the general population, citizens, and guests of the Town before, during, and after a hazard event through public education about disaster preparedness and resilience and expanded awareness of the threats and hazards that face the State.
3. Promote comprehensive hazard mitigation planning at the local level to encourage data integration, plan alignment, and identification of funding and other resources.
4. Identify how climate change impacts natural hazards and mitigation strategies.
5. Strengthen the Continuity of Operations and Continuity of Government across the local level to ensure the continuation of essential services through training, outreach, and education.
6. Promote equity by challenging municipalities to incorporate whole community concepts during the planning and execution of mitigation projects, encouraging the identification and inclusion of vulnerable populations in the planning process.

NATURAL HAZARD OBJECTIVES

1. Reduce long-term risks through assessment, identification, and strategic mitigation of at risk/vulnerable infrastructure (high hazard potential and other dams, stream crossings, roadways, coastal levees, etc.)
2. Minimize illnesses and deaths related to events that present a threat to human and animal health
3. Assist communities with plan development, outreach, and public education in order to reduce the impact from natural disasters
4. Ensure mitigation strategies consider the protection and resiliency of natural, historical, and cultural resources.
5. Effectively collaborate between federal, State, and local agencies as well as private partners, NGOs, and VOADs
6. Ensure that grant related funding processes allow for expedient and effective actions to take place at the Community and State-level

TECHNOLOGICAL & HUMAN-CAUSED HAZARD OBJECTIVES

The State recognizes that technological and human-caused hazards are important to consider at the state and local level. The State and local jurisdictions must prepare to respond to and monitor for these types of hazards. As such, they will remain included in this Plan as an Annex for reference purposes. Strategies and action items for these hazards will not be included in this Plan so that the focus can remain on natural hazards.

⁴ New Hampshire State Hazard Mitigation Plan, 2023 Update; <https://prd.blogs.nh.gov/dos/hsem/wp-content/uploads/2023/10/2023-NH-State-Hazard-Mitigation-Plan-Signed-10.5.23.pdf>

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 crosstalk 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

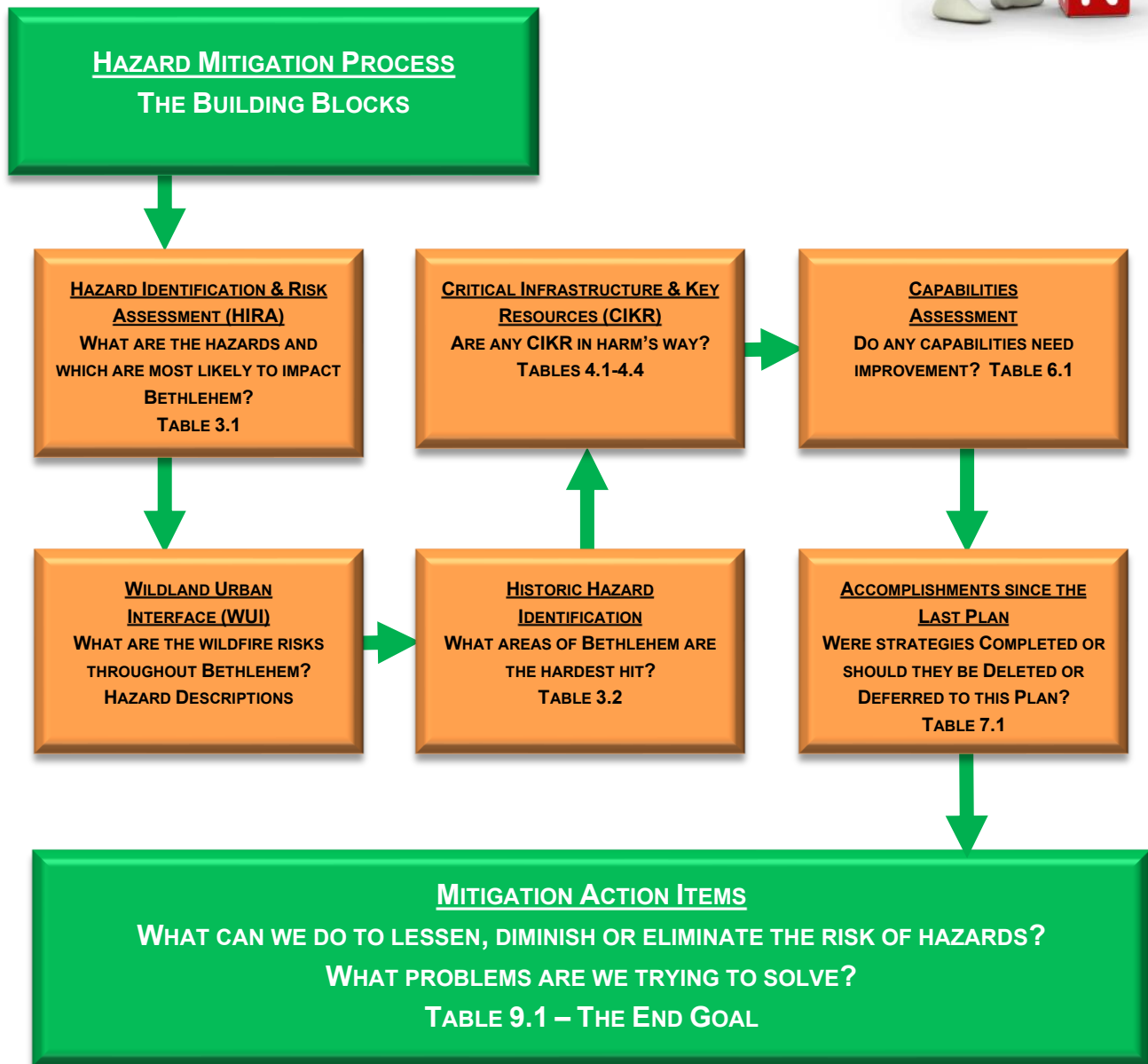
Step 11: Review the Plan before submission to HSEM for APA (Approved Pending Adoption)

Step 12: Adopt and monitor the Plan

I. HAZARD MITIGATION BUILDING BLOCKS & TABLES

The previous plan was the foundation for this mitigation plan; each completed table started 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

The completion of this new hazard mitigation plan required significant preparation. The Plan was developed by coordinating with local, state, and federal agencies. All meetings were designed to facilitate brainstorming, open discussion, and increased awareness of potentially hazardous conditions within the Town.

The planning process included a comprehensive review of the Bethlehem Hazard Mitigation Plan Update 2021. Each element of the old plan was examined and revised to reflect changes in development and the Community's priorities, using the 2021 plan as a base. Strategies from the past were also reassessed and improved upon for the future.

The following narrative explains how the 2021 plan was used during each step of the planning process to make revisions that resulted in this Plan.

MEETING 1, OCTOBER 15, 2025

The first meeting with the Bethlehem Hazard Mitigation Team was held on October 15, 2025. Meeting attendance included John Galloway (Fire Chief/EMD); Mary Moritz (Town Administrator), Mike Bruno (Select Board Member), Brett Jackson (Road Agent), Jeff Dube (Police Chief), and June Garneau (Owner, 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. The Planner also explained the need to sign in, track time, and provide public notice to encourage community involvement.⁵

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 through GIS or get them later. There was some discussion about the seasonal population change in Bethlehem with summer and winter homes. The increase in the daily population was also discussed. The Team tabled this issue until the next meeting, when more information may be available from either the Census Bureau or the Town.

Next on the agenda was *Table 3.1, Hazard Identification & Risk Assessment (HIRA)*. The Team assessed which hazards could affect the Community using the Town's last HMP and the State of New Hampshire Multi-Hazard Mitigation Plan Update 2023.

Meeting 1 – October 15, 2025

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 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 (i.e., 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 Statistics
- b) Table 3.1, Hazard Identification & Risk Analysis (HIRA)
- c) Hazard Descriptions
- d) Tables 4.1-4.4, Critical Infrastructure & Key Resources (CIKR)

5) Homework

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

6) Future Meetings

- a) Wed., November 12, 2025 @ 10:00 AM
- b) Wed., December 17, 2025 @ 10:00 AM
- c) Wed., January 14, 2025 @ 10:00 AM
- d) Wed., February 11, 2025 @ 10:00 AM

⁵ Documents emailed to the Team pre-meeting: agenda, process, acronyms & abbreviations, goals, work record, and 2023 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 What is the probability of death or Injury?
- The Property Impact What is the probability of physical losses and damages?
- The Business Impact What is the probability of interruption of service?
- The Probability What is the likelihood of this occurring within 25 years?

The rankings were then calculated to reveal the hazards that pose the Community's most significant risks. Thirteen natural hazards and nine technological and human-caused hazards were identified. After analyzing the natural hazards in Table 3.1, High Wind Events, Severe Winter Weather, and Inland Flooding were designated as very high-risk natural hazards for the Town.

Due to time limitations, the Planner addressed a few more general questions about the Community, including development trends, but skipped hazard descriptions at this meeting. The Planner explained to the Team that we would work on *Tables 4.1–4.4, Critical Infrastructure & Key Resources (CIKR)*, hazard descriptions, mitigation ideas, and *Table 3.2, Historic Hazard Identification*.

With time running out, the Planner thanked the Team for their participation and adjourned the meeting. The next meeting was set for November 12, 2025.

MEETING 2, NOVEMBER 12, 2025

Meeting attendance included Mary Moritz, Mike Bruno, Brett Jackson, Sean Gawlik (Planning Board Vice Chair), Derek Brown (Bethlehem Village District), Brian Charland (Deputy Fire Chief), 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 the accuracy of the Town data; no changes were made. 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. The Team made a few minor changes to the table.

Having completed and reviewed Table 3.1, the Team started working on descriptions of each hazard and how they could impact the Community.

To gain a deeper understanding of the impact of these hazards, the Planner asked the Team to describe each hazard as it relates to Bethlehem.

Meeting 2 – November 12, 2025

1) Last Meeting

- a) Discussed...
 - i) Planning process, purpose, funding & collaboration
 - ii) Community involvement & stakeholders
- b) Worked on...
 - i) Table 2.1, Town Statistics
 - ii) Table 3.1, Hazard Identification & Risk Assessment (HIRA)
 - iii) Hazard Descriptions (bottom only)

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) Table 3.2, Historic Hazard Identification
 - iii) Tables 4.1-4.4, Critical Infrastructure & Key Resources
 - iv) Table 7.1, Accomplishments since the prior Plan (time allowing)

3) Homework

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

4) Future Meetings

- a) Wed., December 17, 2025 @ 10:00 AM
- b) Wed., January 14, 2025 @ 10:00 AM
- c) Wed., February 11, 2025 @ 10:00 AM

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 senior citizens, people with functional needs, and other vulnerable populations 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?*

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.

Next, the Team began work on *Table 3.2, Historic Hazard Identification*, which lists past and potentially hazardous locations and events. This table had been prepopulated with information from past hazard mitigation plans, Major Disaster Declarations (DRs), and Emergency Declarations (EMs) reported by FEMA that have occurred statewide, and specifically in Carroll County. The Team described the events during each disaster in Bethlehem in each instance.

Finally, the Team worked on *Tables 4.1–4.4, Critical Infrastructure & Key Resources (CIKR)*. The Emergency Response Facilities (ERFs), the Non-Emergency Response Facilities (NERFs), the Facilities & Populations to Protect (FPPs), and the Potential Resources (PRs) from the 2021 plan. In addition, the evacuation routes, helicopter landing zones, and bridges on the evacuation routes would be discussed. Lastly, each Critical Infrastructure & Key Resource would be analyzed for its “Hazard Risk” (see Chapter 4).

With time running out, the Planner reviewed what would occur at the next meeting and thanked the Team. The next meeting was set for December 17, 2025, and the meeting was adjourned.

MEETING 3, DECEMBER 17, 2026

Meeting attendance included Mary Moritz, Brett Jackson, Jeff Dube, Sean Gawlik, Brian Charland, Kevin Partington (NH Homeland Security & Emergency Management), and June Garneau.

First on the agenda was a review of the last meeting, including *Table 3.2, Historic Hazard Identification*. 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 Bethlehem, it was noted that the WUI would cover most of the Town due to the abundance of forested land. Mitigation strategies were discussed to protect structures and educate citizens about wildfire risk.

Next, the Team reviewed *Tables 4.1-4.4, Critical Infrastructure & Key Resources*; minor name changes were made to these tables. The Planner also took some time to discuss development trends in the Town; the Team noted a few development projects, but most were not in hazard-prone areas.

Table 7.1, Accomplishments since the Last Plan, pre-populated with data from the 2021 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 2021 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 worked on *Table 6.1, Capabilities Assessment*; like other tables, this table was also pre-populated with information from the 2021 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*.

The Planner provided handouts detailing a comprehensive list of possible mitigation action items (see Chapter 8, Sections A & B, and Appendix F). The Planner also encouraged the 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 Bethlehem (see right).

With time running out, the Planner thanked the Team for their work and assigned homework to team members, requesting that the Road Agent prepare a list of road and culvert projects that should be completed within the next five years. The Planner also asked the Team to think about critical infrastructure and what projects have been completed since the previous plan. The next meeting was set for January 14, 2026, and the meeting was adjourned.

MEETING 4 – JANUARY 14, 2026

Meeting attendance included Mary Moritz, Mike Bruno, Jeff Dube, Sean Gawlik, Brian Charland, Peter Llewelyn (NH Homeland Security & Emergency Management), and June Garneau.

The meeting began with a quick review of the agenda and the attendance to determine how the project was doing with regards to the required “Match”. The Team and the Planner were confident that the “Match” would easily be met through future attendance and Plan review.

Meeting 3 – December 17, 2026

1) Last Meeting

- a) Reviewed...
 - i) Table 2.1, Town Statistics
 - ii) Table 3.1, Hazard Identification & Risk Assessment (HIRA)
- b) Worked on...
 - i) Hazard Descriptions
 - ii) Table 3.2, Historic Hazard Identification
 - iii) Tables 4.1-4.4, Critical Infrastructure & Key Resources
 - iv) Table 7.1, Accomplishments since the Prior Plan

2) Today's Topics

- a) Review...
 - i) Table 3.2, Historic Hazard Identification
 - ii) Tables 4.1-4.4, Critical Infrastructure & Key Resources
- b) Work on...
 - i) Table 7.1, Accomplishments since the Prior Plan
 - ii) Table 6.1, Capabilities Assessment

3) Homework

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

4) Future Meetings

- a) Wednesday, January 14, 2026 @ 10:00 AM
- b) Wednesday, February 11, 2026 @ 10:00 AM

Link to explore – FEMA Mitigation Ideas:

https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf

Next, the Planner walked the Team through a review of loose items in *Table 7.1, Accomplishments since the Prior Plan*, and *Table 6.1, Capabilities Assessment*. Having translated notes from the last meeting into paragraphs, the Planner reviewed each item that had changes since the last meeting; this review ensured that the concepts and ideas of the Team remained intact. A few changes were made with this review, leaving additional items from Tables 6.1 and 7.1 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.

Then, the Planner introduced the Team to *Table 8.1, Potential Mitigation Action Items & the STAPLEE*, and *Table 9.1, The Mitigation Action Plan*. The Planner provided handouts and explained the STAPLEE process. The STAPLEE method analyzes a project's **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic, and **E**nvironmental characteristics and helps evaluate the efficacy of the action item. 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).

The Team then began work on Tables 8.1 and 9.1. The Planner explained that these tables were combined for the meeting and would 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 included the STAPLEE process, as shown in Chapter 8 and discussed above. Using handouts provided by the Planner, the Team went through the STAPLEE process for the identified action items. The STAPLEE analysis would 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.

After working on the Action Items that were included in both Table 6.1 and Table 7.1, the Planner adjourned the meeting. The next meeting was scheduled for February 11, 2026.

Meeting 4 – January 14, 2026

1) Last Meeting

- a) Reviewed...
 - i) Table 3.2, Historic Hazard Identification
 - ii) Tables 4.1-4.4, Critical Infrastructure & Key Resources
- b) Worked on...
 - i) Table 7.1, Accomplishments since the Prior Plan
 - ii) Table 6.1, Capabilities Assessment

2) Today's Topics

- a) Review...
 - i) Table 7.1, Accomplishments since the Prior Plan
 - ii) Table 6.1, Capabilities Assessment
- b) Work on...
 - i) Table 9.1, Mitigation Action Plan
 - ii) STAPLEE
 - iii) Discuss other mitigation actions

3) Homework

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

4) Future Meetings

- a) Wednesday, February 11, 2026, @ 10:00 AM

MEETING 5 – FEBRUARY 11, 2026

Meeting attendance included Mary Moritz, Mike Bruno, Brian Charland, 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, Capabilities Assessment*
- *Table 7.1, Accomplishments since the Last Plan*

As part of this review, we also tied up some loose ends and discussed dam information that the Planner had obtained through the Department of Environmental Services (DES) using GIS.

Although most of Tables 8.1 and 9.1 were complete, there were a few action items to discuss at this meeting, and the ranking and prioritizing of each action item. The meeting began where we had left off in Tables 9.1 and 8.1. After considering each strategy forwarded from Tables 6.1 and 7.1, the Team considered additional mitigation items, some of which the Planner had suggested from other plans and some provided by the Team at an earlier meeting. After much discussion and a careful review, the Team ultimately settled on multiple “Mitigation Action Items” that they felt were achievable and could help diminish the impact of natural hazards in the future.

The Planner displayed one last document that explained the ranking and prioritizing methodology (Chapter 9, Section A). 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 had 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. The action items were placed in four categories, as shown in Chapter 9, Section A, and assigned a priority within each category. For example, if seven action items were ranked in the A category, the priority ranks were A-1 to A-7. The pre-ranked action items were shown to the Team using a digital presentation to enable the Team to see the action items, determine any changes needed, and adjust the rank. In this fashion, the Team determined which action items were the most important within their rank and in which order they would be accomplished.

With the completion of Tables 8.1 and 9.1, the Team’s work was complete, except for the final review and adoption. No additional meetings were scheduled. The Planner agreed to prepare the draft plan and email a copy for review. The Planner explained the process from this point forward and thanked the Team for their hard work.

Meeting 5 – February 11, 2026

1) Last Meeting

- a) Reviewed...
 - i) Table 7.1, Accomplishments since the Prior Plan
 - ii) Table 6.1, Capabilities Assessment
- b) Worked on...
 - i) Table 9.1, Mitigation Action Plan
 - ii) STAPLEE
 - iii) Discuss other mitigation actions

2) Today’s Topics

- a) Review...
 - i) Tie up loose ends
 - ii) Table 4.1; discuss dams
 - iii) Work already done on Table 9.1
- b) Work on...
 - i) Table 9.1, Mitigation Action Plan
 - ii) STAPLEE
 - iii) Ranking & Priority (time allowing)

3) Homework

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

4) Future Meetings

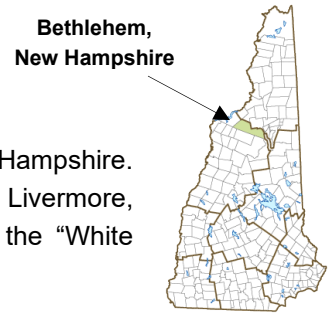
- a) Wednesday, March 18, 2026, @ 10:00 AM

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

Bethlehem is a beautiful community in Grafton County in the northwest part of New Hampshire. Bethlehem is bordered to the north by Whitefield, to the east by Carroll, to the south by Livermore, Lincoln, Franconia, and Sugar Hill, and to the west by Littleton. Bethlehem is in the “White Mountains” tourism region of New Hampshire.



TOWN GOVERNMENT

A five-member Select Board governs the Town of Bethlehem, with a Town Administrator overseeing the Town's day-to-day operations. The Town's departments include, but are not limited to, Fire, Police, Public Works, Planning, Zoning, Recreation, and Conservation. The largest employer in Bethlehem is Rek-Lis, with 60+ employees, followed by Profile Junior/High School, with 55+ employees.

DEMOGRAPHICS & HOUSING

Bethlehem's population has increased from 2,018 in 1990 to 2,484 in 2020, showing an increase of 466, according to the US Census 2020.⁶ This data represents a growth rate of approximately 28.2%.

There are an estimated 1,367 housing units, most of which are occupied (1,053), while vacant housing units total 314, thus confirming the presence of second and occasional-use homes. The estimated median household income is \$85,029, and the median age is 50.6 years.⁷

EDUCATION & CHILD CARE

Students in grades K-6 attend Bethlehem Elementary School, while students in grades 7-12 attend Profile Cooperative Middle/High School (Bethlehem). There are also two private schools in Bethlehem, the Woodland Community School and Christian School. There are no colleges or universities or child care facilities in the Town.

NATURAL FEATURES

Bethlehem covers approximately 90.9 square miles of land area and 0.1 square miles of inland water. The mountains, rivers, and streams of northern New Hampshire dominate the Community. The highest peak is North Twin at 4,761' above sea level. The lowest elevation in the Town is 1,426' above sea level near the center of the Town. More than half of Bethlehem is classified as conserved land. The majority of the conserved land belongs to the White Mountains National Forest.

Incorporated: 1799

Origin: This community was first established in 1774 as Lloyd's Hills, the last of the provincial land grants. Probably because James Lloyd, for whom the town was named, was a loyalist, voters elected to change the name following the Revolution. The name Bethlehem was selected on the last Christmas Day in the century, and the town was so incorporated on December 27, 1799. According to the US Postal Service, Bethlehem is one of several US communities with holiday-themed names who have special holiday postmarks.

Villages and Place Names: Alderbrook, Five Corners, Maplewood, Pierce Bridge

Population, Year of the First Census Taken: 171 residents in 1800

Population Trends: Population change for Bethlehem totaled 1,432 over 49 years, from 1,142 in 1970 to 2,574 in 2019. The largest decennial percent change was between 1970 and 1980, when population increased by 56 percent. The 2019 Census estimate for Bethlehem was 2,574 residents, which ranked 121st among New Hampshire's incorporated cities and towns.

Population Density and Land Area, 2019 (US Census Bureau): 28.3 persons per square mile of land area. Bethlehem contains 90.9 square miles of land area and 0.1 square miles of inland water area.

Source: Economic & Labor Market Information Bureau, NH Employment Security, October 2025; Received 5/14/25

⁶ US Census 2020

⁷ American Community Survey (ACS 2024) 5-Year Estimate Data

Vegetation is typical of northern 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 Ammonoosuc River, the Gale River, and Miller Pond.

TRANSPORTATION

Interstate 93 travels through the western corner of Bethlehem, from Franconia in the south to Littleton in the north. Four additional primary roadways run through Bethlehem: US Routes 3 and 302 and NH Routes 142 and 116. US Route 3 travels from Franconia in the south to Carroll in the north. US Route 302 travels from Littleton in the east to Carroll in the west. NH Route 142 travels from Franconia in the south to Whitefield in the north. NH Route 116 travels from Littleton in the west to Whitefield in the north.

Although less traveled than the roadways mentioned above, other roadways are important for traffic control and evacuation. These roadways also lend access to other areas of the Town. Bethlehem's roads are subject to severe winter weather, which is very common in the State.

B. EMERGENCY SERVICES

EMERGENCY OPERATIONS CENTER & EMERGENCY MANAGEMENT DIRECTOR

The Town of Bethlehem has a designated Emergency Management Director (EMD) and a Deputy 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 major emergency or disaster. In Bethlehem, the designated EOC is the Library Meeting Room.

FIRE & EMS

The Bethlehem Fire Department is a municipal department providing quality fire and emergency medical services (EMS) to the residents and visitors of Bethlehem 24 hours a day, 365 days a year. The department staffs a full-time Chief, twenty paid-on-call firefighters, and operates one station within the Community. The Fire Department also provides emergency medical transportation for the Town.

Twin State Fire Mutual Aid and Northern NH Fire Mutual Aid District provide mutual aid to the Bethlehem Fire Department. For hazardous materials incidents, the Bethlehem Fire Department will contact the NH State Fire Marshal or Homeland Security & Emergency Management (HSEM).

LAW ENFORCEMENT

The Bethlehem Police Department is a full-time department providing quality law enforcement services to the residents and visitors of Bethlehem. The department staffs a full-time Chief, two full-time officers, and five part-time officers. The Bethlehem Police Department has mutual aid agreements with the NH State Police, Grafton County Sheriff's Office, and surrounding towns' police departments.

PUBLIC WORKS

The Bethlehem Public Works Department (PWD) operates on a year-round, 24-hour basis as needed. The department staffs a full-time Road Agent and five full-time crew members. The DPW's mission is to support the citizens of Bethlehem through safe operation, proper maintenance, and future development of highways, supporting infrastructure, and utilities in a cost-conscious manner without sacrificing quality. The department does not belong to the NH Public Works Mutual Aid Association; however, it is working to become a member.

MEDICAL FACILITIES

Bethlehem's closest medical facility is Littleton Regional Healthcare in Littleton (8 miles). If the need arises, alternative medical facilities are Weeks Medical Center in Lancaster (17 miles) and Cottage Hospital in Woodsville (26 miles). These medical facilities are well-suited to handle disaster situations; however, they may become overwhelmed in large-scale events.

EMERGENCY SHELTER(S)

The primary shelter is where evacuees are directed during an emergency. The designated shelter in Bethlehem is the Profile Regional High School. The school offers a large sleeping area, restrooms, shower(s), and a kitchen. There is also a permanent generator to maintain utilities during power outages. The secondary shelter for the Town is the Bethlehem Elementary School; however, the school does not have a generator. The Town has also designated the Town Offices as a secondary shelter, as it has a generator. Other potential shelter(s) may include other community buildings, hotels, inns, and B&Bs.

C. BETHLEHEM'S CURRENT & FUTURE DEVELOPMENT TRENDS

Nearly every New Hampshire community experienced a significant drop in new home construction after the 2008 Great Recession. Bethlehem was no exception. Between 2008 and 2020, there were never more than ten new single-family homes built annually, according to City-Data.com (see right)⁸. The single-family average cost has changed dramatically from \$60,000 in 1997, \$175,000 in 2019, to \$536,300 in 2024. Post-COVID, Bethlehem saw an increase in single-family new home construction, which is consistent with New Hampshire trends.

Since the pandemic's beginning in 2020, development in New England has undergone several changes. One of the most significant changes was that occasionally used homes were modified as permanent residences 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 of 2022 and continuing to 2026. The largest difference was in the cost of real estate, with the average NH home value at \$516,578 according to Zillow⁹, slightly lower than the 2024 data provided by City-Data.com for Bethlehem.

The Team reported that no large subdivisions or new town-owned facilities have been built since the last hazard mitigation plan that compromised the Town's hazard vulnerability. The Team reported that there was discussion about 3-4 new subdivisions and the suspicion that the Bethlehem Golf Course would be developed. The Planning Board reported in the 2025

Single-family new house Construction building permits

- 2024: 16 buildings, average cost: \$536,300
- 2023: 17 buildings, average cost: \$684,700
- 2022: 12 buildings, average cost: \$762,300
- 2021: 16 buildings, average cost: \$300,000
- 2020: 10 buildings, average cost: \$512,100
- 2019: 4 buildings, average cost: \$175,000
- 2018: 5 buildings, average cost: \$180,000
- 2017: 6 buildings, average cost: \$248,100
- 2016: 2 buildings, average cost: \$150,000
- 2015: 6 buildings, average cost: \$387,900
- 2014: 7 buildings, average cost: \$387,900
- 2013: 5 buildings, average cost: \$150,000
- 2012: 6 buildings, average cost: \$151,800
- 2011: 3 buildings, average cost: \$129,000
- 2010: 10 buildings, average cost: \$150,000
- 2009: 10 buildings, average cost: \$175,000
- 2008: 9 buildings, average cost: \$175,000
- 2007: 20 buildings, average cost: \$171,500
- 2006: 27 buildings, average cost: \$171,500
- 2005: 29 buildings, average cost: \$100,000
- 2004: 33 buildings, average cost: \$100,000
- 2003: 33 buildings, average cost: \$145,500
- 2002: 15 buildings, average cost: \$99,400
- 2001: 14 buildings, average cost: \$99,400
- 2000: 23 buildings, average cost: \$55,900
- 1999: 16 buildings, average cost: \$57,800
- 1998: 13 buildings, average cost: \$69,200
- 1997: 19 buildings, average cost: \$60,000

⁸ City-Data.com; <http://www.city-data.com/city/Bethlehem-New-Hampshire.html>

⁹ <https://www.zillow.com/home-values/39/nh/>

Annual Report that the Board, “...discussed four conceptual plans...two site plan reviews...and acted on three subdivision applications”.¹⁰

In Bethlehem, development is very well-regulated. The Bethlehem 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 local character. Bethlehem’s regulations address wetland areas, stormwater flow, and fire protection. New development approval requires live hydrants, cisterns, sprinklers, or other fire mitigation provisions as appropriate. The Bethlehem Planning Board stated in the 2025 Annual Report, “*The Bethlehem Planning Board continued its work in 2025 supporting thoughtful growth, land use planning, and long-term community development consistent with the Town’s goals and regulatory framework.*”¹¹ All development that has occurred or is proposed in hazard-prone areas has been closely monitored and mitigated to reduce the Town’s hazard vulnerability.

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 Code Enforcement Officer, 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.

The Code Enforcement Officer, the Planning Board, the Select Board, and other town officials are almost always aware of construction that is taking place. The Planning Board will follow the Town Regulations to ensure that any construction in hazardous areas will be built to minimize vulnerability to the hazards identified in this Plan.



Bethlehem Village with a view of Mount Washington
Photo Credit: MAPS

¹⁰ Town of Bethlehem, 2025 Annual Report, Planning Board Report, page 58

¹¹ Ibid

TABLE 2.1: TOWN STATISTICS

Table 2.1 - Town Statistics				
Census Population Data	2020	2010	2000	1990
Bethlehem, NH - Census Population Data	2,484	2,528	2,191	2,018
Grafton County	91,118	89,118	81,743	74,929
30-year Growth Rate	23.09%	Growth Rate = 2020POP-1990POP/1990POP		
Elderly Population-% over 65 (2024 ACS 5-Year)	28.2%			
Median Age (2024 ACS 5-Year)	50.6			
Median Household Income (2024 ACS 5-Year)	\$85,029			
Poverty Rate (2024 ACS 5-Year)	10.1%			
Change in Population-Summer Weekends (%)	15%			
Change in Population-Winter Weekends (%)	10%			
Housing Statistics (2024 ACS 5-Year)				
Total Housing Units	1,367			
Occupied Housing Units	1,053			
Vacant, Recreational, Occasional Housing Units	314			
Assessed Building Values				
Building types	Value		1% Damage	5% Damage
Residential	\$312,574,022		\$3,125,740	\$15,628,701
Manufactured Housing	\$8,962,600		\$89,626	\$448,130
Commercial	\$91,868,700		\$918,687	\$4,593,435
Discretionary Preservation Easement	\$0		\$0	\$0
Tax Exempt	\$23,477,379		\$234,774	\$1,173,869
Utilities	\$26,063,000		\$260,630	\$1,303,150
Totals	\$462,945,701		\$4,629,457	\$23,147,285
The above chart shows the 2025-MS1 structure values. These values estimate structure loss due to natural hazards (see Chapter 5) based on a loss of 0-1% or 1-5% of structures in the Community. Source: Provided by the Town				
Regional Coordination				
County	Grafton			
Tourism Region	White Mountains			
Municipal Services & Government				
Town Hall or Town Office	Town Building/Town Offices			
Town Administrator	Yes			
Select Board (5-member)	Yes			
Planning Board	Yes			
School Board	Yes			
Zoning Board of Adjustment	Yes			
Conservation Commission	Yes			
Master Plan	Yes, December 28, 2016 (currently being updated)			
Emergency Operation Plan (EOP)	Yes, 2012			

Table 2.1 - Town Statistics	
<i>Hazard Mitigation Plan (HMP)</i>	Yes, July 2, 2021
<i>Zoning Ordinances</i>	Yes, March 2025
<i>Subdivisions Regulations</i>	Yes, March 2023
<i>Site Plan Review Regulations</i>	Yes, March 2024 (being done again)
<i>Capital Improvement Plan (CIP)</i>	Yes, reviewed annually
<i>Capital Reserve Funds (CRF)</i>	Yes, reviewed annually
<i>Building Permits Required</i>	Yes
<i>Adopted IBC & IRC</i>	Yes
<i>Town Website</i>	Yes, www.bethlehemnh.gov
<i>Floodplain Ordinance</i>	Yes, 2024 (part of Zoning)
<i>National Flood Insurance Program (NFIP) Member</i>	April 15, 1986
<i>Flood Insurance Rate Maps (DFIRMs)</i>	February 8, 2024
<i>Flood Insurance Rate Study (FIS)</i>	February 8, 2024
Percent of Local Assessed Valuation by Property Type - 2024 (NH Department of Revenue)	
<i>Residential Buildings</i>	78.3%
<i>Commercial Land & Buildings</i>	18.6%
<i>Other (including Utilities)</i>	3.2%
Emergency Services	
<i>Town Emergency Warning Systems</i>	Genasys (formerly CodeRED)
<i>School Emergency Warning System</i>	Alert Solutions
<i>Emergency Page</i>	No
<i>Facebook</i>	Fire Department, Police Department, Library & Recreation Department & Bethlehem (private)
<i>ListServ</i>	Bethlehem Newsletter (privately managed, weekly)
<i>Local Newspapers</i>	Littleton Courier, Caledonia Record & Union Leader
<i>Public Access TV</i>	No
<i>Local TV Stations</i>	WMUR, Manchester (channel 9) & WCAX, Burlington, VT (channel 8)
<i>Local Radio Stations</i>	96.7 FM WLTN (Littleton) & 99.9 FM WZNC-LP (Colonial Theater)
<i>Police Department</i>	Yes, full-time Chief, two full-time & five part-time officers
<i>Police Dispatch</i>	Grafton County Dispatch
<i>Police Mutual Aid</i>	NH State Police & surrounding towns
<i>Animal Control Officer</i>	No, the Police Department handles animal control.
<i>Fire Department</i>	Yes, full-time Chief, 20 paid-on-call firefighters
<i>Fire Dispatch</i>	Grafton County Dispatch
<i>Fire Mutual Aid</i>	Twin State Mutual Fire Aid Association & Northern NH Fire Mutual Aid District
<i>Fire Stations</i>	One
<i>Forest Fire Warden</i>	Yes
<i>Emergency Medical Services (EMS)</i>	Bethlehem Fire Department

Table 2.1 - Town Statistics	
<i>EMS Dispatch</i>	Grafton County Dispatch
<i>Emergency Medical Transportation</i>	Bethlehem Fire Department
<i>HazMat Team</i>	Contact the State Fire Marshal or HSEM
<i>Established Emergency Management Director (EMD)</i>	Yes
<i>Established Deputy EMD</i>	No
<i>Line of Succession (if EMD is unavailable)</i>	1st...Deputy Fire Chief
	2nd...Police Chief
	3rd...Select Board Chair or designee
<i>Public Health Network</i>	North Country Regional Public Health Network
<i>Health Officer</i>	Yes
<i>Deputy Health Officer</i>	No
<i>Code Enforcement Officer</i>	Yes
<i>Established Public Information Officer (PIO)</i>	No
<i>Nearest Hospital</i>	Littleton Regional Healthcare, Littleton (8 miles)
<i>Alternative Hospitals</i>	Weeks Medical Center, Lancaster (17 miles)
	Cottage Hospital, Woodsville (26 miles)
<i>Primary EOC</i>	Library Meeting Room (generator)
<i>Secondary EOC</i>	Fire Station Office at the Town Offices (working on generator)
<i>Primary Shelter</i>	Profile Regional High School (generator)
<i>Secondary Shelter</i>	Bethlehem Elementary School (no generator) & Town Offices (generator)
<i>Cooling & Warming Shelter</i>	The Library (generator)
<i>Household Pet Shelter</i>	Profile Regional High School (generator) (must have up-to-date shot records)
<i>Large Animal & Livestock Shelter</i>	Farmer cooperatives generally assist each other.
<i>Local Humane Society & Veterinarians</i>	Littleton Area Veterinary Urgent Care (Littleton), Second Chance Animal Rescue (Littleton), Companion Pet Care (Littleton) & Above the Notch Humane Society (Sugar Hill)
Utilities	
<i>Town Sewer</i>	Municipal sewer & private septic
<i>Public Works Department</i>	Yes, full-time Road Agent & five full-time crew members
<i>Miles of Class V Roads</i>	45 paved, 8 gravel, 53 total miles
<i>NH Public Works Mutual Aid</i>	No, the Bethlehem Village District only.
<i>Water Supply</i>	Municipal water & private wells
<i>Wastewater Treatment Plant</i>	Yes
<i>Electric Supplier</i>	Eversource Energy & Littleton Water & Light
<i>Natural Gas Supplier</i>	None
<i>Cellular Telephone Access</i>	Yes, with a minor amount of dead spots
<i>Pipelines or Gaslines</i>	A methane processing plant on Trudeau Road transports methane gas from the landfill to the plant
<i>High-Speed Internet</i>	Yes
<i>Telephone Company</i>	Spectrum, Fidium & Consolidated Communications

Table 2.1 - Town Statistics	
Transportation	
<i>Primary Evacuation Routes</i>	Interstate 93, US Route 302, US Route 3, NH Route 142 & NH Route 116
<i>Secondary Evacuation Routes</i>	Brook Road, Prospect Street, Lewis Hill Road, Trudeau Road & Wing/River Road
<i>Nearest Interstate</i>	Interstate 93, Exit 40 (local access)
<i>Nearest Airstrip</i>	Franconia Airport, Franconia (8 miles, 2,305 ft. turf runway)
	Mount Washington Regional Airport, Whitefield (12 miles, 4,100 ft. asphalt runway)
<i>Nearest Commercial Airport(s)</i>	Manchester-Boston Regional Airport, Manchester (71 miles)
	Logan International Airport, Boston, MA (117 miles)
<i>Public Transportation</i>	No, Tri-County Cap
<i>Railroad</i>	No
Education & Childcare	
<i>Elementary School</i>	Bethlehem Elementary School (grades K-6)
<i>Middle & High School</i>	Profile Cooperative (grades 7-12)
<i>Private Schools</i>	Bethlehem Christian School & Woodland Community School
<i>School Administrative Unit</i>	SAU 35
<i>Colleges/Universities</i>	None
<i>Licensed Child Care Facilities (2024)</i>	None
Fire Statistics (NH Division of Forests & Lands, Fire Warden Report, and the Town)	
<i>Wildfire Fires (2024)</i>	None
<i>Grafton County Fire Statistics (2025 estimate)</i>	31 fires, 8 acres
<i>State Forest Fires Statistics (2025)</i>	157 fires, 146 acres
<i>Unless otherwise noted, the 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 2025. Community Response Received 5/14/25, https://www2.nhes.nh.gov/GraniteStats/SessionServlet?page=Community.jsp&SID=1&city=000505&cityName=Bethlehem</i>	

Chapter 3: Hazard Identification, Risk Assessment & Probability

A. HAZARD IDENTIFICATION

The first step in hazard mitigation is to identify hazards. The Team determined that fourteen 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 instances¹², 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 Bethlehem. However, several of the State's hazards were excluded from this Plan - these hazards scored a zero during the HIRA process and were excluded from Table 3.1 on page 33. The reasons for exclusion are further explained below.

State Hazard

Reason for Exclusion from this Plan

*Coastal Flooding	Distance away from the sea
*Avalanche	No known areas of avalanches
Radiological	Distance away from radiological sites

*Natural Hazard as identified in this Plan

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.¹³ 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.

¹² 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)

¹³ 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, <https://pro.arcgis.com/en/pro-app/latest/help/mapping/layer-properties/data-classification-methods.htm>

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.

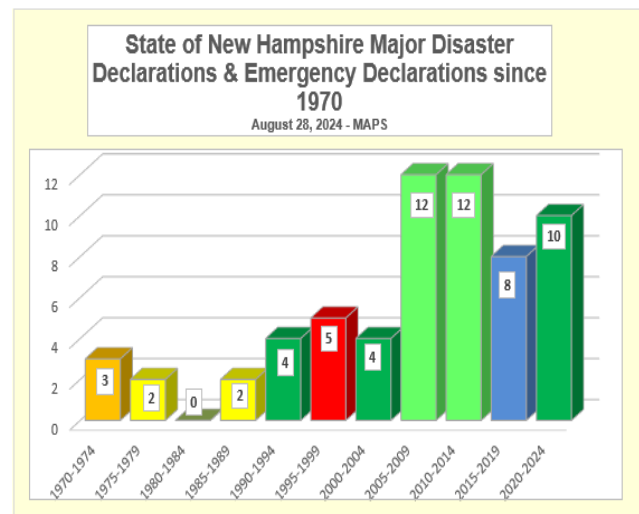
Bethlehem is relatively safe from natural, technological, and human-caused hazards. However, due to Bethlehem's geographic location, at the foothills of the high peaks of the White Mountains, forested lands, hills, heavy snowpack, and topography, there is always a probability that future hazards will 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. FEMA stated in its State Mitigation Plan Mitigation Policy Guide,¹⁴ *"Climate change increases the frequency, duration, and intensity of natural hazards, such as wildfires, extreme heat, drought, storms, heavy precipitation, and sea level rise. Communities are feeling the impacts of a changing climate now"*. FEMA recognizes climate change by including it in this 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.¹⁵ The decade beginning in 2020 includes ten disaster declarations: DR-4516 and EM-3445, DR-4622, DR-4624, DR-4693, DR-4740, DR-4761, DR-4771, DR-4799, and DR-4812.

Communities in New Hampshire, such as Bethlehem, should become increasingly aware of climate change's impact on the hazards they have already experienced and anticipate an increase in their probability. Bethlehem has installed solar arrays at the Library, Public Works Garage, Bethlehem Elementary School, and Profile Junior/High School. The Town also offers a tax incentive to residents who do "green projects" on their properties.



HAZARD PROBABILITY COMBINED WITH LONG-TERM UTILITY OUTAGE

Any potential disaster in Bethlehem 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 senior and vulnerable citizens. The food supply of individual citizens could quickly become 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.

¹⁴ State Mitigation Planning Policy Guide, FEMA, Released April 19, 2022, page 6

¹⁵ Derived from FEMA's record of disasters; categorized by decade since 1970 by the Planner

TABLE 3.1: HAZARD IDENTIFICATION & RISK ASSESSMENT (HIRA)

Table 3.1 - Hazard Identification & Risk Assessment (HIRA)							
Scoring for Probability	Column A	Column B	Column C	Column D	Column E	Column F	Risk
1=Very Low (0-20%)	Probability				Severity	Relative Threat	Very High 10.0-14.0
2=Low (21-40%)	Human Impact	Property Impact	Business Impact	Occurrence within 25 years	Average of Human, Property & Business Impact (A+B+C)/3	Risk Severity x Occurrence D x E	High 5.0-9.9
3=Moderate (41-60%)							Medium 4.0-4.9
4=High (61-80%)							Low 2.0-3.9
5=Very High (81-100%)							Very Low 1.0-1.9
Natural Hazards - as determined by NH HSEM and the Town							
1) High Wind Events	2.00	3.00	3.00	5.00	2.67	13.33	Very High
2) Severe Winter Weather	3.00	3.00	3.00	4.00	3.00	12.00	Very High
3) Inland Flooding	2.00	3.00	2.00	5.00	2.33	11.67	Very High
4) Extreme Temperatures	2.00	2.00	2.00	3.00	2.00	6.00	High
5) Infectious Disease	4.00	1.00	3.00	2.00	2.67	5.33	High
6) Drought	1.00	3.00	1.00	3.00	1.67	5.00	High
7) Tropical/Post Tropical Cyclones	2.00	2.00	2.00	2.00	2.00	4.00	Medium
8) Lightning	2.00	2.00	2.00	2.00	2.00	4.00	Medium
9) Dam Failure	1.00	3.00	2.00	1.00	2.00	2.00	Low
10) Wildfire	1.00	1.00	1.00	2.00	1.00	2.00	Low
11) Earthquake	1.00	2.00	1.00	1.00	1.33	1.33	Very Low
12) Solar Storms & Space Weather	1.00	1.00	1.00	1.00	1.00	1.00	Very Low
13) Landslides	1.00	1.00	1.00	1.00	1.00	1.00	Very Low
Hazards that scored a zero in this analysis can be seen in Chapter 3, Section A.							
Technological & Human-caused Hazards							
1) Hazardous Materials	3.00	3.00	3.00	3.00	3.00	9.00	High
2) Transport Accidents	3.00	3.00	2.00	3.00	2.67	8.00	High
3) Cyber Events	1.00	1.00	3.00	4.00	1.67	6.67	High
4) Terrorism & Violence	3.00	2.00	1.00	3.00	2.00	6.00	High
5) Aging Infrastructure	1.00	3.00	2.00	3.00	2.00	6.00	High
6) Long-Term Utility Outage	2.00	2.00	3.00	2.00	2.33	4.67	Medium
7) Mass Casualty Incidents	3.00	1.00	1.00	2.00	1.67	3.33	Low
8) Known & Emerging Contaminants	2.00	2.00	1.00	2.00	1.67	3.33	Low
9) Conflagration	2.00	4.00	3.00	1.00	3.00	3.00	Low

D. NATIONAL FLOOD INSURANCE PROGRAM (NFIP) STATUS

Bethlehem entered the National Flood Insurance Program (NFIP) on April 15, 1986. Bethlehem has a relatively small floodplain with approximately 1.80 square miles of land in the 100-year floodplain¹⁶, including 0.1 square miles of inland water. Bethlehem's floodplain makes up less than 2% of the land in the Community. The floodplain areas are primarily along the Ammonoosuc River, the Gale River, Indian Brook, Baker Brook, and Black Brook. Bethlehem is likely to experience flooding on several roads and along most rivers and streams, but the overall flood risk due to riverine and 100-year flood events is minimal.

The latest Flood Insurance Rate Studies (FIRS) and Digital Flood Insurance Rate Maps (DFIRMS) are dated February 8, 2024. The latest DFIRM and FIRS are incorporated by reference when amended in the Floodplain Development Ordinance.

According to FEMA, there is one NFIP policy in effect in Bethlehem, including one other residential building. There have been zero paid losses and therefore zero repetitive losses.¹⁷

ARTICLE XIV FLOODPLAIN DEVELOPMENT

The Town of Bethlehem has developed flood zone regulations as part of the Bethlehem Zoning Ordinance 2011. Article XIV, Floodplain Development, was first adopted in March 1987 and amended in March 2001 and March 2007.

Article XIV guides development in the Town and supports compliance with and enforcement of NFIP standards. The Planning Board initiates these requirements, while the Select Board enforces them, in accordance with the rules and regulations in Article XIV. The Bethlehem Zoning Ordinance is available on the Ordinances page of the Town's website. The following provides a brief overview of each section of the Bethlehem Floodplain Development Ordinance.

Article XIV applies to all lands identified by the Federal Emergency Management Agency as special flood hazard areas on the Flood Insurance Rate Maps dated April 15, 1986, which are incorporated into the ordinance by reference. When Article XIV differs from or conflicts with the Zoning Ordinance or another ordinance or regulation, the provision with the greater restriction or more stringent standard controls.

ITEM I.

Item I requires a permit for any proposed development within a special flood hazard area.



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

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>

¹⁶ GIS Analysis of Grafton County DFIRM (Digital Flood Insurance Rate Map)

¹⁷ FEMA, November 2024

ITEM II.

Item II requires the Building Inspector to review permit applications for new construction and substantial improvements to determine whether proposed sites are reasonably safe from flooding. It also addresses anchoring, flood-resistant materials, construction methods, and utility design intended to reduce flood damage.

ITEM III.

Item III requires applicants to demonstrate that sanitary systems are designed and located to reduce floodwater infiltration and avoid impairment or contamination during flooding.

ITEM IV.

Item IV requires applicants to provide certification of floodproofing and as-built elevation information for the lowest floor.

ITEM V.

Item V requires the Building Inspector to confirm that all required federal and state permits have been obtained, including permits related to water pollution control requirements, and that applicants provide the necessary documentation.

ITEM VI.

Item VI addresses development near rivers and watercourses, including relocation, maintenance, encroachments, and review requirements. It requires notification to the New Hampshire Department of Environmental Services Wetlands Bureau, submission of required materials to the Building Inspector, and professional engineering certification when applicable. It also restricts development in floodway-related areas unless the applicant demonstrates that the project, together with existing and anticipated development, will not increase base flood elevations beyond allowed limits.

ITEM VII

Item VII outlines the standards the Building Inspector uses for new construction and substantial improvements involving residential structures, nonresidential structures, manufactured homes, recreational vehicles, and enclosed areas below the lowest floor. It includes requirements for flood openings and allows designs to be certified by a registered professional engineer or architect or to meet minimum ordinance criteria.

ITEM VIII. VARIANCES AND APPEALS:

Item VIII summarizes the process for variances and appeals.

Although not addressed in the floodplain ordinance, erosion from flooding, including road and culvert washouts, is a potential concern in Bethlehem. However, the Town works diligently to maintain and repair drainage systems and has and continues to mitigate many of these problems. With any significant rainfall, particularly when combined with rapid snowmelt, roads, ditches, and culverts within the Town may become overwhelmed.

Bethlehem'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 NFIP's benefits extend to structures not in the 100-year floodplain. They felt it worthwhile to have NFIP brochures and information available at the Town Hall for current homeowners and potential developers. 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.

Table 3.1, Table 3.2 and Chapter 5, Section B provide more information on past and potential hazards in Bethlehem.

TABLE 3.2: HISTORIC HAZARD IDENTIFICATION

Key for Table 3.2

2009 HMPT 2009 Hazard Mitigation Planning Team
2014 HMPT 2014 Hazard Mitigation Planning Team
2021 HMPT 2021 Hazard Mitigation Planning Team
2026 HMPT 2026 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:

A. Inland Flooding	D. Severe Winter Weather	G. Miscellaneous Hazards
B. Wildfire	E. Earthquake	H. Other Hazards
C. High Wind Events	F. Drought	

Type of Event	Date of Event	Location	Description	Source
A. Inland flooding includes flooding caused by 100-year rain events, heavy rainfall, rapid snowmelt, ice jam flooding, dam failure, and local road flooding. 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 increases with climate change. The entire State of NH has a high flood risk. Flood events have the potential to impact the Community townwide. Since the last hazard mitigation plan, no significant flooding has occurred in Bethlehem. However, in December 2022, a declared inland flooding event impacted Bethlehem as a significant windstorm.				
A summary of flood events, including Major Disaster and Emergency Declarations in the State and region				
Inland Flooding before 1970	1927, 1936, 1938, 1943 (2), 1953, 1955, 1959		Spring and fall flooding events resulting from severe storms and heavy snowmelt	See below
Inland Flooding 1970-1979	1972 (DR-327), 1973 (DR-399), 1974 (DR-411), 1976, 1978 (DR-549), 1979 (EM-3073)			
Inland Flooding 1980-1989	1986 (DR-771), 1987 (DR-789)			
Inland Flooding 1990-1999	1990 (DR-876), 1991 (DR-923), 1991 (DR-917), 1995, 1996 (DR-1077), 1996 (DR-1144), 1998 (DR-1231)			
Inland Flooding 2000-2009	2003 (DR-1489), 2005 (DR-1610), 2006 (DR-1643), 2007 (DR-1695), 2008 (DR-1787), 2008 (DR-1799)			
Inland Flooding 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)			
Inland Flooding 2020 - Present	2021 (DR-4622), 2021 (DR-4624), 2022 (DR-4693), 2023 (DR-4740), 2023 (DR-4761), 2024 (DR-4771), 2024 (DR-4812)			
A detailed summary of flood events in the Community				
Inland Flooding (Heavy Rain)	July 11, 1973	All Ten NH Counties	Major Disaster Declaration DR-399: Heavy rain and flooding at the Wayside Inn. The old bridge had water almost up to the bottom of the bridge.	FEMA, 2021 HMPT & 2026 HMPT
Inland Flooding (Heavy Rain)	January 21, 1974	Belknap, Carroll, Cheshire & Grafton	Major Disaster Declaration DR-411: No recollection of events during this period.	FEMA, 2021 HMPT & 2026 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	Major Disaster Declaration DR-789: No recollection of events during this period.	FEMA, 2021 HMPT & 2026 HMPT
Inland Flooding (Heavy Rain)	August 7-11, 1990	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, & Sullivan	Major Disaster Declaration DR-876: No recollection of events during this period.	FEMA, 2021 HMPT & 2026 HMPT
Inland Flooding (Heavy Rain)	October 20- November 15, 1995	Carroll, Cheshire, Coos, Grafton, Merrimack & Sullivan	Major Disaster Declaration DR-1077: No recollection of events during this period.	FEMA, 2021 HMPT & 2026 HMPT
Inland Flooding (Heavy Rain)	October 20-23, 1996	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan	Major Disaster Declaration DR-1144: No recollection of events during this period.	FEMA, 2021 HMPT & 2026 HMPT
Inland Flooding (Heavy Rain)	June 12- July 2, 1998	Belknap, Carroll, Grafton, Hillsborough, Merrimack & Rockingham	Major Disaster Declaration DR-1231: No recollection of events during this period.	FEMA, 2021 HMPT & 2026 HMPT
Inland Flooding (Heavy Rain)	October 7-18, 2005	Belknap, Cheshire, Grafton, Hillsborough, Merrimack & Sullivan	Major Disaster Declaration DR-1610: 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. In Bethlehem, there were five roads damaged, per the Town Report.	FEMA, 2021 HMPT & 2026 HMPT
Inland Flooding (Heavy Rain)	May 12-23, 2006	Belknap, Carroll, Grafton, Hillsborough, Merrimack, Rockingham & Strafford	Major Disaster Declaration DR-1643: Flooding occurred in most of southern NH during the period of May 12-23, 2006 (aka: Mother's Day Storm). There was no significant impact in Bethlehem.	FEMA, 2021 HMPT & 2026 HMPT
Inland Flooding (Heavy Rain)	April 15-23, 2007	All Ten NH Counties	Major Disaster Declaration DR-1695: FEMA & SBA obligated more than \$27.9 million in disaster aid for flood damages following the April nor'easter (aka: Tax Day Storm). There was no significant impact in Bethlehem.	FEMA, 2021 HMPT & 2026 HMPT
Inland Flooding (Heavy Rain & Tornado)	July 24- August 14, 2008	Belknap, Carroll & Grafton & Coos	Major Disaster Declaration DR-1787: A period of severe storms and flooding from July 24 to August 14, which also spawned a tornado on July 24th. In Bethlehem, there were some trees down and minor flooding on Swazey Lane and Parker Road, but no major damage. The flooding did cause some road erosion, which the Public Works Department repaired.	FEMA, 2021 HMPT & 2026 HMPT
Inland Flooding (Heavy Rain)	February 23- March 3, 2010	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan	Major Disaster Declaration: DR-1892: 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. There was no significant impact in Bethlehem.	FEMA, 2021 HMPT & 2026 HMPT
Inland Flooding (Heavy Rain)	May 26-30, 2011	Coos & Grafton County	Major Disaster Declaration DR-4006: Flooding and hail occurred as a result of a severe storm on May 26th-30th, 2011, in Coos & Grafton County (aka: Memorial Day Weekend Storm). There was no significant impact in Bethlehem.	FEMA, 2021 HMPT & 2026 HMPT

Type of Event	Date of Event	Location	Description	Source
Inland Flooding (Tropical Storm Irene)	August 26- September 6, 2011	EM 3333: All Ten NH Counties DR-4026: Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, & Sullivan	Major Disaster Declaration DR-4026 & Emergency Declaration EM-3333: See below, Section C	FEMA, 2021 HMPT & 2026 HMPT
Inland Flooding (Heavy Rain)	July 9-10, 2013	Cheshire, Sullivan & Grafton	Major Emergency Declaration DR-4139: Severe storms, flooding, and landslides occurred from June 26 to July 3, 2013, in Cheshire and Sullivan Counties and in southern Grafton County. There was no significant impact in Bethlehem.	FEMA, 2021 HMPT & 2026 HMPT
Inland Flooding (Heavy Rain)	July 1-2, 2017	Grafton & Coos	Major Disaster Declaration DR-4329: 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, 2017, to July 2, 2017, in two New Hampshire Counties. Bethlehem saw road washouts on Kimball Hill, Swazey Lane, Parker Road, Cottage Street, Maplewood Hill, Cherry Valley Road, and Prospect Street. The Public Works Department replaced one 16" steel culvert on Parker Road with an 18" plastic culvert with FEMA funding. Noyes Street, Cottage Street, and Elm Street had substantial flooding in homes; all insurance claims were filed. The Town is estimating \$48,000 in FEMA post-disaster funding.	FEMA, 2021 HMPT & 2026 HMPT
Inland Flooding (Heavy Rain)	October 29- November 1, 2017	Sullivan, Grafton, Coos, Carroll, Belknap & Merrimack	Major Disaster Declaration, DR-4355: 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 October 29 to November 1, 2017, in five New Hampshire Counties. Bethlehem did not receive much damage in this storm. Bethlehem Village Water District lost the water main to Zealand. BVWD applied separately from the Town for FEMA funding and received around \$80,000.	FEMA, 2021 HMPT & 2026 HMPT
Inland Flooding (Heavy Rain)	July 11-12, 2019	Grafton	Major Disaster Declaration, DR 4457: 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. There was no significant impact in Bethlehem.	FEMA, 2021 HMPT & 2026 HMPT
Inland Flooding (Heavy Rain) Long-Term Utility Outage	December 22-25, 2022	Belknap, Grafton, Coos & Carroll	Major Disaster Declaration, DR-4693: A severe storm occurred December 22-25, 2022. Most communities saw heavy rain and wind, causing culvert damage, road washouts, and power outages. The northern communities saw heavy, wet snow, causing trees and power lines to fall, creating power outages. The declaration was declared in four of the State's ten counties. Bethlehem experienced a severe windstorm that brought down multiple trees on Trudeau Road and Swazey Lane. Swazey Lane was closed for several days and experienced long-term utility outages.	FEMA & 2026 HMPT
Inland Flooding (Heavy Rain)	July 9-17, 2023	Coos, Grafton, Belknap, Sullivan & Cheshire	Major Disaster Declaration, DR-4740: The Federal Emergency Management Agency announced a major disaster declaration and notification of individual and public assistance on September 14, 2023, for five NH Counties. There was no significant impact in Bethlehem.	FEMA & 2026 HMPT

Type of Event	Date of Event	Location	Description	Source
Inland Flooding (Heavy Rain)	December 17-21, 2023	Coos, Grafton & Carroll	Major Disaster Declaration, DR-4761: A significant rain storm, likened to a 100-year flood event, struck multiple areas in New Hampshire, causing widespread damage to rivers, roads, and bridges. There was no significant impact in Bethlehem.	FEMA & 2026 HMPT
Inland Flooding (Heavy Rain)	January 9-14, 2024	Grafton & Rockingham	Major Disaster Declaration, DR-4771: Severe storms brought significant winter rains and flooding to towns in two counties in New Hampshire. There was no significant impact in Bethlehem.	FEMA & 2026 HMPT
Inland Flooding (Heavy Rain)	July 10-13, 2024	Grafton & Coos	Major Disaster Declaration, DR-4812: FEMA announced that federal disaster assistance is available to the state of New Hampshire to supplement recovery efforts in the areas affected by the severe storms and flooding on July 10-13, 2024. There was no significant impact in Bethlehem.	FEMA & 2026 HMPT
B. Wildfire: 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 townwide. Since the prior hazard mitigation plan, no significant wildfire events have occurred in Bethlehem.				
A summary of wildfire events, including Major Disaster and Emergency Declarations in the State, and other recent large fires				
Wildfire (Fire of 1947)	October 21, 1947	Strafford County	This fire, caused by drought conditions and a spark from the Boston & Maine Railroad, burned a swath 9.5 miles long and 1.5 miles wide, starting in Farmington; the fire was widespread enough to cause significant damage in Maine. Spaulding High School was used to serve meals to the hundreds of firefighters and volunteers who assisted. Around a thousand people were evacuated in Rochester; the fire resulted in one death, an 18-year-old UNH student. This fire did not reach Grafton County or Bethlehem.	Local Resources & 2026 HMPT
Wildfire (Shaw Mountain Fire)	July 2, 1953	Carroll County	Major Disaster Declaration DR-11: This wildfire occurred in Carroll County at Shaw Mountain. This fire did not reach Grafton County or Bethlehem.	FEMA, 2021 HMPT & 2026 HMPT
Wildfire (Table Mountain Fire)	October 16, 1984	Carroll County	Table Mountain Fire: This Class D fire burned 100 acres in Carroll County before being extinguished. This fire did not reach Grafton County or Bethlehem.	Local Resources & 2026 HMPT
Wildfire (Lucy Brook Fire)	November 16, 2004	Carroll County	Lucy Brook Fire: 136 acres burned in the Lucy Brook Fire before it was extinguished. This fire did not reach Grafton County or Bethlehem.	Local Resources & 2026 HMPT
Wildfire (Bayle Mountain Fire)	May 2015	Carroll County	The Bayle Mountain Fire: This Class D fire burned 275 acres and took five days to put out on rocky and steep terrain in Ossipee, NH. Military and private helicopters and 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 Bethlehem.	Local Resources & 2026 HMPT
Wildfire (Stoddard Fire)	April 2016	Cheshire County	Fire Management Assistance Declaration, FM-5123: 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 Bethlehem.	FEMA & 2026 HMPT
Wildfire (Covered Bridge Fire)	November 2016	Carroll County	The Covered Bridge Fire: 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 Bethlehem.	Local Resources & 2026 HMPT

Type of Event	Date of Event	Location	Description	Source
Wildfire (Dilly Cliff Fire)	October 2017	Grafton County	The Dilly Cliff Fire: This fire 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 later. This fire was in Grafton County, but it did not reach Bethlehem. However, the Fire Department sent crews to assist.	Local Resources & 2026 HMPT
Wildfire (Centennial Fire)	May 9, 2022	Coos County	The Centennial Fire: This fire was caused by an out-of-control campfire and burned 48 acres along the Appalachian Trail (state land) in Shelburne. There was a multi-agency response, but no structural damage or injuries. This fire did not reach Grafton County or Bethlehem.	Local Resources & 2026 HMPT
Wildfire (Bemis Fire)	May 14, 2022	Carroll County	The Bemis Fire: This fire 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 Bethlehem.	Local Resources & 2026 HMPT
Detailed summary of wildfire events in the community				
Wildfire	1952, 1955, 1962	Abbott Road, Haystack Road & Mt. Cleveland Road	2 Class unknown, 1 Class B; Causes: lumbering, lightning & unknown.	2009 HMPT, 2021 HMPT, & 2026 HMPT
Wildfire	1972, 1971, Mid-1970's	Hazen Road, Valley View Road & River Road	3 Class B; Causes: 2 unknown; 1 illegal burn; dry spell in mid-70's; Valley View fire was mostly field damage; River Road fire burned two buildings and a large area of grass/brush.	2009 HMPT, 2021 HMPT, & 2026 HMPT
Wildfire	1985, 1986, 1988	West Forest Lake Road; Off Old Dump/Prospect Street (2)	3 Class B; Causes: 1 cause unknown; 2 caused by burning debris at the dump.	2009 HMPT, 2021 HMPT, & 2026 HMPT
Wildfire	Mid-Late 1980's	Vicinity of White Mts School	Class B: 5-10 acres; Cause: juveniles with illegal campfire.	2009 HMPT, 2014 HMPT, 2021 HMPT & 2026 HMPT
Wildfire	1989	NH Route 116	Class C; Cause: smoking material; fairly large fire; helicopter assist; fire got into softwood and threatened to spread; fire was fought with skidders.	2009 HMPT, 2014 HMPT, 2021 HMPT & 2026 HMPT
Wildfire	1992, 1993, 1994, 1999 (3)	Several locations in Town, including Spencer Farms, Jerret Maroney Turnaround, Bethlehem Hollow, Maple/Pleasant Street & 2 Undocumented	4 Class A; 2 Class B; Causes: unknown, illegal burn, grass, smoking, brush/debris burning.	2009 HMPT, 2021 HMPT, & 2026 HMPT
Wildfire	1999	Sawmill Road	Class B; Cause: illegal burning in a barrel; fire involved vehicles and a home; this also turned into a woods fire.	2009 HMPT, 2014 HMPT, 2021 HMPT & 2026 HMPT

Type of Event	Date of Event	Location	Description	Source
Wildfire	2000, 2001, 2002, 2003, 2005 (4), 2006 (4)	Haystack Road, Beech Hill Road, Route 116, Maplewood Golf Course, Oxbow Road (2), Blainey Road, Gilmanton Hill Road, Main Street & 3 Undocumented	Classes A & B; Causes: brush/debris (6), lightning, broken bottle, arson & a grass fire (structures in the area); mostly spot fires of .25 to .5 acres; 1 2-acre fire caused by burning debris was near a residence.	2009 HMPT, 2014 HMPT, 2021 HMPT & 2026 HMPT
No wildfires of significance have occurred in Bethlehem since the 2021 Hazard Mitigation Plan was completed.				2026 HMPT
C. High Wind Events, including Tropical/Post Tropical Cyclones, Tornadoes, Downbursts, and Windstorms: 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. Downbursts happen throughout NH and are becoming more prevalent 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 prevalent 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 townwide. Since Tropical Storm Irene in 2011, no tropical/post-tropical cyclones have occurred in Bethlehem. However, in 2023, a High Wind event impacted Beech Hill (see below).				
A summary of high wind events and tropical/post-tropical cyclone events, including Major Disaster and Emergency Declarations in the State and region				
Tropical/Post Tropical Cyclones	1804, 1869, 1938, 1944, 1954 (2), 1960, 1976, 1978, 1985, 1991 (DR-917), 1999 (DR-1305), 2005 (EM-3258), 2011 (EM-3333 & DR-4026), 2012 (EM-3360)		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
High Wind Events (Tornadoes)	1814, 1890, 1951, 1953, 1957, 1961, 1963, 2008 (DR-1782)		All listed tornadoes were reported as F2, except for the June 1953 tornado, reported as an F3.	See below
A detailed summary of high wind and tropical/post-tropical cyclone events in the Community				
Tropical/Post Tropical Cyclone (Great New England Hurricane)	September 21, 1938	All Ten NH Counties	The Great New England Hurricane: Statewide, multiple deaths occurred, and damages in NH were about \$12.3 million in 1938 (about \$200 million now). This storm damaged 20,000 structures, 26,000 automobiles, 6,000 boats, and 325,000 sugar maples 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 Bethlehem. (Source http://nhpr.org/post/75th-anniversary-new-englands-greatest-hurricane)	FEMA, 2021 HMPT & 2026 HMPT
Tropical & Post-Tropical Cyclone Hurricanes Carol & Edna	August 31, 1954	State & Region Wide	Hurricanes Carol & Edna: Hurricane Carol resulted in an extensive amount of trees blown down and damage to damage as well as large 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 in Bethlehem, damage would have been similar to the rest of the State. (Source: http://www.wmur.com/Timeline-History-Of-NH-Hurricanes/11861310)	FEMA, 2021 HMPT & 2026 HMPT
Tropical & Post-Tropical Cyclone Hurricane Bob	August 18-20, 1991	Carroll, Hillsborough, Rockingham & Strafford	Major Disaster Declaration DR-917: Although not declared in Grafton County, it was reported that heavy rain fell during this time.	FEMA, 2021 HMPT & 2026 HMPT

Type of Event	Date of Event	Location	Description	Source
Tropical & Post-Tropical Cyclone Tropical Storm Floyd	September 16-18, 1999	Belknap, Cheshire & Grafton	Major Disaster Declaration DR-1305: The declaration covers damage to public property from the storm that spawned heavy rains, high winds, and flooding over the period of September 16-18. There was no significant impact in Bethlehem.	FEMA, 2021 HMPT & 2026 HMPT
High Wind Event	2005	Pierce Bridge Area (the Junction)	High winds fell trees in the Pierce Bridge area and on Beech Hill. A mobile home was moved right off its foundation. The Team felt it was a small tornado, but it was never confirmed as one.	2014 HMPT, 2021 HMPT & 2026 HMPT
Tropical/Post Tropical Cyclone (Hurricane Katrina evacuation)	August 29-October 1, 2005	All Ten NH Counties	Emergency Declaration EM-3258: Assistance was provided to evacuees from the areas struck by Hurricane Katrina; emergency assistance to those areas began on August 29, 2005. The President's action made federal funding available to all 10 New Hampshire counties. Bethlehem did not receive any evacuees or pets as a result of Katrina.	FEMA, 2021 HMPT & 2026 HMPT
Tropical/Post Tropical Cyclone (Tropical Storm Irene)	August 26-September 6, 2011	EM 3333: All Ten NH Counties DR-4026: Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, & Sullivan	Major Disaster Declaration DR-4026 & Emergency Declaration EM-3333: Tropical Storm Irene, August 26 to 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. In Bethlehem, there was a significant washout of the Town water line in Zealand. The Bethlehem Water District received \$26,000 reimbursement from FEMA. Other than the water line, there was no other damage.	FEMA, 2021 HMPT & 2026 HMPT
Tropical/Post Tropical Cyclone (Hurricane Sandy)	October 26-November 8, 2012	DR-4095: Belknap, Carroll, Coos, Grafton, Rockingham & Sullivan EM-3360: All Ten NH Counties	Major Disaster Declaration DR-4095 & Emergency Declaration EM-3360: The declaration covers damage to property from the storm that spawned heavy rains, high winds, high tides, and flooding from October 26 to November 8, 2012. Hurricane Sandy came ashore in NJ bringing high winds, power outages, and heavy rain to six New Hampshire counties. Bethlehem did not receive significant damage from this storm.	FEMA, 2021 HMPT & 2026 HMPT
High Wind Event	2023	Beech Hill	A high wind event on the back side of Beech Hill caused about 20 trees to fall. There was no power loss.	2026 HMPT
D. Severe Winter Weather, including Nor'easters, Blizzards, and Ice Storms: 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. Since the last hazard mitigation plan, no significant winter weather events have occurred in Bethlehem.				
A summary of severe winter weather events, including Major Disaster and Emergency Declarations in the State and region				
Severe Winter Weather (Ice Storms)	1942, 1969, 1970, 1979, 1991, 1998 (DR-1199), 2008 (DR-1812)	The major ice storms that have occurred and caused significant disruptions to power, transportation, and public and private utilities.		FEMA & 2026 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), 2024 (DR-4799)	The major severe winter weather events with snowfalls exceeding two feet in parts of the State. Power and transportation systems were disrupted.		FEMA & 2026 HMPT

Type of Event	Date of Event	Location	Description	Source
A detailed summary of severe winter storm events in the Community				
Severe Winter Weather (Snowstorm)	Winter of 1968-69	All Ten NH Counties	The winter of 1968-69 brought record 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, and snow that had already fallen in previous storms. NH experienced difficulty with snow removal because of the great depths that had fallen from December 1968 to April 1969. Bethlehem reported heavy snow accumulations and some roof damage.	FEMA, 2021 HMPT & 2026 HMPT
Severe Winter Weather (Snowstorm) High Wind Events Coastal Flooding	February 16, 1978	All Ten NH Counties	Major Disaster Declaration DR-549: 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 most intense storms 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. There was no significant impact in Bethlehem.	FEMA, 2021 HMPT & 2026 HMPT
Severe Winter Weather (Snowstorm) High Wind Events	March 13-17, 1994	All Ten NH Counties	Emergency Declaration EM-3101: No recollection of this event, but it is assumed that the Town received heavy snow accumulations, and the Bethlehem Public Works Department handled it.	FEMA, 2021 HMPT & 2026 HMPT
Severe Winter Weather (Ice Storm)	January 7-25, 1998	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, Strafford & Sullivan	Major Disaster Declaration DR-1199: A major ice storm struck nearly every part of the State, impacting 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. There was no significant impact in Bethlehem.	FEMA, 2021 HMPT & 2026 HMPT
Severe Winter Weather (Snowstorm)	March 5-7, 2001	Cheshire, Coos, Grafton, Hillsborough, Merrimack, & Strafford	Emergency Declaration EM-3166: 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 Town received heavy snow accumulations, but the Bethlehem Public Works Department handled it.	FEMA, 2021 HMPT & 2026 HMPT
Severe Winter Weather (Snowstorm)	December 6-7, 2003	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack & Sullivan	Emergency Declaration EM-3193: 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 Town received heavy snow accumulations, but the Bethlehem Public Works Department handled it.	FEMA, 2021 HMPT & 2026 HMPT
Severe Winter Weather (Snowstorms)	January 22-23, 2005 February 10-11, 2005 March 11-12, 2005	EM-3208-002 (Jan, Feb & Mar): All Ten NH Counties EM-3207 (Jan): Nine NH Counties EM-3208 (Feb): Five NH Counties EM-3211 (Mar): Five NH Counties	Emergency Declaration EM 3208-002: The Federal Emergency Management Agency (FEMA) had obligated more than \$6.5 million to reimburse state and local governments for costs incurred in three snowstorms. The total aid for all three storms was \$6,892,023. Emergency Declaration EM-3207: The total aid for the January storm in Grafton was \$137,118. Emergency Declaration EM-3208: The total aid for the January storm in Grafton was \$213,531. Emergency Declaration EM-3211: The total aid for the March storm in Grafton County was \$0.00. The Town received heavy snow accumulations, but the Bethlehem Public Works Department handled it.	FEMA, 2021 HMPT & 2026 HMPT

Type of Event	Date of Event	Location	Description	Source
Severe Winter Weather (Snowstorm & Ice Storm)	December 11-23, 2008	All Ten NH Counties	Major Disaster Declaration DR-1812 & Emergency Declaration EM-3297: A damaging ice storm impacted the 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. The Town received heavy snow accumulations, but the Bethlehem Public Works Department handled it.	FEMA, 2021 HMPT & 2026 HMPT
Severe Winter Weather (Snowstorm)	February 23-March 3, 2010	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan	Major Disaster Declaration: DR-1892: 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 Town received heavy snow accumulations, but the Bethlehem Public Works Department handled it.	FEMA, 2021 HMPT & 2026 HMPT
Severe Winter Weather (Snowstorm)	October 29-30, 2011	DR-4049: Hillsborough & Rockingham EM-3344: All Ten NH Counties	Major Disaster Declaration DR-4049 & Emergency Declaration EM-3344: A severe winter storm occurred in two New Hampshire counties on October 29-30, 2011. EM-3344: The emergency declaration for snow removal and damage repair included all ten NH counties (Snowtober). Leaves were still on trees, contributing to multiple power outages in Bethlehem. The Town received heavy snow accumulations, but the Bethlehem Public Works Department handled it.	FEMA, 2021 HMPT & 2026 HMPT
Severe Winter Weather (Snowstorm)	February 8, 2013	All Ten NH Counties	Major Disaster Declaration DR-4105: A severe winter storm resulted in heavy snow in February 2013 in all ten New Hampshire counties (Nemo). The Town received heavy snow accumulations, but the Bethlehem Public Works Department handled it.	FEMA, 2021 HMPT & 2026 HMPT
Severe Winter Weather (Extreme Temperatures)	February 3-4, 2023	Regionwide	Dangerously cold temperatures struck most of New Hampshire in early February 2023, the coldest recorded temperatures in five years. Wind chills on top of Mount Washington were recorded at -109°. Bethlehem also experienced dangerously cold temperatures, but no injuries, deaths, or significant damage were reported.	FEMA & 2026 HMPT
Severe Winter Weather (Snowstorm)	April 3-5, 2024	Carroll, Belknap, Sullivan & Rockingham	Major Disaster Declaration, DR-4799: A late winter snowstorm on April 4, 2024, brought heavy wet snow with accumulations up to two feet in some parts of the State. The Town received heavy snow accumulations, but the Bethlehem Public Works Department handled it.	FEMA & 2026 HMPT
E. Earthquake: 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 townwide. Since the last hazard mitigation plan, no significant earthquakes have been felt in Bethlehem.				
A summary of earthquakes with a magnitude of 4.0 or more significant in the State and region				
Earthquakes	3/5/1905 (Lebanon, NH, Unknown), 8/30/1905 (Rockingham County, Unknown), 11/09/1925 (Ossipee, NH, 4.0), 3/18/1926 (New Ipswich, NH, Unknown), 11/10/1936 (Laconia, NH, Unknown), 12/20/1940 (Tamworth, NH, 5.3), 12/24/40 (Tamworth, NH, 5.6), 1/19/1982 (Sanbornton, NH, 4.5), 10/16/2012 (Hollis Center, ME, 4.7)		Occurrences of earthquakes with a magnitude of 4.0 or greater since 1900.	State of NH Multi-Hazard Mitigation Plan, Update 2023

Type of Event	Date of Event	Location	Description	Source
A summary of most earthquakes with a magnitude over 3.0 that may have been felt in New Hampshire since 1960				
Earthquake	June 26, 1964	Salisbury, NH	Magnitude 3.2	United States Geological Society (USGS), State of NH Multi-Hazard Mitigation Plan Update & 2026 HMPT
Earthquake	June 15, 1973	Quebec/ME border	Magnitude 4.8, felt in Bethlehem, lights shook, but no damage	
Earthquake	December 25, 1977	Hopkinton, NH	Magnitude 3.2	
Earthquake	June 28, 1981	Sanbornton, NH	Magnitude 3.0	
Earthquake	January 19, 1982	Sanbornton, NH	Magnitude 4.5	
Earthquake	October 25, 1986	Northfield, NH	Magnitude 3.9	
Earthquake	October 20, 1988	Milan, NH	Magnitude 3.9	
Earthquake	November 22, 1988	Milan, NH	Magnitude 3.2	
Earthquake	April 6, 1989	Berlin, NH	Magnitude 3.5	
Earthquake	October 6, 1992	Canterbury, NH	Magnitude 3.4	
Earthquake	June 16, 1995	Lisbon, NH	Magnitude 3.8	
Earthquake	August 21, 1996	Livermore, NH	Magnitude 3.8	
Earthquake	January 10, 1999	Merrimac, MA	Magnitude 3.1 & 3.0	
Earthquake	January 27, 2000	Fremont, N	Magnitude 3.0	
Earthquake	September 26, 2010	Canterbury, NH	Magnitude 3.2	
Earthquake	October 16, 2012	Hollis Center, ME	Magnitude 4.7, felt in Bethlehem, but no reported damage	
Earthquake	January 27, 2025	Portsmouth, NH	Magnitude 3.8	
Other recent earthquakes with a magnitude of 2.5-2.9 that may have been felt in Bethlehem				
Earthquake	February 15, 2018	East Kingston, NH	Magnitude 2.7	
Earthquake	February 4, 2022	Gorham, NH	Magnitude 2.9	
Earthquake	April 25, 2023	Center Sandwich	Magnitude 2.9	
Earthquake	May 31, 2023	Andover, NH	Magnitude 2.2	
Earthquake	December 23, 2023	Chichester, NH	Magnitude 2.7	
Earthquake	January 3, 2024	Loudon, NH	Magnitude 2.0	
Earthquake	March 28, 2024	Gilford, NH	Magnitude 2.2	
Earthquake	June 18, 2024	Haverhill, NH	Magnitude 2.6	
F. Drought: Drought is generally not as damaging or disruptive as 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 or 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 townwide. Since the 2025 drought, no significant droughts have occurred in Bethlehem.				
A summary of drought in the State and region				
Drought	1775, 1840, 1882, 1910's, 1929-1936, 1939-1944, 1947-1950, 1960-1969, 1999; 2001-2002, 2016-2017, 2020-2021, 2022, 2024, and 2025		Occurrences of severe droughts in recorded New Hampshire history.	State of NH Multi-Hazard Mitigation Plan, Update 2023

Type of Event	Date of Event	Location	Description	Source
A summary of drought in the Community since 1929				
Drought	1929-1936	Statewide	Regional	State of NH Multi-Hazard Mitigation Plan, Update 2023 & 2026 HMPT
Drought	1939-1944	Statewide	Severe in the southeast and moderate elsewhere	
Drought	1947-1950	Statewide	Moderate	
Drought	1960-1969	Statewide	The lengthiest recorded regional continuous spell of less-than-average precipitation	
Drought	2001-2002	Statewide	The third-worst drought on record	
Drought	2016-2017	Statewide	Declared drought for the summer of 2016 and into 2017, moderating from extreme in southern New Hampshire to dry in the most northern communities. The drought affected Bethlehem with the loss of a few dug wells and springs.	
Drought	2020-2021	Statewide	A declared drought for 2020-2021, with NH's north country being impacted more than the southern communities. In Bethlehem, a few dug wells and springs dried up. There was no water ban, but the fire ponds became dangerously low.	
Drought	2022	Statewide	A declared drought in the summer and fall of 2022 waned as fall and winter approached, and after several periods of rain. This drought moderated from south to north. Significant drought conditions had nearly abated by January 2023. In Bethlehem, a few dug wells and springs dried. There was no water ban, but the fire ponds became dangerously low.	
Drought	2025	Statewide	Bethlehem experienced a significant drought in the summer of 2025. Many residents' wells went dry, with an 18-month wait to get one drilled. The fire danger was high, but no water bans were established. A notice went around the Town asking the residents to conserve water where possible. Depending on snow accumulations, the Town may establish a water ban in the spring.	
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. Since the last hazard mitigation plan, no significant miscellaneous hazards have occurred in Bethlehem.				
Transport Accidents	1986	Route 302	A gasoline transport crashed and burned on Route 302.	2014 HMPT, 2021 HMPT & 2026 HMPT
Hailstorm	1970's	Townwide	There was significant damage to vinyl siding on homes and automobiles.	2014 HMPT, 2021 HMPT & 2026 HMPT
Hazardous Materials	2014	Pinetree Power	The generator at the power plant failed and caused a fire and an explosion at the plant. There were no injuries, and the oil was contained.	FEMA, 2021 HMPT & 2026 HMPT
Infectious Disease	January 2020-May 11, 2023	All Ten NH Counties	Major Disaster Declaration, DR-4516: 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 specific 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, 2021 HMPT & 2026 HMPT

Type of Event	Date of Event	Location	Description	Source
Infectious Disease	January 2020-May 11, 2023	All Ten NH Counties	Emergency Declaration EM-3445: Ten-county declaration to provide individual assistance and public assistance as a result of the impact of COVID-19.	FEMA, 2021 HMPT & 2026 HMPT
Solar Storms & Space Weather	May 3-9, 2024	Statewide	NASA's Solar Dynamics Observatory observed 82 solar flares from May 3-9, 2024. These flares caused minor utility and emergency service interruptions throughout the State and the region. There were no interruptions in Bethlehem.	NASA & 2026 HMPT
H. Other Hazards: Identified hazards with no specific example of occurrence.				
Natural Hazards			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. See <i>Table 3.1, Hazard Threat Analysis</i> , and Chapter 5 for more details on these hazards.	
Lightning				
Dam Failure				
Landslides				
Technological & Human-caused Hazards				
Cyber Events				
Terrorism & Violence				
Aging Infrastructure				
Mass Casualty Incidents				
Known & Emerging Contaminants				
Conflagration				

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

- Website for NH Disasters: <https://www.nh.gov/safety/divisions/hsem/disaster/documents/NHDisasterInfo.pdf>
- FEMA Disaster Information: <https://www.fema.gov/disaster>
- The Tornado Project: <https://www.tornadoproject.com/alltorns/nhtorn.htm>
- The Disaster Center (NH): <https://www.disastercenter.com/newhamp/tornado.html>
- United States Geological Survey (earthquakes): <https://www.usgs.gov/programs/earthquake-hazards>

Chapter 4: Critical Infrastructure & Key Resources (CIKR)

Team discussion and brainstorming identified Critical Infrastructure & Key Resources (CIKR) within Bethlehem. 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 (ERFs)			
ERFs are primary facilities and resources that may be needed during an emergency response.			
Facility	Type of Facility	Hazard Risk	
Town Offices (no generator)	Town government & records, fire, EMS & police services & secondary EOC	All Hazards	1
Public Works Garage (portable generator)	Heavy equipment & fuel	All Hazards	1
Profile Regional High School (generator)	Primary shelter	All Hazards	1
Bethlehem Reservoir (generator)	Water supply	All Hazards	1
Cell Tower/Radio Tower/Police (Mt. Agassiz)	Communications	All Hazards, Lightning & High Wind Events	2
Helicopter Landing Zones	Numerous	All Hazards	1
Manns Hill Tower	Emergency services communications	All Hazards, Lightning & High Wind Events	2
Bethlehem Public Library (generator)	Primary EOC	All Hazards	1
Evacuation Routes			
Route 302 (East/West)	Primary evacuation route	All Hazards & Inland Flooding	2
142 (North/South)	Primary evacuation route	All Hazards & Inland Flooding	2
Route 116	Primary evacuation route	All Hazards	1
Route 18 (North/South)	Primary evacuation route	All Hazards & Inland Flooding	2
I-93 (North/South)	Primary evacuation route	All Hazards	1
Route 3	Primary evacuation route	All Hazards	1
Prospect Street	Secondary evacuation route	All Hazards & Inland Flooding	2
Trudeau Road	Secondary evacuation route	All Hazards & Inland Flooding	2
Lewis Hill Road	Secondary evacuation route	All Hazards & Inland Flooding	2
Brook Road	Secondary evacuation route	All Hazards & Inland Flooding	2
Wing / River Road	Secondary evacuation route	All Hazards & Inland Flooding	2
Bridges & Culverts on the Evacuation Routes			
Pierce Bridge	Bridge on an evacuation route	All Hazard	1
Maple Street Bridge	Bridge on an evacuation route	All Hazards & Inland Flooding	2
Prospect Street Bridge	Bridge on an evacuation route	All Hazard	1
West Farm Road at I-93	Bridge on an evacuation route	All Hazard	1
Route 302 at I-93 (Exit 40)	Bridge on an evacuation route	All Hazard	1
Route 302 at I-93 (Littleton town line)	Bridge on an evacuation route	All Hazard	1
Redington Street Bridge (Littleton)	Bridge on an evacuation route	All Hazard	1

Emergency Response Facilities (ERFs)			
ERFs are primary facilities and resources that may be needed during an emergency response.			
Facility	Type of Facility	Hazard Risk	
Dams			
Baker Brook Dam	Significant-hazard dam	All Hazards, Dam Failure & Inland Flooding	2
Bethlehem Sewage Lagoon Dam	Significant-hazard dam	All Hazards, Dam Failure & Inland Flooding	2
Bethlehem Hydro Dam (Ammonoosuc)	Low-hazard	All Hazards, Dam Failure & Inland Flooding	2
There are an additional eleven non-menace dams in Bethlehem. The status of ten other inactive dams is exempt, not built, removed, or ruins.			

TABLE 4.2 – NON-EMERGENCY RESPONSE FACILITIES (NERFs)

Non-Emergency Response Facilities (NERFs)			
NERFs are facilities that, although they are critical, are not necessary for the immediate emergency response efforts. NERFs would include facilities to protect public health and safety and to provide backup emergency facilities.			
Facility	Type of Facility	Hazard Risk	
Gale River (Intake for town water via Swazey)	Water supply	All Hazard	1
Zealand River (Intake for town water - 8" line)	Water supply	All Hazards & Inland Flooding	2
Littleton (Intake for town water)	Water supply	All Hazard	1
Consolidated Communications Switch Station	Communications	All Hazard	1
Waste Water Treatment Facility (generator)	Waste water	All Hazard	1
Eversource Substation	Electric	All Hazard	1
High Tension Power Lines	Electric	All Hazard	1
Consolidated Fiber Optic Lines	Fiber optic	All Hazard	1
Spectrum Cable	Cable/phone/internet	All Hazard	1

TABLE 4.3 – FACILITIES & POPULATIONS TO PROTECT (FPPs)

Facilities & People to Protect (FPPs)			
FPPs are facilities that need to be protected because of their importance to the Town and to residents who may need help during a hazardous event.			
Facility	Type of Facility	Hazard Risk	
Maplewood Casino & Golf Course	Gathering of people	All Hazards & Lightning	1
Bethlehem Country Club	Historic & potential shelter	All Hazards & Lightning	1
Eagles Club	Potential shelter	All Hazards	1
Adair's Inn	Historic	All Hazards	1
Elks Club	Potential shelter	All Hazards	1
Wayside Inn	Potential shelter	All Hazards & Inland Flooding	2
Matoso Warehouse	Gathering of people	All Hazards	1
Bethlehem Elementary School (no generator)	School	All Hazards	1
Profile High School (generator)	School & primary shelter	All Hazards	1
Bethlehem Christian School	School	All Hazards	1

Facilities & People to Protect (FPPs)			
FPPs are facilities that need to be protected because of their importance to the Town and to residents who may need help during a hazardous event.			
Facility	Type of Facility	Hazard Risk	
Woodland Community School	School	All Hazards & Inland Flooding	2
New Hampshire Detox	Group facility	All Hazards	1
Hillview Elderly Housing	Elderly housing	All Hazards	1
New Life Assembly Church	Gathering of people & potential shelter	All Hazards	1
Durrell Methodist Church	Church & potential shelter	All Hazards	1
Hebrew Congregation Synagogue	Gathering of people	All Hazards	1
Feltzengarten	Historic (National Register)	All Hazards	1
The Rocks Estate	Historic (National Register)	All Hazards	1
Morin Farm	Historic	All Hazards	1
Bethlehem Heritage Society	Historic	All Hazards	1
Wren Gallery	Historic	All Hazards	1
Beckett School	School	All Hazards	1
Colonial Theatre	Historic (NH Register)	All Hazards	1
Bethlehem Public Library	Primary EOC & gathering of people	All Hazards	1
Stonecrest Colony	Historic	All Hazards	1
The Chandler at White Mountains	Gathering of people	All Hazards	1
Presidential Mountain Resort	Gathering of people	All Hazards	1

TABLE 4.4 – POTENTIAL RESOURCES (PRs)

Potential Resources (PRs)			
PRs are potential resources that could be helpful for emergency response in the case of a hazardous event.			
Irving Station	Fuel	All Hazards	1
Presby's Energy	Fuel & heating oil	All Hazards	1
Precision Fuel	Fuel & heating oil	All Hazards	1
Public Works Garage	Fuel, diesel & gas	All Hazards	1
John Starr's Construction	Construction & heavy equipment	All Hazards	1
Bethlehem Earthworks	Gravel	All Hazards	1
Village Market	Food & water	All Hazards	1
El Mirador	Kitchen facilities & shelter	All Hazards	1
Rosa Flamingo's Restaurant	Food & water	All Hazards	1
Cold Mountain Cafe	Food & water	All Hazards	1
Rek-Lis	Food & water	All Hazards	1
North Country Environmental Services Landfill	Heavy equipment	All Hazards	1
The Chandler at White Mountains	Lodging	All Hazards	1
Presidential Property Management	Lodging	All Hazards	1
For additional resources, please refer to the Resource Inventory List in the 2012 Emergency Operations Plan.			

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Chapter 5: Hazard Effects in Bethlehem

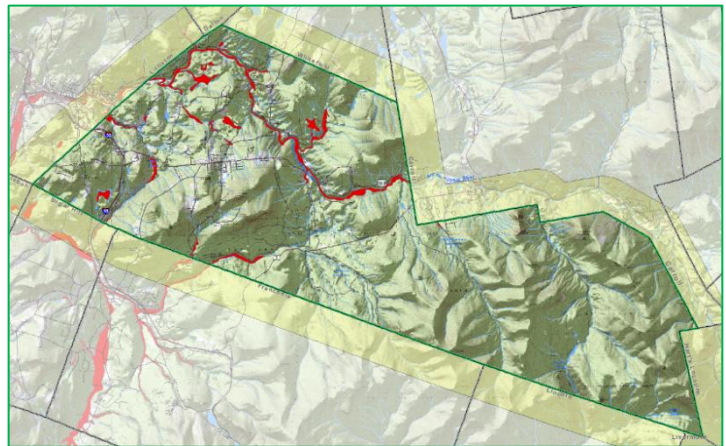
A. IDENTIFYING VULNERABLE CRITICAL INFRASTRUCTURE & KEY RESOURCES (CIKR)

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 Bethlehem is heavily forested.

Overall Flood Risk

Bethlehem's CIKR were identified and listed in Chapter 4; each CIKR was analyzed for its flooding potential, on a scale of 1-3, with three indicating a higher susceptibility. The Emergency Response Facilities (ERFs) were determined to be safe from flooding. However, several evacuation routes, including US Route 302 and NH Routes 142 and 18, were determined to have a moderate risk for flooding, as well as all of the secondary evacuation routes listed in Table 4.1. In addition, the Maple Street Bridge, Baker Brook Dam, the Sewage Lagoon Dam, and the Bethlehem Hydro Dam were all documented to have a higher than normal flood risk. Of the remaining CIKR listed in Chapter 4, three others were also identified: the Zealand River Intake, the Wayside Inn, and the Woodland Community School. Please refer to Chapter 4, Tables 4.1-4.4 for more information.

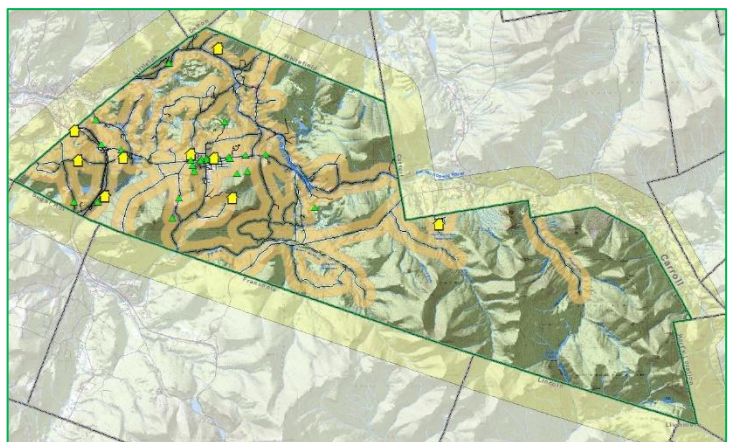
GIS analysis showed that the Wayside Inn and the Woodland Community School are in the FEMA floodplain. All other identified CIKR are outside the flood zone; however, it is expected that there may be many structures and homes within the flood zone. Town officials should consider all at-risk properties when a flood hazard is likely. The 100 and 200-year floodplains are indicated in the map above with red symbology.¹⁸



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. In Bethlehem, state highways and named state roads were added to this analysis, as shown in the map to the right (orange symbology)¹⁹.



¹⁸ GIS Map Image prepared by MAPS

¹⁹ GIS Map Image taken from the prior hazard mitigation plan; mapping prepared by MAPS

The WUI 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 some rural communities, this would virtually cover the entire town. A different method to determine the WUI in exurban and suburban communities includes identifying developments, streets, roads with limited egress, a high canopy of old-growth softwoods, or older wooden structures. The Bethlehem Team reported that areas near River Road, Mountain View Lane (hilly terrain), Beaver Pond, Moose Trail, and the National Forest are areas for wildfire concern.

Using GIS, several critical facilities were found in the WUI; however, all were found to have defensible space to lower the risk for wildfire. An analysis of Tables 4.1-4.4 found that no particular CIKR had a wildfire risk; the Team felt that due to the extent of the traditional WUI (see map) and the extensive forested land in Bethlehem, the entire town is within the WUI and therefore susceptible to wildfires.

Many structures in Bethlehem are expected to be prone to wildfires, particularly, as suggested above, in neighborhoods with limited egress and a canopy of old-growth trees or where forests surround structures. Because Bethlehem is heavily forested outside Bethlehem Village, it can be assumed that nearly every structure outside the Village District area 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 the impact is localized.

MS1-2025, Assessed Building Values			
Building types	Value	1% Damage	5% Damage
<i>Residential</i>	\$312,574,022	\$3,125,740	\$15,628,701
<i>Manufactured Housing</i>	\$8,962,600	\$89,626	\$448,130
<i>Commercial</i>	\$91,868,700	\$918,687	\$4,593,435
<i>*DPE</i>	\$0	\$0	\$0
<i>Tax Exempt</i>	\$23,477,379	\$234,774	\$1,173,869
<i>Utilities</i>	\$26,063,000	\$260,630	\$1,303,150
<i>Totals</i>	\$462,945,701	\$4,629,457	\$23,147,285
<i>*DPE: Discretionary Preservation Easement</i>			

This Plan assumes that the potential loss from the identified natural hazards would range from **\$0 to \$4,629,457** or **\$4,629,457 to \$23,147,285**, based on the 2025 MS1 total structure value of **\$462,945,701**. (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.

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

C. NATURAL HAZARDS

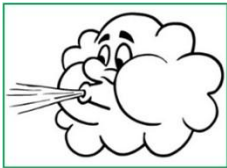
The descriptions below represent the **local impact** on the Community of the hazards identified by the Team. The **extent** of these hazards is shown in *Appendix C, The Extent of Hazards*. Charts such as the Saffir-Simpson Hurricane Wind Scale, the Beaufort Wind Scale, the National Weather Service 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.

1) HIGH WIND EVENTS

Hazard Identification & Risk Assessment (HIRA)	Very High
Probability	Very High
Estimated Structure Loss Value	\$4,629,457 to \$23,147,285

Isolated High Wind Events



Isolated high winds and downdrafts are likely to occur in Bethlehem. These unpredictable wind events could cause trees to fall, 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 Bethlehem is forested.

Due to the geographic location of Bethlehem and its location among some of the highest peaks of the White Mountains of New Hampshire, isolated high winds and downdrafts are common occurrences within the Town. Wind tends to swoop down the mountainsides, bringing down trees and causing power failures and road closures. The effect of isolated high winds would most likely be localized. The Team noted that high winds often occur on Cherry Valley Road, Maplewood Hill Road, and Mount Cleveland Road. Due to Bethlehem’s geography and size, high winds could occur on one side of the Town and not on the other.

Electric providers, Asplundh, and the Bethlehem Public Works Department (PWD) have aggressively trimmed trees, particularly those near power lines, which could cause damage throughout the community, but the risk still exists.

Tornadoes & Downbursts (microbursts & macrobursts)



The most significant difference between tornadoes and downbursts, also known as microbursts and macrobursts, is the 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. Its winds blow circularly, leaving behind downed trees 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 Bethlehem, a microburst would be more likely than a tornado. Since the previous hazard mitigation plan, Bethlehem 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 1% and 5% of the total structure value.

2) SEVERE WINTER WEATHER

Hazard Identification & Risk Assessment (HIRA)	Very High
Probability	High
Estimated Structure Loss Value	\$4,629,457 to \$23,147,285

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 Bethlehem. These impacts are a risk to the Community, including isolation, especially to senior citizens (28.2%) and other vulnerable populations. In addition, the ability to get in and out of the 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.

Poor weather conditions often impact Bethlehem's roads, particularly Interstate 93, US Routes 3 and 302, and NH Routes 116 and 142, and this, combined with steep terrain, can make travel difficult. The topography of Bethlehem, with large mountains, river valleys, and open farmland, makes winter weather conditions much more threatening. Severe winter snowstorms or blizzards can temporarily shut all of Bethlehem's roads down, thus preventing many of the Town's citizens from going to work and visitors from arriving. Fortunately, in New England, most road crews can handle 2-3' snowstorms without difficulty. As shown in Table 3.2, snowstorms and nor'easters have struck Bethlehem in the past, and since the last hazard mitigation plan, the Public Works Department has kept up with the accumulation.

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 PWD, ice storms present significant problems. Downed power lines and fallen trees make it difficult for road crews and emergency responders. School buses are also at risk.

There have been significant ice storms in New Hampshire, but Bethlehem had no damage in the most significant events (1979, 2008, 1998, and 2010). The 2008 ice storm brought heavy snow accumulations and spotty ice damage; however, the PWD was able to handle the issues.

Since the last hazard mitigation plan, no damaging or debilitating winter storm events have occurred in Bethlehem. 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 the Town.

3) INLAND FLOODING

Hazard Identification & Risk Assessment (HIRA)	Very High
Probability	Very High
Estimated Structure Loss Value	\$4,629,457 to \$23,147,285

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, Bethlehem has a relatively small floodplain, running primarily along the Ammonoosuc and Gale Rivers. Nearly every spring, ice jams, rapid snowmelt, and heavy rain cause the flooding of the Ammonoosuc and Gale Rivers. The Town maintains a flood monitor on the Ammonoosuc River to measure the river's height during high water periods.

The Team noted that nearly every time there is heavy rain, Black Brook on River Road overtops the road; the Town has a grant to replace the culvert with a concrete bridge. Brook Road also holds a lot of water during heavy rain events, and often floods the road. The Team noted that the water intake pipe in Zealand washes out when the river swells; this intake is the primary source for Bethlehem's water supply. Please refer to Table 3.2 for more details and how flooding events have impacted Bethlehem both recently and in the past. Although there have been several Major Disaster Declarations since the last hazard mitigation plan, no significant flooding has impacted Bethlehem since October 2017.

While staying within its budget, the Public Works Department (DPWD) has been proactive in the maintenance and repairs of culverts, reducing the incidence of local road erosion and washouts. To further improve stormwater flow in the Community, culvert improvement projects are included in *Table 9.1, Mitigation Action Plan*.

The Public Works Department (DPWD) cares for 53 miles of road, and eight miles which are gravel. In addition, several major arteries are maintained by the State, including US Routes 302 and 3, NH Routes 142 and 116, and Interstate 93. Nonetheless, significant rain, particularly if combined with rapid snowmelt, can cause considerable damage to Bethlehem's roads.

The expected loss value from inland flooding would be based on the cost of repairing roadways and the potential cost of damage to structures. Flooding can be severe enough to take out utilities and create areas of the 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 also 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) EXTREME TEMPERATURES

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

Extreme Cold & Heat



Winter temperatures in Bethlehem 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.

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. The estimated over-65 population in Bethlehem is 28.2%, and the estimated poverty rate is 10.1% of the total population²⁰. No deaths or illnesses due to cold or heat have been reported in Bethlehem since the prior hazard mitigation plan. The Team noted that during a particular cold spell, the Town had a minor issue with a generator and had to thaw fire hydrants before they would produce water.

Extreme Temperatures combined with Long-Term Utility Outage



Town officials are concerned that during extreme temperatures, they look after their citizens to ensure that extreme temperatures do not create a life or property-threatening disaster. When combined with a power failure, extreme temperatures are of the most concern; a power failure could result in no water, heat, or air conditioning for the Town's most vulnerable populations.

The Town provides warnings and recommendations regarding extreme temperatures on department Facebook pages. It has designated the Library 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.

²⁰ American Community Survey, 2023 ACS 5-Year Estimate

5) INFECTIOUS DISEASE

Hazard Identification & Risk Assessment (HIRA)	High
Probability	Low
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.”²¹

Infectious diseases and epidemics, or pandemics, present a possible threat to Bethlehem. Bethlehem 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. The United States and the world have been coping with the COVID-19 pandemic for over five 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.

Bethlehem’s unique geography provides hikers and summer and winter recreation enthusiasts opportunities to visit the Town; the Community’s population slightly increases during the summer and winter. Facilities in Bethlehem hold events and activities that could increase the likelihood of spreading infectious diseases. In addition, while Bethlehem’s elementary school children attend school within the Town, students in grades 7-12 attend the Profile School with students from Franconia, Easton, and Sugar Hill. Bethlehem is also home to two private schools, the Christian School and the Woodland Community School. Churches, 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 Bethlehem. To help mitigate the crisis, the Town Offices closed in the spring of 2020, reopening in July with mitigation measures in place. Essential town business continued, and virtual meetings took place instead of in-person meetings. Initially, the schools went virtual. The Town continues to encourage social distancing and protecting the Town’s most vulnerable citizens. The CDC recommends that persons, particularly those who are medically compromised or over 65, receive the newest booster shot, which became available in the Spring of 2026. Recommendations for children are similar.

Bethlehem’s EMD and other town officials plan extensively to prepare for and respond to infectious diseases in coordination with emergency service personnel. 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.

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

6) DROUGHT

Hazard Identification & Risk Assessment (HIRA)	High
Probability	Moderate
Estimated Structure Loss Value	\$0 to \$4,629,457

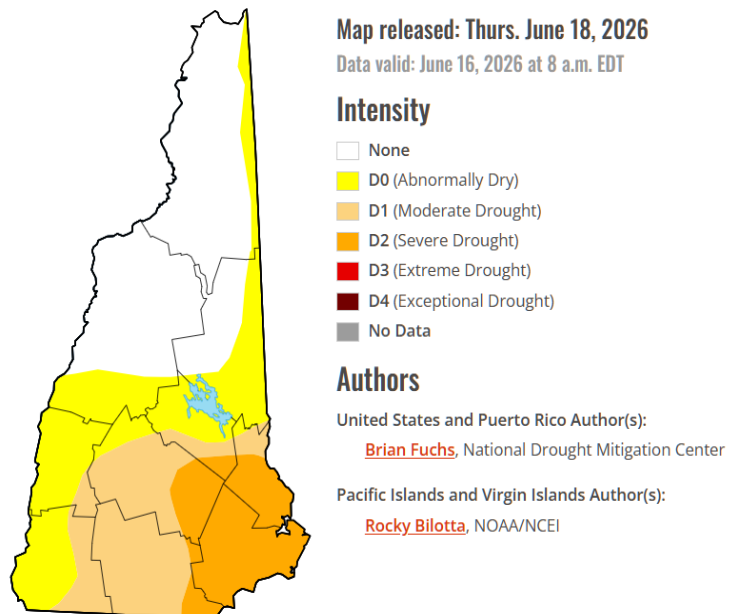
A drought, an extended period without precipitation, could elevate the risk of wildfire and blowdowns in the Community's forested areas. With an extreme drought, the water supply and aquifer levels could be threatened.

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."*²² A concern is that more frequent and longer-lasting droughts will occur. In addition, drought conditions damage the local forests and farms and increase the risk of wildfire. Besides being heavily forested, Bethlehem has many open fields, although it is not a predominantly agricultural community.

Only four significant droughts occurred before 2000, while five have occurred in just the past ten years (2016, 2020-2021, 2022, 2024, and 2025-2026). The 2016-2017 drought brought extreme drought conditions in the south and dry or no drought conditions in the north. The 2020-2021 drought was less significant than the 2016 drought in southern NH but more significant in northern NH. During the summer of 2022, yet another drought impacted NH. Once again, this drought was more significant in the southern part of the state; it was over by January 2023. Another shorter drought was reported by some communities in 2024. The impact of recent droughts can be seen in Table 3.2, Historic Hazard Identification.

As of June 18, 2026, southeastern New Hampshire was in severe drought, the midsouthern area in moderate drought, and the western area in abnormally dry conditions. The remainder of the state is without drought.²³

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.



²² <https://www.des.nh.gov/climate-and-sustainability/>

²³ <https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?NH>

7) TROPICAL/POST TROPICAL CYCLONES

Hazard Identification & Risk Assessment (HIRA) Medium
Probability Low
Estimated Structure Loss Value \$0 to \$4,629,457

Damaging winds due to tropical and post-tropical cyclones (hurricanes) are considered a moderate probability, primarily because of Bethlehem's abundance of forested land. Significant forest damage could occur, as during the 1938 hurricane. 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 downgraded to post-tropical cyclones when they reach central and northern New Hampshire.

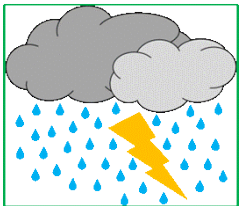


Tropical Storm Irene, the remnants of Hurricane Irene, brought heavy rain and wind to Bethlehem, but did not create any significant structural damage in the Community. Bethlehem did, however, lose about 200 feet of water main at the Zealand River Intake. FEMA reimbursement made to the Bethlehem Village Water District covered 75% of the approximate \$40,000 worth of damage at this site. Tropical Storm Sandy had little impact in Bethlehem, except for heavy rain. Since the prior hazard mitigation plan, no tropical or post-tropical cyclones have reached Bethlehem.

The probability that a tropical or post-tropical cyclone would remain a Category 1 or higher in this part of the State is low. However, if one should occur, there could be significant damage; 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.

8) LIGHTNING

Hazard Identification & Risk Assessment (HIRA) Medium
Probability Low
Estimated Structure Loss Value \$0 to \$4,629,457



Lightning strikes have occurred in Bethlehem because 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, along with 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.

The Town documents several lightning strikes each year. The 2014 hazard mitigation team reported that two lightning-related deaths had occurred, one resulting from a tree falling on a person and the other from a lightning strike by a pool. The 2014 plan also indicated that two buildings had burned due to lightning strikes; one was a building behind the Mulburn Inn, and the other was a small cabin elsewhere in the Town. The Town's elevation of 1,400 feet and one active golf course make Bethlehem susceptible to lightning strikes. The 2021 hazard mitigation team noted that the White Mountains School had been hit by lightning in the past. Tree and brush trimming to reduce the risk has been added as an action item in this Plan.

Accompanying hail could also impact the Community. 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. It should be noted that although Bethlehem is not a heavily farmed community, several small farms could be affected. Overall, it was felt that a hailstorm event would be unlikely and cause minimal damage.

It was noted that severe thunder and lightning storms have been happening more often in recent years. Also concerning are the heavy rains that thunderstorms can produce and the subsequent erosion of ditches and roadways. Based on the localized nature of lightning strikes, the potential loss value was determined to be between 0% and 1% of the total assessed structure value.

9) DAM FAILURE

Hazard Identification & Risk Assessment (HIRA)	Low
Probability	Very Low
Estimated Structure Loss Value	\$0 to \$4,629,457



Fourteen active dams are listed by the Department of Environmental Services (DES) in Bethlehem. Two dams, Bethlehem Sewage Lagoon Dam and the Baker Brook Dam, are classified as Significant Hazard. The Bethlehem Hydro Dam is considered a Low Hazard. The remaining eleven active dams are classified as Non-menace. There are no High Hazard dams in Bethlehem.

The failure of Baker Brook Pond Dam could result in flooding and structure damage. This dam is also continually impacted by beaver activity. Beavers build their dam on the face of the existing dam and compromise the flow of stormwater through the culvert under Route 302. Fortunately, the Bethlehem Hydro Dam does not hold back a significant volume of water. Even if there were a complete failure, no roads or structures would be affected.

Although road damage could occur with the failure of the Baker Brook Dam, overall, the risk related to dam failure would primarily be for minor road washouts. Therefore, the potential structure loss value due to dam failure was determined to be between 0% and 1% of the total assessed structure value.



10) WILDFIRE

Hazard Identification & Risk Assessment (HIRA)	Low
Probability	Low
Estimated Structure Loss Value	\$4,629,457 to \$23,147,285

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 Bethlehem and Table 3.2, for a historic look at wildfires.

Approximately 52% of the Town of Bethlehem is located within the White Mountain National Forest. The Team described the forests of Bethlehem as consisting primarily of mixed forests, with a predominance of hardwoods. Some fires are “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.”*²⁴ However, drought no longer has a low probability in New Hampshire, and fires are as likely to be surface fires. Burn permits are required in Bethlehem, as they are throughout the State, but often, burning occurs without the proper permits. Sometimes, it is 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 trails creates additional risks. The most concerning area for wildfire would be along River Road, where there is a higher incidence of softwoods and about 50 houses and camps located off the roadway well into the WUI.

To help mitigate the effects of wildfire, the Bethlehem Fire Department strives to improve and maintain firefighting equipment, maintain water resources, and manage funds to help pay costs for new equipment. Bethlehem has had no significant wildfires since the last hazard mitigation plan.

Significant wildfires in New Hampshire are uncommon; six large fires have occurred in the State since 2015. These include the Bayle Mountain Fire in Ossipee, the Stoddard Fire in Stoddard, the Covered Bridge Fire in Albany, the Dilly Cliff Fire in Woodstock, the Centennial Fire in Shelburne, and the Bemis Fire in Crawford Notch. The Bethlehem Fire Department was called to assist with the Dilly Cliff Fire.

²⁴ https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fswdev3_009827.pdf

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.

11) EARTHQUAKE

Hazard Identification & Risk Assessment (HIRA) Very Low
Probability Very Low
Estimated Structure Loss Value \$4,629,457 to \$23,147,285

Earthquakes can cause buildings and bridges to collapse, water lines to break, 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 Tamworth in December of 1940 (5.5-5.8). Since then, only one earthquake with a magnitude greater than 4.0 has occurred in the State; it occurred in Sanbornton on January 19, 1982.

The Team reported an earthquake in the fall of 2010 that was felt in the Town. This earthquake was likely a 3.2 magnitude quake centered in Canterbury. Many New Hampshire residents also felt the large earthquake (over 4.0) in October 2012, with its epicenter in Hollis Center, ME. The Team noted that the Hollis earthquake was felt in Bethlehem, but no damage occurred. A more recent earthquake, with a magnitude of 3.8, occurred in Portsmouth in January 2025. Team members did not feel the Portsmouth quake. Many small earthquakes, such as this, frequently occur in New Hampshire.²⁵ 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. In addition, it was noted that an earthquake with a 6.0 or better on the Richter Scale could cause significant damage to the water lines that run throughout Bethlehem. These water lines provide water for Bethlehem Village and the neighboring town of Littleton. A high-magnitude earthquake could demolish the Town's water lines, take out bridges, and cause isolation of the Community. Therefore, the potential structure loss value due to earthquakes was determined to be between 1% and 5% of the total assessed structure value.

12) SOLAR STORMS & SPACE WEATHER

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

*"Space weather describes the "dynamic conditions in the Earth's outer space environment, in the same way that "weather" and "climate" refer to conditions in Earth's lower atmosphere. Space weather includes any and all conditions and events on the Sun, in the solar wind, in near-Earth space, and in our upper atmosphere that can affect space-borne and ground-based technological systems and through these, human life and endeavor. Heliophysics is the science of space weather."*²⁶

Solar storms and space weather are direct products of activity on the surface, or corona, of the Sun. As the Sun continuously changes, its wind blows charged particles in every direction, including the direction of Earth. When sudden amounts of stored magnetic energy and ions are discharged from the Sun's surface, solar flares, high-speed

²⁵ United States Geological Survey (USGS), Earthquake Hazards Program (<https://www.usgs.gov/programs/earthquake-hazards>)

²⁶NASA, <https://science.nasa.gov/science-research/heliophysics/space-weather/solar-flares/what-is-a-solar-flare#q2>

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.

These particles can also produce their own magnetic field, disrupting navigation and communication systems and GPS satellites and potentially producing Geomagnetic Induced Currents (GICs), which could affect the power grid and pipelines. An electromagnetic surge from a solar storm has the potential to produce an Electromagnetic Pulse (EMP). An EMP could cause significant damage to critical infrastructures such as nuclear power plants, banking systems, the electrical grid, sewage treatment facilities, cell phones, landlines, and even vehicles.

NASA's Solar Dynamics Observatory observed 82 solar flares from May 3-9, 2024. These flares caused minor utility and emergency service interruptions throughout the State and the region, but Bethlehem was not impacted. This 2024 storm and other solar storms have impacted Earth, but none have been as significant as the Carrington Event in September 1859²⁷.

A solar storm could create significant economic loss and disruptions to the local, state, national, and worldwide communications systems; however, a solar storm would not directly impact structures; therefore, the estimated loss value was not determined.

13) LANDSLIDES

Hazard Identification & Risk Assessment (HIRA) Very Low
Probability Very Low
Estimated Structure Loss Value \$0 to \$4,629,457

Landslides and subsequent erosion are often associated with heavy rains, steep terrain, and riverbank overflow. They often occur where unstable slopes threaten to collapse on homes, buildings, and local roads. Landslides and erosion in this section refer primarily to riverbank erosion. See Inland Flooding for more information on local road erosion.



In the past, Bethlehem has not been impacted by significant landslide or erosion events, but the potential exists at the intersection of NH Route 142 and River Road (Wing Road). Under the right conditions, a steep bank in this location could slide onto Route 142 and into the Ammonoosuc River. A slide could also potentially damage the nearby bridge. Natural growth has overtaken the steep bank, and some bank stabilization has been completed, but further stabilization is required. The Team added a mitigation action item to work with the Department of Environmental Services (DES) to add more stabilization to the riverbank.

Although landslides and erosion are issues, no structures appear to be in harm's way; therefore, the structure loss value was estimated to be between 0% and 1% of the total assessed structure value.

²⁷ https://en.wikipedia.org/wiki/Carrington_Event

D. TECHNOLOGICAL & HUMAN-CAUSED HAZARDS

The following 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 Bethlehem. The estimated structure loss was not determined for these hazards.

1) HAZARDOUS MATERIALS

Hazard Identification & Risk Assessment (HIRA) High
Probability Moderate

Hazardous material in fixed locations is a concern in many New Hampshire communities, and in Bethlehem. 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, soil, and the air we breathe.

In Bethlehem, locations which could potentially house hazardous materials include: Casella Landfill, R & R Fireworks, the natural gas factory, and Pine Tree Power, although currently non-operational; the disruption to business and traffic could be significant. Still, the risk to the general public and structures in the vicinity of any of these three sites is minimal. Other small bulk fuel, oil, and diesel companies, such as Presby, KMJ, and Irving, also exist in the Community; these sites pose little risk because of the safety precautions in place.

Residents on private property may also store hazardous materials; to help its residents, the Town participates in collecting household hazardous waste, such as batteries and some paint types. If hazardous materials ignited, entire buildings could be susceptible to explosions and fire. The resulting losses could be significant, not only in terms of structure loss but also in loss of business revenue for local merchants.

2) TRANSPORT ACCIDENTS

Hazard Identification & Risk Assessment (HIRA) High
Probability Moderate

The possibility of vehicular accidents involving hazardous materials is identified as potentially significant in Bethlehem. The Town's major roads, Interstate 93, US Routes 3 and 302, and NH Routes 116 and 142, are known to be used by vehicles carrying hazardous materials to areas of the Town, other parts of the State, New England, and Canada. These roadways traverse the Bethlehem area, traveling through terrain with little or no population and, at other times, through more densely populated areas.

Many of Bethlehem's 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 Bethlehem are susceptible to hazards such as road flooding and high winds, leading to downed trees in the roadways and potentially hazardous materials spills.

Interstate 93 carries considerable commercial traffic, including unknown quantities of dangerous substances such as liquid hydrogen. US Route 302 and US Route 3 are also known commercial routes for vehicles carrying large amounts of chemicals, propane, oil, gas, and other petroleum products. In one instance, 50 gallons of fuel were

spilled on Route 302 when a delivery truck overturned. A hazmat team was called in to assist with the clean-up. The steep terrain found in Bethlehem and the treacherous winter driving conditions make these busy routes more vulnerable to hazardous materials accidents.

Losses could be relatively high in property and structural damage in a hazardous materials incident, 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.

3) CYBER EVENTS

Hazard Identification & Risk Assessment (HIRA) High
Probability High

Presidential Policy Directive (PPD-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.”*²⁸

With the increased use of computers and the internet, cyber events could include targets such as banks, hospitals, schools, churches, towns, 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 Team did not report any cyberattacks, but the threat is real. The Town participates in cyber-training and has updated its email system for more security. Primex, the Town's insurance provider, monitors cybersecurity for the Town. Security on computer networks, off-site backup, and user education are vital to protecting sensitive town information and data.

4) TERRORISM & VIOLENCE

Hazard Identification & Risk Assessment (HIRA) High
Probability Moderate

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.”*²⁹

Several areas in Bethlehem may be of concern for terrorist activity. These areas include Interstate 93, a major thoroughfare connecting the US to Canada via Interstate 91 and US Routes 302 and 3, major east-west and north-south highways. Any disruption to these major routes would considerably affect business, travel, and the overall economy in Bethlehem.

²⁸ PPD-41; <https://obamawhitehouse.archives.gov/the-press-office/2016/07/26/presidential-policy-directive-united-states-cyber-incident>

²⁹Homeland Security *Soft Targets and Crowded Places*, https://www.cisa.gov/sites/default/files/publications/DHS-Soft-Target-Crowded-Place-Security-Plan-Overview-052018-508_0.pdf

In addition, a segment of the Hasidic population makes Bethlehem their home during July and August. Although the potential for targeting of this group is unlikely, it is not outside the realm of possibility. Bomb threats at the Town Offices and the schools are also a concern. To mitigate the potential for terrorism and violence, “panic buttons” have been installed at both locations.

As with many 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. The Town continues to monitor and manage potentially violent or terrorism-related events, particularly within critical facilities such as shelters or emergency operations centers.

5) AGING INFRASTRUCTURE

Hazard Identification & Risk Assessment (HIRA) High
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.”³⁰

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.³¹ The American Society of Civil Engineers gave NH an overall C- in its 2017 report card.³²

Aging infrastructure is a concern in Bethlehem as it is throughout New Hampshire and the United States. In Bethlehem, some town facilities are aging and in need of repair or replacement. Of particular concern is the Transfer Station and the Town Offices. The Town is also looking into the possibility of building a new Public Safety Building that would likely include the fire and police departments, thus loosening up some space at the Town Offices.

6) 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 Bethlehem 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 seniors, disabled people, or people experiencing poverty. The Team reported that long-term power outages have diminished due to utility companies' efforts to trim trees and branches near power lines.

³⁰ <https://www.infrastructurereportcard.org/wp-content/uploads/2016/10/2017-NH-Report-Card-hq-with-cover.pdf>

³¹ <https://prd.blogs.nh.gov/dos/hsem/wp-content/uploads/2023/11/2023-NH-STATE-HAZARD-MITIGATION-PLAN-APPENDICES-2.pdf>, page 87

³² Ibid

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. The Team felt that many residents are self-sufficient and equipped with generators and woodstoves. Driving can be difficult due to weather conditions and steep terrain; unfortunately, many services, including pharmacies and grocers, are outside of the Town.

As shown in Table 3.2, significant power outages have occurred in Bethlehem; declarations that occurred are detailed in Table 3.2. The most recent events involving long-term utility outages occurred in December 2022 (DR-4693) and April 2024 (DR-4799). In both events, there was no significant impact in Bethlehem. Bethlehem is a large, rural town with vast changes in elevation; therefore, a power outage could affect one area of the Town and not another.

As a close-knit community, town officials know persons who may need help in emergencies. Nonetheless, a long-term utility outage would have a significant impact. Town officials have designated the Library as a potential warming and cooling center.

7) MASS CASUALTY INCIDENTS

Hazard Identification & Risk Assessment (HIRA) Low
Probability Low

A Mass Casualty Incident (MCI) is defined as *“any number of casualties that exceed the resources normally available from local resources”*³³. 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.

In Bethlehem, an MCI could happen anywhere, but more likely on Interstate 93 or US Route 302. Route 302 is a twisty, steep, and busy road that often sees animal crossings and poor weather. With the influx of tourists throughout the year and tour and school bus activity, an MCI is a genuine risk for the Town.



In addition, with students traveling to and from Bethlehem schools from other communities, the potential for an MCI is increased. Past incidents included a bus accident involving twenty students returning to the White Mountains School (no longer operating). Two students were transported to the hospital, but fortunately, only minor injuries occurred. Emergency responders also responded to a deck collapse on Lewis Hill Road. Fifteen people were on the deck when it collapsed, and three were transported to the hospital with injuries.

No MCIs have occurred since the previous hazard mitigation plan. Except in extraordinary situations, Bethlehem emergency responders can cope with smaller MCIs, relying on mutual aid assistance when necessary.

³³ DeValle Institute Learning Center; <https://delvalle.bphc.org/mod/wiki/view.php?pageid=89>

8) KNOWN & EMERGING CONTAMINANTS

Hazard Identification & Risk Assessment (HIRA) Low
Probability 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.

Naturally occurring contaminants could include trace elements such as arsenic, lead, manganese, and uranium. The most concerning of these for private well water is arsenic; arsenic is naturally occurring and common in groundwater.

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.

Except for the Village District, most of Bethlehem's residents have private well water; thus, radon and arsenic contamination in the aquifer may be a concern. Town officials should encourage testing by individual homeowners for known and emerging contaminants. The Department of Environmental Services (DES) and Aries Engineering are monitoring the Town's water supply for contamination. The Landfill is also being monitored.

9) CONFLAGRATION

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

A conflagration is an uncontrolled burning that threatens human life, health, property, or ecology. A conflagration can be accidentally or intentionally created. The main difference between a wildfire and a conflagration is the density of the human interface at the site of the fire.

In Bethlehem, the risk of a sizeable uncontrolled fire threatens the entire Town because of its proximity to forested land and the developments and neighborhoods created in the Wildland Urban Interface (WUI). When combined with high winds, a sizeable uncontrolled fire could spread from building to building across the Community. Fire could easily 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.

A conflagration could result in explosions, affect the transportation infrastructure, hamper communication and power systems, shut down the numerous businesses along Bethlehem's highways, and even close Interstate 93. The impact on communication, power, and transportation would likely be temporary, but damage to homes and businesses could be significant.

Chapter 6: Current Plans, Policies, and 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, 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 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
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 provide people with flood insurance. A community's floodplain ordinance regulates all new and substantially improved structures located in the 100-year floodplain, as identified on the FEMA Flood Maps, which in Bethlehem are dated February 8, 2024.	Planning Board & Select Board	Good	Improvements Needed: The Town developed a flood ordinance and became a National Flood Insurance Program (NFIP) member on April 15, 1986. The Town's Flood Ordinance works well to successfully prohibit or force compliance with the ordinance for building and substantial improvements to structures within the FEMA flood zone. The Flood Ordinance was last amended in 2024; the FEMA floodplain maps were also updated in 2024. The Town has also offered public education on the local flood risk. This strategy was deferred to this Plan to continue compliance with the NFIP, obtain NFIP brochures to have available at the Town Offices, 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. Action Item #9 (also in Table 7.1)

Current Program or Activity	Description	Managing Department	How Effective	Improvements Needed
Genasys	Genasys is a reverse calling system that uses residents' landline phone numbers. Genasys does not include cell and unlisted numbers or email addresses. The Bethlehem School District uses Alert Solutions, a reverse calling system for school activities and emergency notification.	Emergency Management Director	Good	Improvements Needed: Genasys (formerly CodeRED/NH ENS) is an excellent warning system, but it only stores residents' landline phone numbers. The Town has provided information to residents about CodeRED in the past. This strategy was deferred to provide public outreach to encourage all residents to contact Genasys to add cell numbers, emails, and unlisted numbers, and verify their information. Use the Town's website, a possible brochure at the Town Offices, social media platforms, or a sign-up at Town Meeting. Action Item #10 (also in Table 7.1)
Public Education & Awareness	Bethlehem is well situated to provide public information and outreach to its citizens.	Emergency Management Director & other Departments	Good	Improvements Needed: The Town has a website with some emergency-related links, including a link to Genasys; however, there is no Emergency Management webpage. An emergency web page is a great way to provide outreach to residents on emergency preparedness and mitigation techniques that property owners can use to reduce or eliminate the impact of natural hazards. This strategy was deferred to this Plan to develop and provide vital information and links on an Emergency Management webpage to educate the public on general and seasonal mitigation techniques. The Town can also get information via social media platforms (see Table 2.1). Action Item #8 (also in Table 7.1)
Emergency Operation Plan (2012)	An emergency operations plan identifies the response procedures and capabilities of the Town in the event of a disaster.	Emergency Management Director	Inadequate (because of age)	Improvements Needed: The Bethlehem Emergency Operations Plan (EOP) was last updated in 2012 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. Action Item #23 (also in Table 7.1)
Master Plan (2016)	A Master Plan includes goals, objectives, and expectations for the future development of the Town.	Planning Board	Good	Improvements Needed: The Bethlehem Master Plan was last updated in 2016; however, an update to the Master Plan is currently underway. This strategy was deferred to update the Master Plan according to the State's 10-year recommendation and consider including a natural hazards section and a discussion on climate change and action items from this Plan in future updates. Action Item #18 (also in Table 7.1)
Culvert & Stormwater Maintenance Plan	A Culvert & Stormwater Maintenance Plan includes an inventory of all culverts and ditches in the Community and a record of the location, size, etc. The Bethlehem Public Works Department and the NH DOT clean the drainage basins once a year, and after significant flooding events, culverts are repaired as needed.	Public Works Department	Inadequate	Improvements Needed: Although the Bethlehem Public Works Department does an excellent job cleaning and repairing drainage basins and culverts, a written Culvert & Stormwater Maintenance Plan should be developed to ensure continuity of actions and efficient stormwater management. This strategy was deferred for continued maintenance and to develop a written Culvert & Stormwater Maintenance Plan detailing the size, material, installation date, recommended date for improvement, GPS location, and any associated problems (i.e., flooding). Action Item #3 (also in Table 7.1)

Current Program or Activity	Description	Managing Department	How Effective	Improvements Needed
Tree Removal Program	Tree Removal Program reduces damage from fallen trees and limbs to power lines, stormwater ditches, and structures. It also helps reduce wildfire risk.	Public Works Department	Excellent	Improvements Needed: As trees become damaged and threaten structures and town roads, the Public Works Department removes them. The NH DOT, Littleton Water & Light, 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 high wind events, ice storms, wildfires, and other natural hazards. Action Item #1 (also in Table 7.1)
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	Good	Improvements Needed: NIMS and ICS training have been done by most first responders. Although this is preparedness, this strategy was deferred to this Plan to continue providing NIMS (IS-700) and ICS (ICS 100 and ICS 200) training to new first responders and town officials as they become elected/appointed. Action Item #6 (also in Table 7.1)
Emergency Training	Fire, Police, and EMS personnel training for all fire, law enforcement, and EMS situations.	Fire Chief, Police Chief & Emergency Management Director	Excellent	Improvements Needed: 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 Twin State Fire Mutual Aid District, Northern NH Fire Mutual Aid District, the State of New Hampshire Fire & EMS Training Facility in Bethlehem (Trudeau Road), and the Fire Academy. Police training includes many aspects of law enforcement response, including active shooters 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. Action Item #7 (also in Table 7.1)
Bethlehem Hazard Mitigation Plan (2019)	A hazard mitigation plan is designed to address natural and other hazards and understand the risks these pose to 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	Excellent	Improvements Needed: The Bethlehem Hazard Mitigation Plan (2021) is being updated to this Plan. This strategy was deferred to review this Plan, the Bethlehem Hazard Mitigation Plan 2026, annually, and to update the Plan again in 2031. Action Item #16 (also in Table 7.1)
Emergency Generators	Emergency generators are important to an emergency response as they enable Continuity of Operations and Continuity of Government. Key facilities must have emergency generators.	Emergency Management Director	Poor	Improvements Needed: Although Bethlehem has emergency backup power at some of the Town's CIKR, the Town could benefit from permanent generators for the Bethlehem Elementary School and the Public Works Garage. This strategy was deferred to fund and obtain generators for the Elementary School and Public Works Garage. Action Items #25 and #29 (also in Table 7.1)
E- 911 Signage Compliance	E-911 signage compliance includes markers at driveway entrances that identify residence locations in conjunction with the E-911 alerting system.	Fire Department & Police Department	Inadequate	Improvements Needed: Bethlehem is about 60% 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 need. Use public outreach opportunities, such as an Emergency Management webpage or social media, to promote better compliance and develop other means of increasing compliance. Action Item #4 (also in Table 7.1)

Current Program or Activity	Description	Managing Department	How Effective	Improvements Needed
Capital Improvement Plan (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	Improvements Needed: The Bethlehem Capital Improvement Program is reviewed and updated annually. A CIP is generally reviewed to ensure the program's goals are achieved. This strategy was deferred to review the CIP after approval of this Plan to integrate concepts, ideas, and action items into the CIP. Action Item #20 (also in Table 7.1)
Subdivision Regulations (2023) Zoning Ordinance (2025) Site Plan Review Regulations (2024)	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.	Select Board & Planning Board	Good	Improvements Needed: Bethlehem's regulations address setbacks, road frontage, and the size of the lot. Regulations also address driveways, structures, roads, erosion and sediment control, and maintaining adequate stormwater flow. This strategy was deferred to review the Town's planning mechanisms, including but not limited to the Subdivision, Zoning, Site Plan Review, and Floodplain Regulations, and to discuss changes that may mitigate the occurrence of and damage from the natural hazards identified in this Plan. Action Item 26 (also in Table 7.1)
Pressurized & Dry Hydrants & Other Water Resources	The Bethlehem Fire Department and the Village District maintain pressurized and dry hydrants and multiple locations for water drafting throughout the community.	Fire Department & Village District	Excellent	Improvements Needed: Pressurized hydrants, dry hydrants, and drafting sites throughout Bethlehem provide water resources for firefighting. This strategy was deferred to maintain the pressurized hydrants (Village District), the dry hydrants, and other water resources (Fire Department) to help mitigate the effects of structure fires and wildfires. Action Item #2 (also in Table 7.1)
Amateur Radio Emergency Service	Amateur radio (ham radio) operators can significantly assist the Town during emergencies to augment the Town's communication resources.	Emergency Management Director	Good	Improvements Needed: A list of ham radio operators has not been established since the last hazard mitigation plan. This strategy was deferred to establish a list of ham radio operators in the Town who can assist emergency responders. Action Item #19 (also in Table 7.1)
Bridge Maintenance Program	There are currently no red-listed bridges in the Community. Inspection and clean-up of bridges occur annually. The State inspects all bridges every other year and maintains them regularly.	Public Works Department	Excellent	No Improvements Needed: The State red-listed bridge on Route 142 over the Ammonoosuc River has not been completed; the State is expected to repair the bridge in 2027. The Bethlehem Public Works Department has established a short and long-term bridge maintenance and replacement schedule. Currently, there are two bridges in Town, and neither is "red-listed"; therefore, this strategy was deleted. (also in Table 7.1)

Current Program or Activity	Description	Managing Department	How Effective	Improvements Needed
Mutual Aid Agreements (Fire, Police, Public Works & 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 Department, Fire Department & Public Works Department & EMS	Excellent	Improvements: The Bethlehem Fire Department has a mutual aid agreement with the Twin State Fire Mutual Aid and the Northern NH Fire Mutual Aid District. The Bethlehem Fire Department performs EMS services and medical transportation. The Bethlehem Police Department has mutual aid agreements with surrounding towns, the NH State Police (Troop F), US Border Patrol, the Grafton County Sheriff's Office, and Fish & Game. However, the Public Works Department is not a NH Public Works Mutual Aid Association member, only the Bethlehem Village District. All mutual aid systems in Bethlehem work well; however, this strategy was deferred to become an NH Public Works Mutual Aid Association member. Action Item #17 (also in Table 7.1)
Burning Index	NH Forests & Lands (DNCR) has a burning index that measures the wildfire risk and how likely fires are to start on a given day. It also evaluates the potential damage wildfires can create, the number of people needed to fight them, and the type of equipment that might be needed.	NH Forests & Lands (DNCR) & Fire Department	Excellent	No Improvements Needed: The Fire Department receives regular notification of the burning index via email from NH Forests & Lands. This notification is made daily during the fire danger season, and a Fire Danger Sign is in front of the Town Building. When a new Public Safety Building is built, the Fire Danger Sign will be moved to that location or another suitable location.
Capital Reserve Fund (CRF)	A Capital Reserve Fund is a type of 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	Good	No Improvements Needed: 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 or in emergencies. The Bethlehem Capital Reserve Funds work well and are part of the Town Warrant at the annual Town Meeting.
Life Safety & Fire Codes	Guides all buildings for life safety and fire codes	Fire Department	Good	No Improvements Needed: The National Fire Protection Association (NFPA) and the NH Safety and Fire Codes guide the Bethlehem Fire Department to inspect all commercial, public assembly, and rental properties (3 units or more). The Bethlehem Fire Department does its best to provide timely inspections based on available staffing.
Public Health Plan	The State Health Department wrote the "Influenza, Pandemic, Public Health Preparedness, and Response Plan" to be prepared for any public health emergency; the Town is part of the North Country Regional Public Health Emergency Annex.	North Country Regional Public Health Network	Excellent	No Improvements Needed: The State Public Health Plan assists the Community as part of the services provided by the North Country Regional Public Health Network. The Bethlehem Health Officer attends public health meetings whenever possible.

Current Program or Activity	Description	Managing Department	How Effective	Improvements Needed
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	Good	No Improvements Needed: All three emergency departments in Bethlehem (Police/Fire/Public Works Departments) have radio interoperability. Communications systems and radios are updated with state and federal requirements and work as intended. There are areas of the Town that have "dead spots, and although some improvements have been made to diminish dead spots, there is no apparent mitigation at this time.
Local Road Design Standards	Local road design standards are specifications for constructing new roads in a community.	Select Board & Public Works Department	Good	No Improvements Needed: 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. Acceptance of new roads is voted on at Town Meeting as a warrant article.
Shoreland Water Quality Protection Act (formerly the Comprehensive Shoreland Protection Act)	The Shoreland Water Quality Protection Act (SWQPA) establishes minimum standards for using and developing 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	No Improvements Needed: The Town of Bethlehem follows the Shoreland Water Quality Protection Act regulations. Compliance with the Act is encouraged; however, enforcement may not always be optimal.
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	Excellent	No Improvements Needed: Facebook pages are maintained by the Town Office, the Fire Department, the Police Department, and the Library. These social media accounts work very well to keep the citizens of Bethlehem informed about things happening in the Town.
Building Code & Permits	The Town and State have adopted the International Building Codes (IBC) and the International Residential Codes (IRC). The Town requires builders to follow these adopted codes for new construction so that national standards for flood, wind, earthquake, fire, and snow load are met.	Select Board & Planning Board	Good	No Improvements Needed: The Town of Bethlehem has a Code Enforcement Officer. The permitting process requires builders to abide by the International Building Codes (IBC) and the International Residential Codes (IRC), which the Town and the State of New Hampshire have adopted. No improvements are needed.
NH Forest & 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	No Improvements Needed: The system with NH Forests & Lands (DNCR) and the local fire warden works well. The public knows fire permitting requirements and can get permits online (\$5.50 fee) or in person.

Chapter 7: Last Mitigation Plan

A. DATE OF LAST PLAN

Based on the Disaster Mitigation Act (DMA) of 2000, Bethlehem has developed hazard mitigation plans in the past. The most recent update was formally approved in 2021. The Bethlehem, NH Hazard Mitigation Plan Update 2026 updates the 2021 plan.

Below are the action items that were identified in the 2021 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 2021 Hazard Mitigation Plan. Additional columns not shown here – *Type of Hazard, Managing Department, Funding or Support, Time Frame, and Estimated Cost* – can be found in the 2021 Hazard Mitigation Plan.

TABLE 7.1: ACCOMPLISHMENTS SINCE THE LAST PLAN

Rank	New Mitigation Project	Completed, Deleted, or Deferred
0-1	Action Item #1: Advise the public about the local flood hazard, flood insurance, and flood protection measures (F10) by obtaining and keeping on hand a supply of National Flood Insurance (NFIP) brochures to have available in the Town Offices. Give NFIP materials to homeowners and builders when proposing new development or substantial improvements; encourage property owners to purchase flood insurance (F22), whether or not they are in the flood zone. Through public outreach, educate homeowners on the risks of building in the flood zone and measures that can be taken to reduce the chance of flooding. Add links to the NFIP, Ready.gov, and other flood mitigation information to the town's Emergency Services webpage, a possible brochure, available social media platforms, and local newsletters. Work with residents to ensure they comply with the town's floodplain ordinance. (F23) (Tables 6.1 & 7.1)	Completed & Deferred: The Town developed a flood ordinance and became a National Flood Insurance Program (NFIP) member on April 15, 1986. The Town's Flood Ordinance works well to successfully prohibit or force compliance with the ordinance for building and substantial improvements to structures within the FEMA floodplain. The Flood Ordinance was last amended in 2024; the FEMA floodplain maps were also updated in 2024. The Town has also offered public education on the local flood risk. This strategy was deferred to this Plan to continue compliance with the NFIP, obtain NFIP brochures to have available at the Town Offices, 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. Action Item #9 (also in Table 6.1)

Rank	New Mitigation Project	Completed, Deleted, or Deferred
0-2	Action Item #2: Provide public outreach to encourage all residents to contact CodeRED to add cell numbers, unlisted numbers, and emails, and verify their information. Use the Community website, a possible brochure, available social media platforms, and local newsletters, or a Town Meeting sign-up. (MU14) (Table 7.1)	Completed & Deferred: Genasys (formerly CodeRED/NH ENS) is an excellent warning system, but it only stores residents' landline phone numbers. The Town has provided information to residents about CodeRED in the past. This strategy was deferred to provide public outreach to encourage all residents to contact Genasys to add cell numbers, emails, and unlisted numbers, and verify their information. Use the Town's website, a possible brochure at the Town Offices, social media platforms, or a sign-up at Town Meeting. Action Item #10 (also in Table 6.1)
0-3	Action Item #3: Develop robust information on the town's Emergency Services web page and other available social media platforms to educate the public on hazard mitigation and preparedness measures (MU14) . Include information such as emergency contacts, shelter locations, evacuation routes (SW7, WF11 & T3) , methods of emergency alerting, 911 compliance, water-saving techniques (D9) , earthquake risk and mitigation activities that can be taken in residents' homes (EQ7) , steps homeowners can take to protect themselves and their properties when extreme temperatures occur (ET1 & ET4) , safety measures that can be taken during hail (HA3) and lightning storms (L2) , mitigation techniques for property protection and links to available sources. Educate homeowners regarding the risks of building in hazard zones, encourage homeowners to install carbon monoxide monitors and alarms (WW5) , and provide public information regarding infectious diseases. Develop ways to provide alternative public education. (Table 7.1)	Completed & Deferred: The Town has a website with some emergency-related links, including a link to Genasys; however, there is no Emergency Management webpage. An emergency web page is a great way to provide outreach to residents on emergency preparedness and mitigation techniques that property owners can use to reduce or eliminate the impact of natural hazards. This strategy was deferred to this Plan to develop and provide vital information and links on an Emergency Management webpage to educate the public on general and seasonal mitigation techniques. The Town can also get information via social media platforms (see Table 2.1). Action Item #8 (also in Table 6.1)
0-4	Action Item #4: Post important information on the Town's Emergency Services 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 town's emergency page. Provide Firewise® brochures to residents seeking burn permits and advise them of the importance of maintaining defensible space, the safe disposal of yard and household waste, and the removal of combustible materials from roofs, decks, eaves, porches, and yards. (WF12) (Table 7.1)	Completed & Deferred: The Town has posted important information on the Town's website and notices of red flag burning days. It also obtained and had available Firewise® brochures to educate homeowners on methods to reduce fire risk around their homes and provides a link to Firewise® on the emergency page of the Town's website. This strategy was deferred to 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. Action Item #11
0-5	Action Item #5: Provide public outreach to Bethlehem's citizens to encourage the purchase and installation of home generators, along with guidelines on the safe operation of generators in homes. Develop a townwide list of available portable generators that may be used to assist the functional needs population during an emergency or disaster. (MU15) (Table 7.1)	Deferred: The strategy from the prior plan to develop a townwide list of emergency generators was not completed due to oversight. This strategy was determined to be worth repeating, so it was deferred to develop a list of available generators that may be used to assist the functional needs population during a disaster. Action Item #12
0-6	Action Item #6: To promote private mitigation efforts, provide public outreach to Bethlehem's citizens on the importance of maintaining private roads to allow for safe access for fire apparatus into wildland-urban interface neighborhoods and properties. This will help to ensure accessibility for emergency response and decrease the risk for wildfire. (MU16) (Table 7.1)	Completed & Deferred: The Town has promoted private mitigation efforts and outreach on the importance of maintaining private roads to allow for safe access for fire apparatus into wildland-urban interface neighborhoods and properties. This strategy was deferred to continue to educate the public to help ensure accessibility for emergency response and decrease the wildfire risk. Action Item #13
0-7	Action Item #7: Update the Bethlehem Emergency Operations Plan to coincide with the State 15-ESF format. Include an analysis of the impact of natural hazards on Critical Infrastructure & Key Resources that may be needed during an emergency. The new EOP will include an EOC Call Alert List as well as a detailed Resource Inventory List and Player Packets. (MU6) (Tables 6.1 & 7.1)	Deferred: The Bethlehem Emergency Operations Plan (EOP) was last updated in 2012 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. Action Item #23 (also in Table 6.1)

Rank	New Mitigation Project	Completed, Deleted, or Deferred
0-8	Action Item #8: Review this plan, the Bethlehem Hazard Mitigation Plan Update 2020, whenever an annual review of the Master Plan is done, and consider the incorporation of a discussion on climate change, a natural hazards section, and mitigation action items from this plan. (MU6) (Tables 6.1 & 7.1)	Completed & Deferred: The Bethlehem Master Plan was last updated in 2016; however, any update to the Master Plan is currently underway. This strategy was deferred to update the Master Plan according to the State's 10-year recommendation and consider including a natural hazards section and a discussion on climate change and action items from this Plan in future updates. Action Item #18 (also in Table 6.1)
0-9	Action Item #9: Review the Bethlehem Capital Improvement Program (CIP) to ensure that the goals of the program will be achieved to assist the Town's departments with planned purchases of equipment and supplies. Review the CIP after approval of this plan to integrate concepts, ideas, and action items from this hazard mitigation plan. (MU6) (Table 7.1)	Completed & Deferred: The Bethlehem Capital Improvement Program is reviewed and updated annually. A CIP is generally reviewed to ensure the program's goals are achieved. This strategy was deferred to review the CIP after approval of this Plan to integrate concepts, ideas, and action items into the CIP. Action Item #20 (also in Table 6.1)
0-10	Action Item #10: Inspect the functionality of all hydrants and maintain and repair all hydrants and other water resources in Bethlehem. Identify locations in the Town that would benefit from the installation of dry hydrants, drafting sites, cisterns, or fire ponds, and work with local land owners to gain access to available water resources to help mitigate the effects of wildfire. (WF8, MU12 & MU13)	Completed & Deferred: Inspect the functionality of all pressurized and dry hydrants and maintain and repair all hydrants and other water resources in Bethlehem. Identify locations in the Town that would benefit from the installation of dry hydrants, drafting sites, cisterns, or fire ponds, and work with local land owners to gain access to available water resources to help mitigate the effects of wildfire. Action Item #2 (also in Table 6.1)
0-11	Action Item #11: Develop and maintain a written stormwater maintenance plan in order to ensure more efficient stormwater management. In this plan or "inventory", include the location, date of installation, GPS coordinates, material, type, size, age, and expected replacement date of all culverts, catch basins, and drainage ditches in the Community. (F5) (Table 6.1)	Deferred: Although the Bethlehem Public Works Department does an excellent job cleaning and repairing drainage basins and culverts, a written Culvert & Stormwater Maintenance Plan should be developed to ensure continuity of actions and efficient stormwater management. This strategy was deferred for continued maintenance and to develop a written Culvert & Stormwater Maintenance Plan detailing the size, material, installation date, recommended date for improvement, GPS location, and any associated problems (i.e., flooding). Action Item #3 (also in Table 6.1)
0-12	Action Item #12: In addition to work that is 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, and work to reduce wildfire risk by clearing dead vegetation, cutting high grass and other fuel loads in the Community. (SW4, WF7, WF9 & F14) (Table 7.1)	Completed & Deferred: As trees become damaged and threaten structures and town roads, the Public Works Department removes them. The NH DOT, Littleton Water & Light, 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 high wind events, ice storms, wildfires, and other natural hazards. Action Item #1 (also in Table 6.1)
0-13	Action Item #13: Using the functional needs list of individuals identified during the COVID-19 pandemic as a base, develop a broader and more complete database to track those individuals at high risk of death, such as the elderly, homeless, etc. Create an updated survey of the functional needs population and a method of maintaining the data. (ET3 & WW6) (Table 7.1)	Deleted: Although the Town had good intentions of further developing a functional needs list, this was not completed due to changing priorities and available time and staff to keep the list updated. The Team determined that EMS had a good handle on who could be on a functional needs list, and that there was not enough staff or time to maintain a list; therefore, this strategy was deleted.
0-14	Action Item #14: Monitor the banks of the Ammonoosuc River along Wing Road to assess their stability. Provide bank stabilization (rip rap, etc.) if necessary, when the situation appears threatening. (ER5) (Table 7.1)	Partially Completed & Deferred: Some bank stabilization of the banks of the Ammonoosuc River along Wing Road has been done. This strategy was deferred to add additional stabilization, as the river is encroaching on the road; this will require approvals by the Department of Environmental Services (DES). Action Item #32
0-15	Action Item #15: Lobby the State to prioritize the replacement of the one red-listed state-owned bridge, the Route 142 bridge over the Ammonoosuc River (evacuation route). This bridge is currently on the State schedule; it is expected that repairs will take place in 2022 at the earliest. However, in the Draft 2021-2030 10-Year Plan, the 2019 State Bridge List places replacement in 2027. (MU13) (Table 6.1)	Completed & Deleted: The State red-listed bridge on Route 142 over the Ammonoosuc River has not been completed; the State is expected to repair the bridge in 2027. The Bethlehem Public Works Department has established a short and long-term bridge maintenance and replacement schedule. Currently, there are two bridges in Town, and neither is "red-listed"; therefore, this strategy was deleted.

Rank	New Mitigation Project	Completed, Deleted, or Deferred
0-16	Action Item #16: Continue HazMat training for the members of the Bethlehem Fire Department. (Tables 6.1 & 7.1)	Completed & Deferred: This action item from the prior plan is combined with Action Item #7 in this Plan. (also in Table 6.1)
0-17	Action Item #17: 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 (ICS100 & ICS200). Additionally, the EMD should encourage key personnel to learn about and become adept with WEB-EOC. (Table 7.1)	Completed & Deferred: NIMS and ICS training have been done by most first responders. Although this is preparedness, this strategy was deferred to this Plan to continue providing NIMS (IS-700) and ICS (ICS 100 and ICS 200) training to new first responders and town officials as they become elected/appointed. Action Item #6 (also in Table 6.1)
0-18	Action Item #18: Provide ongoing training for all fire responders as coordinated, which will include the many aspects of emergency response. Training is done through the Twin State Fire Mutual Aid District, Northern NH Fire Mutual Aid District, the State of New Hampshire Fire & EMS Training Facility in Bethlehem (Trudeau Road), and the Fire Academy. (Table 7.1)	Completed & Deferred: 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 Twin State Fire Mutual Aid District, Northern NH Fire Mutual Aid District, the State of New Hampshire Fire & EMS Training Facility in Bethlehem (Trudeau Road), and the Fire Academy. Police training includes many aspects of law enforcement response, including active shooters 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. Action Item #7 (also in Table 6.1)
1-1	Action Item #19: Provide an annual review of the Bethlehem Hazard Mitigation Plan Update 2020, including a review of the status of "Action Items" listed in this plan to encourage completion. Obtain approval from the local elected body on an annual basis and provide a complete update of the plan in five years. (MU11) (Table 6.1)	Completed & Deferred: The Bethlehem Hazard Mitigation Plan (2021) is being updated to this Plan. This strategy was deferred to review this Plan, the Bethlehem Hazard Mitigation Plan 2026, annually, and to update the Plan again in 2031. Action Item #16 (also in Table 6.1)
1-2	Action Item #20: Requested funding from the Select Board for the \$25 needed to join the NH Public Works Mutual Aid Association to ensure more access to public works resources at the time of an emergency. (Tables 6.1 & 7.1)	Partially Completed & Deferred: Bethlehem Village District is a member of the NH Public Works Association. This strategy was deferred to add the Town of Bethlehem as a member of the Association. Action Item #17 (also in Table 6.1)
1-3	Action Item #21: Compile a list of potential ham radio operators who will be contracted to assist during a local emergency. (MU13) (Table 6.1)	Deferred: A list of ham radio operators has not been established since the last hazard mitigation plan. This strategy was deferred to establish a list of ham radio operators in the Town who can assist emergency responders. Action Item #19 (also in Table 6.1)
1-4	Action Item #22: Establish an MOU with the Bethlehem Library and to evaluate the need for additional equipment or supplies that might be needed to manage an EOC effectively. (MU13) (Table 7.1)	Completed & Deleted: The Library meeting has been equipped with the necessary tools to run a successful Emergency Operations Center; there is not much else that can be improved. Therefore, this strategy was deleted.
1-5	Action Item #23: 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)	Completed & Deferred: The prior hazard mitigation plan was approved as a Community Wildfire Protection Plan (CWPP) to enable potential assistance from the State and Federal governments for future wildfire mitigation projects. This strategy was deferred to seek approval of this Plan as a CWPP once again. Action Item #15
1-6	Action Item #24: A new Fire Department program, which was funded as a \$22,000 special warrant article, is underway to install 911 signs throughout the Community. Complete the purchase and installation of appropriate 911 signs for the residents of Bethlehem. (MU15) (Table 7.1)	Completed & Deferred: Bethlehem is about 60% 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 need. Use public outreach opportunities, such as an Emergency Management webpage or social media, to promote better compliance and develop other means of increasing compliance. Action Item #4 (also in Table 6.1)

Rank	New Mitigation Project	Completed, Deleted, or Deferred
2-1	Action Item #25: Review the Site Plan Review Regulations after this plan is approved, to discuss regulatory changes that may reduce the risk for and impact from the hazards that are identified in this plan. (WF2, F1 & MU6) (Tables 6.1 & 7.1)	Completed & Deferred: This action item from the prior plan is combined with Action Item #26 in this Plan. (also in Table 6.1)
2-2	Action Item #26: Review the Bethlehem Subdivision Regulations after this plan is approved, to discuss regulatory changes that may reduce the risk for and impact from the hazards that are identified in this plan. (WF2, F1 & MU6) (Table 6.1 & 7.1)	Completed & Deferred: Bethlehem's regulations address setbacks, road frontage, and the size of the lot. Regulations also address driveways, structures, roads, erosion and sediment control, and maintaining adequate stormwater flow. This strategy was deferred to review the Town's planning mechanisms, including but not limited to the Subdivision, Zoning, Site Plan Review, and Floodplain Regulations, and to discuss changes that may mitigate the occurrence of and damage from the natural hazards identified in this Plan. Action Item #26 (also in Table 6.1)
2-3	Action Item #27: 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.	Deferred: The need for lightning rods has not been established due to changing priorities. This strategy was deferred to inspect all town facilities to determine if an investment in lightning rods would be beneficial. Ensure that proper lightning protection is provided in any new buildings, such as a proposed Public Safety Building. Action Item #27
2-4	Action Item #28: Obtain funding and install a permanent generator at the Bethlehem Highway Garage to ensure the continued use of the facility during a disaster. Although a portable generator is available, a permanent generator will ensure the continued operation of the fuel pumps and the garage doors; all town vehicles are fueled at the Highway Garage. (MU13) (Tables 6.1 & 7.1)	Deferred: A permanent generator has not been installed at the Bethlehem Public Works Garage as suggested in the prior hazard mitigation plan. Although a portable generator is available, a permanent generator will ensure the continued operation of the fuel pumps and the garage doors; all town vehicles are fueled at the Public Works Garage. Action Item #25 (also in Table 6.1)
2-5	Action Item #29: Obtain funding and install a permanent generator at the Bethlehem Town Hall to ensure the continuation of government and the continued operation of the Fire and Police Departments. (MU13) (Tables 6.1 & 7.1)	Deleted: Although portable generators are available to power the police and fire departments, a permanent generator has not been installed at the Town Hall, which rarely loses power. This strategy was deleted as the need for a generator at the Town has been put on hold until a new Public Safety Building is built.
2-6	Action Item #30: Add funding to the Capital Improvement Plan (CIP) for the development of water drafting sites and specialized fire equipment that can be used to mitigate the effects of wildfire. (WF2) (Table 7.1)	Deleted: The strategy from the prior plan was not completed and was deemed unnecessary for this Plan. The Town maintains its CIP, which includes some elements for the fire department to improve equipment and resources. Singling them out in this Plan was not needed; therefore, this strategy was deleted.
2-7	Action Item #31: Based on an engineering study that is in process, either upgrade or "slip-line" the worn metal culvert on Brook Road to prevent the potential for future flooding. (F13) (Table 7.1)	Partially Completed & Deferred: Although an engineering study has been done, there are no current plans to upgrade the aging metal culvert on Brook Road. This strategy was deferred to continue to work with HEB and to obtain funding for this project, which will likely involve a complete culvert replacement and upgrade. Action Item #24
2-8	Action Item #32: Improve the catch basin and 200 feet of underdraining on Cottage Street to improve the flow of stormwater and to prevent flooding. (F13) (Table 7.1)	Deferred: The underperforming and aging concrete culvert on Cottage Street has not been improved since the prior hazard mitigation plan due to funding and changing priorities. This strategy was deferred to improve the catch basin and underdraining on Cottage Street to prevent future flooding. Action Item #31
3-1	Action Item #33: Obtain funding and install a permanent generator at the Bethlehem Elementary School to ensure the use of the facility, if needed, as a possible shelter. (MU13) (Tables 6.1 & 7.1)	Deferred: A generator has not been obtained and installed at the Bethlehem Elementary School (BES). This strategy was deferred to seek funding and obtain a generator for BES to enable this facility to be used as a secondary shelter. Action Item #29 (also in Table 6.1)

Rank	New Mitigation Project	Completed, Deleted, or Deferred
3-2	Action Item #34: Improve the aging culvert on South Road with a new 4' x 5' box culvert to improve the flow of stormwater. (F13) (Table 7.1)	Partially Completed & Deferred: The Town has taken steps to improve the aging culvert on South Road. It has applied for an HMPG grant and is working with state and federal authorities to secure the project. This strategy was deferred to continue to secure the funding for and complete the project of improving the culvert on South Road. Action Item #22
3-3	Action Item #35: Upgrade the 5' existing cement culvert at Black Brook and River Road according to engineering studies (currently underway) to improve the flow of stormwater. Options may include upgrading to a larger box culvert or a 10' bridge. (F13) (Table 7.1)	Partially Completed & Deferred: The upgrade of the 5' cement culvert at Black Brook and River Road has not been completed, although a grant has been obtained for the project. This strategy was deferred to replace the 5' culvert with a 10-foot bridge, to promote better stormwater flow and prevent flooding. Action Item #21
3-4	Action Item #38: Hire an engineer to do a complete study of the stormwater, drainage, and flooding issues in the Noyes Development. The expectation is that there are multiple problems in this area that are further compounded by underground utilities. A complete overhaul of the roads, utilities, and drainage systems, perhaps one road at a time, is expected to be needed to solve the stormwater issues in the development. (F13) (Table 7.1)	Deferred: The drainage issues in the Noyes Development have not been addressed due to changing priorities and funding. This strategy was deferred to once again address the drainage issues in the Noyes Development, and to develop a plan to overhaul the roads, utilities (some underground), and drainage systems to solve stormwater issues that consistently present themselves. Action Item #33
3-5	Action Item #37: Prepare engineering and cost estimates to rebuild Maplewood Hill Road to improve the safety of the road, to prevent future washouts, and to improve the flow of stormwater. (F13)	Partially Completed & Deferred: The Town has obtained a BRIC grant for \$165,000 to complete the engineering only for this \$3.1 million project to rebuild Maplewood Hill Road. This strategy was deferred to seek construction funding for the project and to move forward to improve the roadway, to prevent future washouts, and to improve stormwater flow. Action Item #30
3-6	Action Item #36: Determine a location and funding opportunities for the building of a new and modern Public Safety Building (Fire & Police) so that the emergency responders can better respond to the needs of the community and region. (MU13) (Table 7.1)	Partially Completed & Deferred: The Town has formed a committee to work on a new Public Safety Building (PSB), and local PSBs have been visited. This strategy was deferred to continue to seek a suitable location for a new PSB, to obtain a bond for 2027-2028, and to continue to work towards completion. Action Item #28

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 the Town. Team involvement and the brainstorming sessions proved helpful in bringing new ideas, better relationships, and more in-depth knowledge of the Community.

Prevention

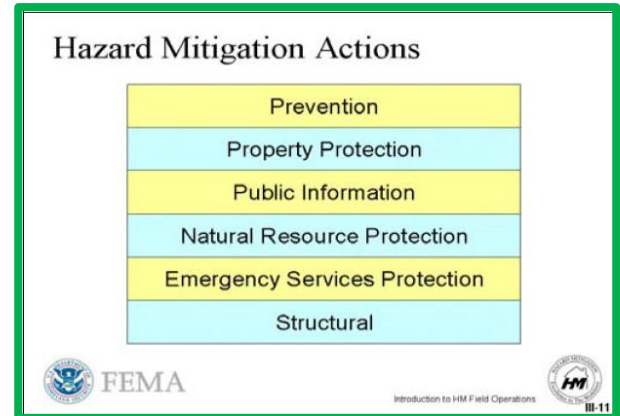
- Forest fire fuel reduction programs
- Special management regulations
- Fire Protection Codes NFPA 1
- Firewise® landscaping
- Culvert and hydrant maintenance
- Planning and zoning regulations
- Building Codes
- Density controls
- Driveway standards
- Slope development regulations
- Master Plan
- Capital 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 upsize 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 Team considered each item from this comprehensive list of possible mitigation action items to determine if any could be implemented for Bethlehem, 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 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 managing and tracking potential emergency planning action items. For instance, the Team knew some action items were more appropriately identified as preparedness or readiness issues. As no other established planning mechanism recognizes 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 10,000 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 Bethlehem 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 Bethlehem 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
Action Item #1: 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 invasive species, 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)	<u>Affected Location</u> -Townwide <u>Type of Activity</u> -Prevention -Emergency Service Protection -Property Protection -Natural Resource Protection	3	3	3	2	2	3	3	19
Action Item #2: Inspect the functionality of all hydrants and maintain and repair all hydrants and other water resources in Bethlehem. Consider other community areas with limited water resources and address these issues by installing new hydrants, fire ponds, and cisterns. Work with local landowners to gain access to available water resources to help mitigate the effects of wildfire. (WF8) (Tables 6.1 & 7.1)	<u>Affected Location</u> -Dry & Pressurized Hydrants -Water resources <u>Type of Activity</u> -Prevention -Emergency Service Protection -Property Protection -Natural Resource Protection	3	3	3	3	3	3	3	21
Action Item #3: Maintain culverts and ditches in the Community and develop and maintain a written stormwater maintenance plan to ensure more efficient stormwater management. In this plan or "inventory", include the location, installation date, GPS coordinates, material, type, size, age, and expected replacement date of all culverts, catch basins, and drainage ditches in the Community. (F5) (Tables 6.1 & 7.1)	<u>Affected Location</u> -Culverts & Ditches <u>Type of Activity</u> -Prevention -Emergency Service Protection -Property Protection -Natural Resource Protection	3	3	3	3	3	3	3	21

Proposed Mitigation Action Items	Type of Activity	S	T	A	P	L	E	E	TTL
Action Item #4: 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 Town's website or available social media to promote better compliance and develop other means of increasing compliance. (MU14) (Tables 6.1 & 7.1)	Affected Location -Townwide	3	3	3	2	3	2	3	19
	Type of Activity -Prevention -Public Education & Awareness -Emergency Service Protection -Property Protection -Natural Resource Protection	Political: Some people will not want compliant signs. Economical: Budget constraints.							
Action Item #5: Lobby the State to mitigate the dangers associated with Long Hill in Bethlehem. Encourage the State to provide better ditching to improve stormwater flow and better winter maintenance to prevent vehicle collisions and traffic issues during inclement weather. (F13) (Other Plans)	Affected Location -Townwide	3	3	3	3	3	3	3	21
	Type of Activity -Prevention	No apparent difficulty with this action item							
Action Item #6: 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. (Tables 6.1 & 7.1)	Affected Location -Townwide	3	3	3	3	3	3	3	21
	Type of Activity -Prevention -Emergency Service Protection	No apparent difficulty with this action item							
Action Item #7: The Fire Chief, Police Chief, EMS Director, 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 shooters, and terrorism. Training is done locally or through Twin State Fire Mutual Aid District, Northern NH Fire Mutual Aid District, the State of New Hampshire Fire & EMS Training Facility in Bethlehem (Trudeau Road), and the Fire and Police Academies. (Tables 6.1 & 7.1)	Affected Location -Townwide	3	3	3	3	3	3	3	21
	Type of Activity -Prevention -Emergency Service Protection	No apparent difficulty with this action item							
Action Item #8: Provide robust information on an 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 mitigation strategies 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)	Affected Location -Townwide	3	3	3	3	3	3	3	21
	Type of Activity -Prevention -Public Education & Awareness -Property Protection	No apparent difficulty with this action item							
Action Item #9: Advise the public about the local flood hazard, flood insurance, and flood protection measures by obtaining and keeping a supply of NFIP brochures available 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 they are in the flood zone, and provide appropriate links to the NFIP and Ready.gov on the Town's website or available social media platforms. Through Public Outreach, educate homeowners regarding the risks of building in the floodplain 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 & 7.1)	Affected Location -Areas prone to flooding	3	3	3	3	3	3	3	21
	Type of Activity -Prevention -Public Education & Awareness -Property Protection	No apparent difficulty with this action item							

Proposed Mitigation Action Items	Type of Activity	S	T	A	P	L	E	E	TTL
Action Item #10: Provide public outreach to encourage all residents to contact Genasys (formerly CodeRED) to add cell numbers, unlisted numbers, and emails, and verify the information. Use the Town's website, a possible brochure, available social media platforms, local newsletters, or a sign-up at Town Meeting. (MU14) (Tables 6.1 & 7.1)	<u>Affected Location</u> -Townwide <u>Type of Activity</u> -Prevention -Public Education & Awareness -Emergency Service Protection	3	3	3	2	3	3	3	20
		<i>Political: Lack of trust in government and not wanting to share private information.</i>							
Action Item #11: Post important information on the Town's website 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 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. (WF10 & WF12) (Table 7.1)	<u>Affected Location</u> -Townwide <u>Type of Activity</u> -Prevention -Public Education & Awareness -Emergency Service Protection -Property Protection -Natural Resource Protection	3	3	3	3	3	3	3	21
		<i>No apparent difficulty with this action item</i>							
Action Item #12: Develop a list of available generators that may be used to assist the functional needs population during a disaster. (MU15) (Table 7.1)	<u>Affected Location</u> -Townwide <u>Type of Activity</u> -Prevention -Public Education & Awareness -Emergency Service Protection -Property Protection	3	3	3	2	3	3	3	20
		<i>Political: Some people may not want to reveal information about what they own to Town officials.</i>							
Action Item #13: To promote private mitigation efforts, provide public outreach to the citizens of Bethlehem 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 ensure accessibility for emergency response and decrease wildfire risk. (MU16) (Table 7.1)	<u>Affected Location</u> -Private Roads <u>Type of Activity</u> -Prevention -Public Education & Awareness -Emergency Service Protection -Property Protection -Natural Resource Protection	3	3	3	2	3	3	3	20
		<i>Political: Some people will not want to be reminded to maintain their private roads.</i>							
Action Item #14: Provide public outreach to the citizens of Bethlehem regarding the availability of the Bethlehem Public Library as a "cooling or warming center" during times of extended high temperatures and severe winter weather. (ET3 & WW6) (Other Plans)	<u>Affected Location</u> -Bethlehem Public Library <u>Type of Activity</u> -Prevention -Public Education & Awareness	3	3	3	3	3	3	3	21
		<i>No apparent difficulty with this action item</i>							
Action Item #15: Obtain approval of this Plan as a Community Wildfire Protection Plan (CWPP) to enable potential assistance from the State and Federal governments for future wildfire mitigation projects. (WF2) (Table 7.1)	<u>Affected Location</u> -Townwide <u>Type of Activity</u> -Prevention -Property Protection -Natural Resource Protection	3	3	3	3	3	3	3	21
		<i>No apparent difficulty with this action item</i>							
Action Item #16: Complete annual reviews of the Bethlehem Hazard Mitigation Plan Update 2026, including a review of the "Action Items" status to encourage completion. Obtain approval from the local elected body annually and provide a complete update of the Plan in five years. (MU11) (Tables 6.1 & 7.1)	<u>Affected Location</u> -Townwide <u>Type of Activity</u> -Prevention	3	3	3	3	3	3	3	21
		<i>No apparent difficulty with this action item</i>							

Proposed Mitigation Action Items	Type of Activity	S	T	A	P	L	E	E	TTL
Action Item #17: Requested funding from the Select Board for the \$50 needed to join the NH Public Works Mutual Aid Association to ensure more access to public works resources in an emergency. (Emergency Preparedness) (Tables 6.1 & 7.1)	Affected Location -Townwide	3	3	3	3	3	3	3	21
	Type of Activity -Prevention -Emergency Service Protection	No apparent difficulty with this action item							
Action Item #18: Review this Plan, the Bethlehem Hazard Mitigation Plan Update 2026, whenever working on the Master Plan. Consider incorporating a discussion on climate change, natural hazards, and mitigation action items from this Plan. (MU6) (Tables 6.1 & 7.1)	Affected Location -Townwide	3	3	2	2	3	2	3	18
	Type of Activity -Prevention	Administrative: Hired professional assistance. Political: Some people will resist this project. Economical: Budget constraints.							
Action Item #19: Establish a list of ham radio operators in the Town who can assist emergency responders. (Tables 6.1 & 7.1)	Affected Location -Townwide	3	3	3	3	3	3	3	21
	Type of Activity -Prevention -Emergency Service Protection	No apparent difficulty with this action item							
Action Item #20: Review the Bethlehem Capital Improvement Program (CIP) to ensure that the program's goals will be achieved and assist the Town's departments with planned purchases of equipment and supplies. Review the CIP after the approval of this Plan to integrate concepts, ideas, and action items from it. (MU6) (Tables 6.1 & 7.1)	Affected Location -Townwide	3	3	3	3	3	3	3	21
	Type of Activity -Prevention -Emergency Service Protection	No apparent difficulty with this action item							
Action Item #21: Replace the 5' culvert with a ten-foot bridge to promote better stormwater flow and prevent flooding. (F13) (Table 7.1)	Affected Location -Culvert at Black Brook & River Road	3	3	2	3	3	1	2	17
	Type of Activity -Prevention -Emergency Service Protection -Property Protection -Natural Resource Protection -Structural Project	Administrative: Outside Assistance may be needed. Economical: Budget constraints. Environmental: Permitting may be needed.							
Action Item #22: Secure funding for and complete the project on South Road by improving the underperforming and aging culvert to improve the flow of stormwater. (F13) (Table 7.1)	Affected Location -Culvert on South Road	3	3	2	3	3	1	2	17
	Type of Activity -Prevention -Emergency Service Protection -Property Protection -Natural Resource Protection -Structural Project	Administrative: Outside Assistance may be needed. Economical: Budget constraints. Environmental: Permitting may be needed.							
Action Item #23: Update the Bethlehem Emergency Operations Plan to coincide with the State's 18-ESF format. Include an analysis of the impact of natural hazards on Critical Infrastructure & Key Resources (CIKR) that may be needed during an emergency. Like the current EOP, the new EOP will include an EOC Call Alert List, a detailed Resource Inventory List, and Player Packets. (MU6) (Tables 6.1 & 7.1)	Affected Location -Townwide	3	3	3	3	3	3	3	21
	Type of Activity -Prevention -Emergency Service Protection	No apparent difficulty with this action item							

Proposed Mitigation Action Items	Type of Activity	S	T	A	P	L	E	E	TTL
Action Item #24: Work with HEB to obtain funding to upgrade the culvert on Brook Road; the project will likely involve a complete culvert replacement and upgrade, using a plastic culvert. (F13) (Table 7.1)	Affected Location -Culvert on Brook Road	3	3	3	3	3	2	2	19
	Type of Activity -Prevention -Emergency Service Protection -Property Protection -Natural Resource Protection -Structural Project	Economical: Budget constraints. Environmental: Will need DES permitting.							
Action Item #25: Obtain funding and install a permanent generator at the Bethlehem Public Works Garage to improve the effectiveness of this key facility during a disaster; this is also the location where the Town vehicles are fueled. (MU13) (Tables 6.1 & 7.1)	Affected Location -Bethlehem Public Works Garage	3	3	3	2	3	1	3	18
	Type of Activity -Prevention -Emergency Service Protection	Political: Some people may not see the need. Economical: Budget constraints.							
Action Item #26: Review the Bethlehem Subdivision, Zoning, Floodplain, and Site Plan Review Regulations to consider changes that will enhance mitigation efforts across the Community. Update these planning mechanisms and integrate elements from this Plan where possible. (WF2, F1 & MU6) (Tables 6.1 & 7.1)	Affected Location -Townwide	3	3	3	3	3	3	3	21
	Type of Activity -Prevention	No apparent difficulty with this action item							
Action Item #27: 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) (Table 7.1)	Affected Location -Town buildings	3	3	3	3	3	3	3	21
	Type of Activity -Prevention -Emergency Service Protection -Property Protection	No apparent difficulty with this action item							
Action Item #28: Seek a suitable location for a new PSB or obtain engineering plans to rebuild the current facility, obtain a bond for 2027-2028, and continue to work towards completion. (MU13) (Table 7.1)	Affected Location -Location To Be Determined	2	2	2	3	3	1	3	16
	Type of Activity -Prevention -Public Education & Awareness -Emergency Service Protection -Structural Project	Social: Expanding the current facility would mean eliminating the playground. Technical: Engineering plans will be needed, whether the current facility is expanded or a new location is chosen. Administrative: Outside assistance will be needed. Political: Depending on the choice to expand the current facility or build new, there will be people who will not see the need to prioritize this project. Economical: Budget constraints.							
Action Item #29: Obtain funding and install a permanent generator at the Bethlehem Elementary School (BES) to improve the effectiveness of this key facility during a disaster, and in case it is used as a cooling and warming shelter or a primary shelter. (MU13) (Tables 6.1 & 7.1)	Affected Location -Bethlehem Elementary School	3	3	3	2	2	1	3	17
	Type of Activity -Prevention -Emergency Service Protection	Political: Some people may not see the need. Legal: Will need cooperation from SAU. Economical: Budget constraints.							
Action Item #30: Seek construction funding to rebuild Maplewood Hill Road in order to move forward to improve the roadway, to prevent future washouts, and to improve stormwater flow. (F13) (Table 7.1)	Affected Location -Maplewood Hill Road	2	3	2	2	3	1	2	15
	Type of Activity -Prevention -Emergency Service Protection -Property Protection -Natural Resource Protection -Structural Project	Social: Traffic inconveniences for some. Administrative: Outside assistance will be needed. Political: Some will not see the need to prioritize this project. Economical: Budget constraints. Environmental: DES permitting may be needed.							

Proposed Mitigation Action Items	Type of Activity	S	T	A	P	L	E	E	TTL
Action Item #31: Improve the catch basin and underdraining on Cottage Street to prevent future flooding. (F13) (Table 7.1)	<u>Affected Location</u> -Cottage Street	3	3	2	3	3	1	2	17
	<u>Type of Activity</u> -Prevention -Emergency Service Protection -Property Protection -Natural Resource Protection -Structural Project	Administrative: Outside Assistance may be needed. Economical: Budget constraints. Environmental: Permitting may be needed.							
Action Item #32: Add additional stabilization on the banks of the Ammonoosuc River, as the river is encroaching on Wing Road; this will require approval by the Department of Environmental Services (DES). (ER5) (Table 7.1)	<u>Affected Location</u> -Wing Road/Ammonoosuc River	2	2	2	3	3	1	1	14
	<u>Type of Activity</u> -Prevention -Emergency Service Protection -Property Protection -Natural Resource Protection	Social: Traffic inconvenience. Technical: This project may be challenging. Administrative: Will require outside assistance. Economical: Budget constraints. Environmental: Will need DES permitting to work near the river.							
Action Item #33: Address the drainage issues in the Noyes Development, and develop a plan to overhaul the roads, utilities (some underground), and drainage systems to solve stormwater issues that consistently present themselves. (F13) (Table 7.1)	<u>Affected Location</u> -Noyes Development	3	3	2	3	3	1	2	17
	<u>Type of Activity</u> -Prevention -Emergency Service Protection -Property Protection -Natural Resource Protection -Structural Project	Administrative: Outside Assistance may be needed. Economical: Budget constraints. Environmental: Permitting may be needed.							

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, 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 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

Very Low Cost	\$0-or staff time only
Low Cost	Less than \$20,000
Medium Cost	\$20,000-\$100,000
High Cost	\$100,000-\$1,000,000
Very High Cost	Greater than \$1,000,000

Key to the Time Frame

Life of Plan	Starting on Plan adoption 2026-2031 (0-60 months)
Short Term	1 year 2026-2027 (0-12 months)
Medium Term	2 years starting in 2027 – 2029 (12 – 36 months)
Long-term	3 years starting in 2029 – 2031 (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	Problem Statement: As trees become damaged and threaten structures and town roads, the Public Works Department removes them. The NH Department of Transportation (NH DOT) does this for state roads, along with Littleton Water & Light and Eversource, as needed. There is a need to continue to work to keep this hazard to a minimum. Action Item #1: 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 invasive species, 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)	High Wind Events, Wildfire, Severe Winter Weather & Inland Flooding	Public Works Department	Local	Life of the Plan	Low Cost
A-2	Problem Statement: Pressurized hydrants, dry hydrants, and drafting sites throughout Bethlehem provide water resources for firefighting. The maintenance of these hydrants needs to continue. Some areas of the Town could benefit from additional water resources for firefighting. Action Item #2: Inspect the functionality of all hydrants and maintain and repair all hydrants and other water resources in Bethlehem. Consider other community areas with limited water resources and address these issues by installing new hydrants, fire ponds, and cisterns. Work with local landowners to gain access to available water resources to help mitigate the effects of wildfire. (WF8) (Tables 6.1 & 7.1)	Wildfire & Conflagration	Village District & Fire Department	Local	Life of the Plan	Low Cost
A-3	Problem Statement: Although the Bethlehem Public Works Department works to clean and repair drainage basins and culverts, a written stormwater maintenance plan should be developed to ensure continuity of actions and efficient stormwater management. The PWD is currently working on a Road Study. Action Item #3: Maintain culverts and ditches in the Community and develop and maintain a written stormwater maintenance plan to ensure more efficient stormwater management. In this plan or "inventory", include the location, installation date, GPS coordinates, material, type, size, age, and expected replacement date of all culverts, catch basins, and drainage ditches in the Community. (F5) (Tables 6.1 & 7.1)	Inland Flooding	Public Works Department	Local	Life of the Plan (for continued culvert maintenance) & Short Term (0-12 months) (for the Plan)	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	Problem Statement: The Town has continuously used public outreach to remind residents of the need for proper E911 signage. However, the Town is only about 60% compliant with the proper E911 signage. Action Item #4: 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 Town's website or available social media to promote better compliance and develop other means of increasing compliance. (MU14) (Tables 6.1 & 7.1)	All Hazards	Fire Department	Local	Life of the Plan	Low Cost
A-5	Problem Statement: US Route 302, in the area known as Long Hill, is particularly dangerous when impacted by winter weather, icing, and heavy rain. Better maintenance and ditching are needed. Action Item #5: Lobby the State to mitigate the dangers associated with Long Hill in Bethlehem. Encourage the State to provide better ditching to improve stormwater flow and better winter maintenance to prevent vehicle collisions and traffic issues during inclement weather. (F13) (Other Plans)	Inland Flood & Aging Infrastructure	Town Administrator & Public Works Department	Local	Life of the Plan	Very Low Cost
A-6	Problem Statement: Although first responders, including firefighters, have received NIMS & ICS training, not all of Bethlehem's town officials have. Action Item #6: 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. (Tables 6.1 & 7.1)	All Hazards	Emergency Management Director	Local	Life of the Plan	Very Low Cost
A-7	Problem Statement: Training of all responders is coordinated by the Fire Chief, Police Chief, EMS Director, and the EMD and includes the many aspects of emergency response. This training needs to continue. Action Item #7: The Fire Chief, Police Chief, EMS Director, 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 shooters, and terrorism. Training is done locally or through Twin State Fire Mutual Aid District, Northern NH Fire Mutual Aid District, the State of New Hampshire Fire & EMS Training Facility in Bethlehem (Trudeau Road), and the Fire and Police Academies. (Tables 6.1 & 7.1)	All Hazards	Fire Department, Police Department, EMS & Emergency Management Director	Local	Life of the Plan	Low Cost

Final R/P	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
A-8	Problem Statement: The Town's website does not have an emergency management webpage. The Town has provided the residents with emergency preparedness and mitigation techniques; this practice is ongoing. Action Item #8: Provide robust information on an 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 mitigation strategies 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)	High Wind Events, Drought, Earthquake, Extreme Temperatures, Lightning, Severe Winter Weather, Wildfire & Infectious Disease	Emergency Management Director, Department Heads & Website Administrator	Local	Life of the Plan	Low Cost
A-9	Problem Statement: Residents and builders may not be aware of flood regulations & the availability of flood insurance through the National Flood Insurance Program (NFIP). They may also not be aware of the risk of building in the floodplain and the steps they can take to reduce flooding. Action Item #9: Advise the public about the local flood hazard, flood insurance, and flood protection measures by obtaining and keeping a supply of NFIP brochures available 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 they are in the flood zone, and provide appropriate links to the NFIP and Ready.gov on the Town's website or available social media platforms. Through Public Outreach, educate homeowners regarding the risks of building in the floodplain 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 & 7.1)	Inland Flooding	Emergency Management Director, Building Inspector & Website Administrator	Local	Life of the Plan	Low Cost
A-10	Problem Statement: Genasys (formerly CodeRED) is an excellent warning system, but it only stores residents' landline phone numbers. Residents may not be aware that they can add cell numbers, emails, and unlisted numbers. Action Item #10: Provide public outreach to encourage all residents to contact Genasys (formerly CodeRED) to add cell numbers, unlisted numbers, and emails, and verify the information. Use the Town's website, a possible brochure, available social media platforms, local newsletters, or a sign-up at Town Meeting. (MU14) (Tables 6.1 & 7.1)	All Hazards	Emergency Management Director & Website Administrator	Local	Life of the Plan	Low Cost

Final R/P	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
A-11	Problem Statement: Although the Town does a great job using its website to promote preparedness, residents may not be aware of the steps they can take to reduce the fire risk at their homes. Action Item #11: Post important information on the Town's website 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 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. (WF10 & WF12) (Table 7.1)	Wildfire & Conflagration	Fire Chief	Local	Life of the Plan	Very Low Cost
A-12	Problem Statement: The strategy from the prior plan to develop a townwide list of emergency generators was not completed. Action Item #12: Develop a list of available generators that may be used to assist the functional needs population during a disaster. (MU15) (Table 7.1)	All Hazards	Emergency Management Director	Local	Life of the Plan	Very Low Cost
A-13	Problem Statement: Residents may not be aware of the importance of maintaining their private roads to allow emergency responders access and prevent wildfires. Action Item #13: To promote private mitigation efforts, provide public outreach to the citizens of Bethlehem 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 ensure accessibility for emergency response and decrease the wildfire risk. (MU16) (Table 7.1)	Wildfire & Conflagration	Emergency Management Director & Website Administrator	Local	Life of the Plan	Very Low Cost
A-14	Problem Statement: Although public outreach has been done to advise the citizens of Bethlehem of the possibility of using the Public Library as a cooling shelter in times of extended high temperatures and as a warming center in times of extended cold temperatures, additional public outreach needs to be done. Action Item #14: Provide public outreach to the citizens of Bethlehem regarding the availability of the Bethlehem Public Library as a "cooling or warming center" during times of extended high temperatures and severe winter weather. (ET3 & WW6) (Other Plans)	Extreme Temperatures & Severe Winter Weather	Emergency Management Director & Website 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
B-1	Problem Statement: This Plan, the Bethlehem Hazard Mitigation Plan Update 2026, will need to be approved again as a Community Wildfire Protection Plan (CWPP). Action Item #15: Obtain approval of this Plan as a Community Wildfire Protection Plan (CWPP) to enable potential assistance from the State and Federal governments for future wildfire mitigation projects. (WF2) (Table 7.1)	Wildfire & Conflagration	Mapping & Planning Solutions	Local	Short Term	Very Low Cost
B-2	Problem Statement: This Plan, the Bethlehem Hazard Mitigation Plan Update 2026, will require an annual review and a complete update in five years. Action Item #16: Complete annual reviews of the Bethlehem Hazard Mitigation Plan Update 2026, including a review of the "Action Items" status to encourage completion. Obtain approval from the local elected body annually and provide a complete update of the Plan in five years. (MU11) (Tables 6.1 & 7.1)	All Hazards	Emergency Management Director	Local & Grants	Short Term (1st annual review) & Long Term (full update)	Low Cost
B-3	Problem Statement: Although most mutual aid systems in Bethlehem are excellent, the Town does not belong to the NH Public Works Mutual Aid Association, only the Bethlehem Village District. Action Item #17: Requested funding from the Select Board for the \$50 needed to join the NH Public Works Mutual Aid Association to ensure more access to public works resources in an emergency. (Emergency Preparedness) (Tables 6.1 & 7.1)	All Hazards	Select Board & Public Works Department	Local	Short Term	Very Low Cost
B-4	Problem Statement: The Bethlehem Master Plan (2016) is reviewed annually and is being updated based on the State's 10-year recommendation. It does not have a natural hazard section or discuss climate change. Action Item #18: Review this Plan, the Bethlehem Hazard Mitigation Plan Update 2026, whenever working on the Master Plan. Consider incorporating a discussion on climate change, natural hazards, and mitigation action items from this Plan. (MU6) (Tables 6.1 & 7.1)	All Hazards	Planning Board	Local	Short Term	Medium Cost
B-5	Problem Statement: A list of ham radio operators has not been established since the last hazard mitigation plan. Action Item #19: Establish a list of ham radio operators in the Town who can assist emergency responders. (Tables 6.1 & 7.1)	All Hazards	Emergency Management Director	Local	Short 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
B-6	Problem Statement: A review of the Bethlehem Capital Improvement Program (CIP) is usually a part of the annual budget review process. The Bethlehem CIP should be reviewed to ensure that the program's goals will be achieved and assist the Town's departments with planned purchases of equipment and supplies. Action Item #20: Review the Bethlehem Capital Improvement Program (CIP) to ensure that the program's goals will be achieved and assist the Town's departments with planned purchases of equipment and supplies. Review the CIP after the approval of this Plan to integrate concepts, ideas, and action items from it. (MU6) (Tables 6.1 & 7.1)	All Hazards	Town Administrator, Select Board, Planning Board & CIP Committee	Local	Short Term	Very Low Cost
C-1	Problem Statement: The upgrade of the 5' cement culvert at Black Brook and River Road has not been completed, although a grant has been obtained for the project. Action Item #21: Replace the 5' culvert with a ten-foot bridge to promote better stormwater flow and prevent flooding. (F13) (Table 7.1)	Inland Flooding & Aging Infrastructure	Public Works Department	Local & Grants	Medium Term	Very High Cost
C-2	Problem Statement: The culvert on South Road has aged and no longer works efficiently. Action Item #22: Secure funding for and complete the project on South Road by improving the underperforming and aging culvert to improve the flow of stormwater. (F13) (Table 7.1)	Inland Flooding & Aging Infrastructure	Public Works Department	Local & Grants	Medium Term	High Cost
C-3	Problem Statement: The Bethlehem Emergency Operations Plan (EOP) was last updated in 2012 and will need to be updated again as soon as possible. Action Item #23: Update the Bethlehem Emergency Operations Plan to coincide with the State's 18-ESF format. Include an analysis of the impact of natural hazards on Critical Infrastructure & Key Resources (CIKR) that may be needed during an emergency. Like the current EOP, the new EOP will include an EOC Call Alert List, a detailed Resource Inventory List, and Player Packets. (MU6) (Tables 6.1 & 7.1)	All Hazards	Emergency Management Director	Local & Grants	Medium Term	Low Cost
C-4	Problem Statement: Although an engineering study has been done, there are no current plans to upgrade the aging metal culvert on Brook Road. The bottom of this metal culvert has worn out. Action Item #24: Work with HEB to obtain funding to upgrade the culvert on Brook Road; the project will likely involve a complete culvert replacement and upgrade, using a plastic culvert. (F13) (Table 7.1)	Inland Flooding & Aging Infrastructure	Public Works 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-5	Problem Statement: Although Bethlehem has emergency backup power at many of the Town's Critical Infrastructure & Key Resources (CIKR), the Bethlehem Public Works Garage does not. Action Item #25: Obtain funding and install a permanent generator at the Bethlehem Public Works Garage to improve the effectiveness of this key facility during a disaster; this is also the location where the Town vehicles are fueled. (MU13) (Tables 6.1 & 7.1)	Long-Term Utility Outages	Emergency Management Director & Public Works Department	Local & Grants	Medium Term	Medium Cost
C-6	Problem Statement: The Bethlehem Subdivision, Zoning, and Site Plan Review 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. Action Item #26: Review the Bethlehem Subdivision, Zoning, Floodplain, and Site Plan Review Regulations to consider changes that will enhance mitigation efforts across the Community. Update these planning mechanisms and integrate elements from this Plan where possible. (WF2, F1 & MU6) (Tables 6.1 & 7.1)	All Hazards	Planning Board	Local	Medium Term	Very Low Cost
C-7	Problem Statement: Lightning has struck town buildings in the past and has caused damage to electronics and power outages. Action Item #27: 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) (Table 7.1)	Lightning	Town Administrator	Local	Medium Term	Low Cost
D-1	Problem Statement: In order to better accommodate the needs of a modern fire and police department, a new Public Safety Building should either be built in a new location or the current facility should be expanded. Action Item #28: Seek a suitable location for a new PSB or obtain engineering plans to rebuild the current facility, obtain a bond for 2027-2028, and continue to work towards completion. (MU13) (Table 7.1)	All Hazards	Select Board	Local & Grants	Long Term	Very High Cost
D-2	Problem Statement: Although Bethlehem has emergency backup power at many of the Town's Critical Infrastructure & Key Resources (CIKR), the Bethlehem Elementary School (BES) does not. Action Item #29: Obtain funding and install a permanent generator at the Bethlehem Elementary School (BES) to improve the effectiveness of this key facility during a disaster, and in case it is used as a cooling and warming shelter or a primary shelter. (MU13) (Tables 6.1 & 7.1)	Long-Term Utility Outages	Emergency Management Director & School Board	Local & Grants	Long Term	Medium Cost

Final R/P	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
D-3	Problem Statement: The Town has obtained a BRIC grant for \$165,000 to complete the engineering for the \$3.1 million project to rebuild Maplewood Hill Road. The total project cost would be \$3.1 million. The road has aged and is in rough shape. Action Item #30: Seek construction funding to rebuild Maplewood Hill Road in order to move forward to improve the roadway, to prevent future washouts, and to improve stormwater flow. (F13) (Table 7.1)	Inland Flooding & Aging Infrastructure	Public Works Department	Local & Grants	Long Term	Very High Cost
D-4	Problem Statement: The underperforming and aging concrete culvert on Cottage Street has not been improved since the prior hazard mitigation plan due to funding and changing priorities. Action Item #31: Improve the catch basin and underdraining on Cottage Street to prevent future flooding. (F13) (Table 7.1)	Inland Flooding & Aging Infrastructure	Public Works Department & Village District	Local & Grants	Long Term	High Cost
D-5	Problem Statement: Some stabilization of the banks of the Ammonoosuc River along Wing Road has been done. However, because of the encroaching river, more should be done. Action Item #32: Add additional stabilization on the banks of the Ammonoosuc River, as the river is encroaching on Wing Road; this will require approval by the Department of Environmental Services (DES). (ER5) (Table 7.1)	Landslides	Public Works Department	Local & Grants	Long Term	High Cost
D-6	Problem Statement: The drainage issues in the Noyes Development have not been addressed due to changing priorities and funding. Action Item #33: Address the drainage issues in the Noyes Development, and develop a plan to overhaul the roads, utilities (some underground), and drainage systems to solve stormwater issues that consistently present themselves. (F13) (Table 7.1)	Inland Flooding & Aging Infrastructure	Public Works Department & Village Precinct	Local & Grants	Long Term	Very High Cost

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

A. HAZARD MITIGATION PLAN MONITORING, EVALUATION, AND UPDATES

The Town's Emergency Management Director will call meetings of all responsible town parties to review plan progress annually on the anniversary of plan adoption and, as needed, based on the occurrence of hazard events, and report outcomes to the Select Board. The public will be notified of these meetings by posting the agenda at the Town Hall. Responsible parties identified for mitigation actions will be asked to submit their reports before the meeting. Meetings will entail the following actions:

- Review previous hazard events to discuss and evaluate major issues, the effectiveness of current mitigation, and possible mitigation for future events.
- Assess how the mitigation strategies of the Plan can be integrated with other Town plans and operational procedures.
- Review and evaluate progress toward implementing the current mitigation plan based on reports from responsible parties.
- Amend the current Plan to improve mitigation practices.
- Evaluate and assess the Plan's effectiveness in achieving its goals, stated purpose, and priorities.

The following questions will serve as the criteria that are used to evaluate and update the Plan:

Plan Mission and Goal

- Is the Plan's stated goal and mission still accurate and up to date, reflecting any changes to local hazard mitigation activities?
- Are there any changes or improvements that can be made to the goal and mission?

Hazard Identification and Risk Assessment

- Have there been any new occurrences of hazard events since the Plan was last reviewed? If so, these hazards should be incorporated into the Hazard Identification and Risk Assessment.
- Have any new occurrences of hazards varied from previous occurrences in terms of their extent or impact? If so, the stated impact, extent, probability of future occurrence, or overall risk and vulnerability assessment should be edited to reflect these changes.
- Is there any new data available from local, state, or federal sources about the impact of previous hazard events, or any new data for the probability of future occurrences? If so, this information should be incorporated into the Plan.

Existing Mitigation Strategies

- Are the current strategies effectively mitigating the effects of any recent hazard events?
- Has there been any damage to property since the Plan was last reviewed?
- How could the existing mitigation strategies be improved to reduce the impact of recent occurrences of hazards?

Proposed Mitigation Strategies

- What progress has been accomplished for the previously identified proposed mitigation strategies?
- How have any completed mitigation strategies reduced the Town's vulnerability and impact from hazards since the strategy was completed? If not, and if they have been tested, what changes are needed to make them more effective?
- Should the criteria for prioritizing the proposed strategies be altered in any way?
- Should the priority given to individual mitigation strategies be changed based on any recent changes to financial and staffing resources or recent hazard events?

Review of the Plan and Integration with Other Planning Documents

- Is the current process for reviewing the Hazard Mitigation Plan effective?
- How could it be improved?
- Are there any town plans in the process of being updated that should have the content of this Hazard Mitigation Plan incorporated into them or integrated with other town planning tools and operational procedures, including the Zoning Regulations, the Subdivision Regulations, the Master Plan, and the Capital Improvement Plan?

Following these discussions, it is anticipated that the Planning Team may decide to reassign the roles and responsibilities for implementing mitigation strategies to different town departments or revise the goals and objectives contained in the Plan.

Review forms for post-hazard or annual reviews are available in Chapter 11 of this Plan. The Town is encouraged to use these forms to document any changes and accomplishments after this Plan's development. Forms are available for years 1-4.

B. INTEGRATION WITH OTHER PLANS

This Plan will only enhance mitigation if balanced with all other town plans. Bethlehem completed its last hazard mitigation plan in 2021 and has completed many projects. Examples in Table 7.1 include providing ongoing fire and flood education, a bank stabilization project on the Ammonoosuc River, a culvert project on South Road, and obtaining funding for the Maplewood Hill Road project. As a result, the Town was able to integrate these actions into other town activities, budgets, plans, and mechanisms.

The Town of Bethlehem has agreed to incorporate a Community Wildfire Protection Plan (CWPP) into the Bethlehem, NH Hazard Mitigation Plan Update 2026. 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:

BETHLEHEM MASTER PLAN

Traditionally, Master Plans are updated every 5 to 10 years. A complete update of Bethlehem's Master Plan was completed in 2016, and an update is underway. Future reviews and updates of the Master Plan will consider integrating concepts, ideas, and action items from this Hazard Mitigation Plan, a natural hazards section, and a discussion on climate change. **(Action Item #18).**

BETHLEHEM EMERGENCY OPERATIONS PLAN 2012 (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 Bethlehem EOP was completed in 2012. An update for the Emergency Operations Plan is expected to be completed after completing this Plan in 2026. The new EOP will incorporate elements from this hazard mitigation plan **(Action Items #23).**

TOWN BUDGET, CAPITAL IMPROVEMENT PLAN & CAPITAL RESERVE FUNDS

The Town of Bethlehem maintains a Capital Improvement Plan and Capital Reserve Funds (CRFs) for major expenditures. The CRFs 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 CRF.**

BETHLEHEM ORDINANCES & SUBDIVISION REGULATIONS

As time passes and the Town's needs 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 #26).**

The local governments 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

The Emergency Management Director will update the Plan every five years and incorporate the results of the Town's plan monitoring and evaluation procedures. The next anticipated annual update will begin upon the anniversary of the Plan's approval. The next full update of the Plan is scheduled to begin before the fifth anniversary of approval. Plan updates may begin earlier following a significant natural hazard event within the Town and region, such as a federally declared disaster.

The public meetings of the Planning Team shall be publicized through legal notices in local newspapers, posted fliers, and on the Town website. Written and email comments shall be directed to the EMD. The updated Plan will incorporate input from the public, other municipalities, and government agencies. The Select Board is responsible for approving the Plan submission to FEMA and for adopting the Plan. The update will follow a similar planning process and outline as the current process, making deviations when needed. The update will be expanded to better address natural hazards, development, climate change, vulnerable populations, regional impacts, and other pertinent issues.

This Plan was completed in a series of open meetings beginning October 15, 2025. 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 and paper formats.

Chapter 11: Signed Community Documents and Approval Letters

A. PLANNING SCOPE OF WORK & AGREEMENT

BETHLEHEM HAZARD MITIGATION PLAN UPDATE



PARTIES TO THE AGREEMENT

Mapping and Planning Solutions

Town of Bethlehem, NH

Current Plan Expiration: 7/29/2026

BRIC FFY 2023 Period of Performance: 9/24/24 to 9/23/2027

Agreement

This agreement is between the Town of Bethlehem (the Town) or its official designee and Mapping and Planning Solutions (MAPS). The agreement outlines the Town's desire to engage the services of MAPS to assist in planning and technical services to produce the Bethlehem Hazard Mitigation Plan Update (the Plan) under the Fiscal Year 2023 Building Resilient Infrastructure and Communities (BRIC) grant program.

This agreement outlines the responsibilities to ensure the Plan is developed involving town members, 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 accurately reflect the Town's values and individuality; this is accomplished by forming a working relationship between the Town's citizens, the Planning Team, and MAPS.

The Adopted Plan

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) or the Federal Emergency Management Agency (FEMA). The adopted Plan will guide the Town's boards, commissions, and departments; however, the action items or projects described in the Plan are not mandatory. Adopted plans do not include any financial commitments by the Town.

All adopted plans should address mitigation strategies for reducing the risk of natural, technological, and human-caused disasters on life and property; this Plan will include a list of action items to address the community's risk. Also, the planning process will include discussions on climate change, building resilient infrastructure, and integrating elements of this Plan with 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.
- MAPS will coordinate and facilitate six to eight two-hour online meetings via Zoom or other virtual meeting applications. MAPS will provide digital materials and handouts to enhance team members' understanding of each step in the planning process.
- MAPS will assist the Team in developing goals, objectives, and action items, and 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.

- 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 each risk's severity.
- MAPS will author, edit, and prepare the Plan for review by the Team before submitting the Plan to HSEM/FEMA for conditional approval. Upon conditional approval by HSEM/FEMA, MAPS will provide the Planning team with the necessary documents for plan adoption by the Bethlehem Select Board and continue to work with the Town until final approval and Plan distribution.
- Once final documents are received, MAPS will print and distribute the Plan. The final documents include the HSEM formal approval email (if applicable), the FEMA formal letter of approval, and the approved Community Wildfire Protection Plan (CWPP) documents. MAPS will provide the Town with one hard copy of the Plan containing all signed documents and a thumb drive containing these documents in digital form. MAPS will distribute digital copies of the Plan to collaborating agencies, including 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; a copy of the report will be forwarded to the primary contact for Bethlehem.
- 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. Mapping and Planning Solutions reserves the right to invoice the Town for the time, travel expenses (if applicable), and staff costs incurred when meeting attendance is inadequate to proceed.

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

- The Town shall ensure that the 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 primary contact to work with MAPS, usually the Emergency Management Director (EMD). The primary contact shall assist with recruiting participants for meetings, including developing mailing lists when necessary, distributing handouts, and placing meeting announcements. This contact shall also assist MAPS with organizing public meetings to develop the Plan and offer assistance in developing the work schedule, 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 notice at the start of the planning process, as FEMA and the Code of Federal Regulations (CFRs) require. In coordination with the principal contact, MAPS will include proof of this notification in the Plan.
- The proposed Plan shall be submitted to the Select Board for consideration and adoption.
- After adoption and final approval, 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 \$12,000; 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.....	\$5900.00
▪ 2. Second payment upon plan submittal to HSEM for APA (Approve Pending Adoption).....	\$5700.00
▪ 3. Final payment upon project completion and receipt of the final hard copy of the Plan	\$400.00
Total Fees.....	\$12,000.00

- **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 the required match amounts have been met.

- **Required Matching Funds:** This project's total cost under BRIC2023 is \$18,570, with a federal share of \$13,927.50 and a matching amount of \$4,642.50 (75%/25% split). This scope reflects a reduction of the amount paid to MAPS from the federal share of \$13,927.50 to \$12,000, thus reducing the match to \$3,000. Matching funds are the responsibility of the Town of Bethlehem, not MAPS. The Town will provide and document 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 to use in its match fulfillment.

- **Project Period:** The grant provided for this project is funded through BRIC2023. Per the grant agreement between the Town and HSEM, all work must be completed by September 23, 2027.

This project shall begin upon grant approval from HSEM and signing this agreement with MAPS and continue through September 23, 2027, or whenever the project is complete. The project period may be extended by mutual written agreement between the Town, MAPS, and Homeland Security. The actual project end date depends on timely adoptions and approvals, which may be outside the control of MAPS and the Town. This project is expected to be completed before the grant expiration date.

- **Ownership of Material:** The Town shall own all 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 that could reasonably be considered confidential. MAPS provides work products as Portable Document Format (PDF) documents. MAPS' work tools are Microsoft Word, Excel, and Publisher. MAPS will not share its work tools.

- **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 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 Bethlehem. MAPS and its employees, if any, shall not be liable for opinions rendered, advice, or errors resulting from the quality of data supplied. Adopting the Plan by the Town and final approval of the Plan by HSEM FEMA relieve Mapping and Planning Solutions of content liability. MAPS carries general liability insurance.

- **Amendments:** Changes, alterations, or additions to this agreement may be made if agreed to in writing between the Town of Bethlehem 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 100 Hazard Mitigation Plans and more than 80 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 & Reviewing 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
PO Box 283
Twin Mountain, NH 03595
jgarneau@mappingandplanning.com
(603) 991-9664 (cell)

For the Town

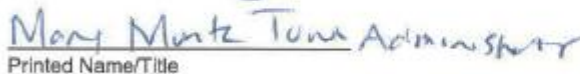
Mary Moritz	John Galloway
Town Administrator	Fire Chief & EMD
2155 Main Street	2155 Main Street
PO Box 189	PO Box 189
Bethlehem, NH 03574	Bethlehem, NH 03574
(603) 869-3351	(603) 869-5822
admin@bethlehemnh.org	firechief@bethlehemnh.org

Signatures below indicate acceptance of and agreement to the details outlined in this agreement.

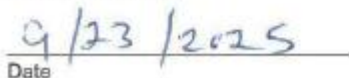
FOR THE TOWN OF BETHLEHEM, NH



Signature

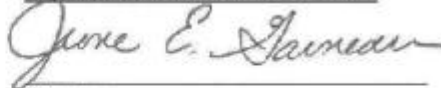


Printed Name/Title



Date

FOR MAPPING AND PLANNING SOLUTIONS



Signature

June Garneau, Owner
September 16, 2025

Signatures are scanned facsimiles; original signatures are on file.

B. APPROVED PENDING ADOPTION (APA) FROM FEMA

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INSERTION OF APA EMAIL FROM FEMA

Signatures are scanned facsimiles; original signatures are on file.

C. FORMAL APPROVAL LETTER FEMA

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INSERTION OF FINAL APPROVAL LETTER FROM
FEMA

Signatures are scanned facsimiles; original signatures are on file.

D. SIGNED CERTIFICATE OF ADOPTION

CERTIFICATE OF ADOPTION

BETHLEHEM, NH

SELECT BOARD

A RESOLUTION ADOPTING THE BETHLEHEM, NH HAZARD MITIGATION PLAN UPDATE 2026

WHEREAS the Town of Bethlehem 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 Bethlehem has received Approved Pending Adoption (APA) status from the Federal Emergency Management Agency (FEMA) for its Hazard Mitigation Plan Update 2025 under the requirements of 44 CFR 201.6 and

WHEREAS, public and committee meetings were held between October 15, 2025, and February 11, 2026, regarding the development and review of the Hazard Mitigation Plan Update 2025 and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and plan maintenance procedures for the Town of Bethlehem and

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

RESOLVED by the Select Board:

1. The Plan is now adopted as an official plan of the Town of Bethlehem.
2. The respective officials identified in the Plan's mitigation action items are directed to pursue the implementation of the recommended actions assigned to them.
3. Future revisions and plan maintenance required by 44 CFR 201.6 and FEMA are now adopted as a part of this resolution for five (5) years from the date of this resolution.
4. The Emergency Management Director shall present an annual report to the Select Board on the progress of the Plan's action items.

Bethlehem, Hazard Mitigation Plan Update Certificate of Adoption, page two

Adopted this day, the _____ of _____, 2026

Select Board Chair

Signature

Print Name

Member of the Select Board

Signature

Print Name

Member of the Select Board

Signature

Print Name

Select Board Vice-Chair

Signature

Print Name

Member of the Select Board

Signature

Print Name

Emergency Management Director

Signature

Print Name

IN WITNESS WHEREOF, the undersigned has affixed their signature and notary stamp on this day, the _____ of _____, 2026

Notary Signature

Expiration



Signatures are scanned facsimiles; original signatures are on file.

E. CWPP APPROVAL LETTER FROM DNCR

**Bethlehem, NH
A Resolution Approving the
Bethlehem, NH Hazard Mitigation Plan Update 2026
As a Community Wildfire Protection Plan**

Several public and committee meetings were held between October 15, 2025, and February 11, 2026, regarding the development and review of the Bethlehem, NH Hazard Mitigation Plan Update 2026. The Plan contains potential future projects to mitigate hazard and wildfire damage in the Town of Bethlehem.

The Select Board and Fire Chief/Emergency Management Director request that the Department of Natural and Cultural Resources (DNCR) accept this plan as a Community Wildfire Protection Plan, having adhered to its requirements.

The Select Board and Fire Chief approve the Bethlehem, NH Hazard Mitigation Plan Update 2026 and understand that with approval by DNCR, this Plan will also serve as a Community Wildfire Protection Plan.

For the Town of Bethlehem

APPROVED and SIGNED this day, _____, 2026.

Chairman of the Select Board

Printed Name

Fire Chief

Printed Name

For the Department of Natural & Cultural Resources (DNCR)

APPROVED and SIGNED this day, _____, 2026.

Forest Ranger – NH Division of Forest and Lands, DNCR

APPROVED and SIGNED this day, _____, 2026.

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.

Bethlehem, 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 Bethlehem, NH Hazard Mitigation Plan Update 2026

Please use the reverse side for additional notes 

[illegible]

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.

Bethlehem, 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 Bethlehem, NH Hazard Mitigation Plan Update 2026

Please use the reverse side for additional notes 

[illegible]

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.

Bethlehem, 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 Bethlehem, NH Hazard Mitigation Plan Update 2026

Please use the reverse side for additional notes 

[illegible]

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.

Bethlehem, 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 Bethlehem, NH Hazard Mitigation Plan Update 2026

Please use the reverse side for additional notes 

Additional Notes – Year Four:

[illegible]

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 Mitigation Planning Handbook**, FEMA, June 2025
- **Mitigation Ideas, A Resource for Reducing Risk to Natural Hazards**, FEMA, January 2013
- **Hazard Mitigation Assistance Program and Policy Guide**, FEMA, March 2023
- **Local Mitigation Planning Policy Guide**, FEMA, April 2025
- **Hazards Mitigation Plans**
 - Bethlehem Hazard Mitigation Plan Update 2021
 - Franconia, NH Hazard Mitigation Plan Update 2025
 - Littleton, NH Hazard Mitigation Plan Update 2024
 - Carroll, NH Hazard Mitigation Plan Update 2024
- **NH State Multi-Hazard Mitigation Plan**, 2023
 - <https://prd.blogs.nh.gov/dos/hsem/wp-content/uploads/2023/10/2023-NH-State-Hazard-Mitigation-Plan-Signed-10.5.23.pdf>
- **Disaster Mitigation Act (DMA) of 2000**, Section 101, b1 & b2, and Section 322a
 - <https://www.fema.gov/emergency-managers/risk-management/hazard-mitigation-planning/regulations-guidance#:~:text=The%20Disaster%20Mitigation%20Act%20of,of%20non%2Demergency%20disaster%20assistance>
- **Economic & Labor Market Information Bureau**, NH Employment Security, October 2025; Community Response for Bethlehem, Received, 5/14/25, Census 2000 and Revenue Information derived from this site;
 - <https://www2.nhes.nh.gov/GraniteStats/SessionServlet?page=Community.jsp&SID=1&city=000505&cityName=Bethlehem>

Photos

- Photos are taken by MAPS unless otherwise noted.

Map Images

- Map images (screen prints) are created by MAPS using readily available data from NH Granite unless otherwise indicated.

Wildfire Links & Wildfire Grant Assistance Links

- US Forest Service; <https://www.fs.usda.gov/>
- US Fire Administration; <https://www.usfa.fema.gov/>
- Community Wildfire Defense Grant Program: <https://www.fs.usda.gov/managing-land/fire/grants#:~:text=The%20Community%20Wildfire%20Defense%20Program,reduce%20the%20risk%20of%20wildfire>
- Firewise®; <https://www.nfpa.org/Education-and-Research/Wildfire/Firewise-USA>
- Fire Adapted Communities; <https://www.fireadapted.org>
- Ready Set Go; <http://www.wildlandfires.org/>
- Fire education for children; <https://www.smokeybear.com/>
- Funding for Community Wildfire Risk Reduction; <https://wildfirerisk.org/reduce-risk/funding/>
- Pre-Disaster Mitigation (PDM) Grant Program; <https://www.fema.gov/grants/mitigation/learn/pre-disaster>
- Fire Prevention and Safety (FP&S); <https://www.fema.gov/grants/preparedness/firefighters/safety-awards>
- Assistance to Firefighters Grants; <https://www.fema.gov/grants/preparedness/firefighters/assistance-grants>
- Community Wildfire Defense Grant Program; <https://www.fs.usda.gov/managing-land/fire/grants/cwdg>
- Federal Wildfire Resources; <https://www.fs.usda.gov/sites/default/files/2022-08/Fed-Wildfire-Mitigation-Resources.pdf>

Additional Websites

- NH Homeland Security & Emergency Management; <https://www.nh.gov/safety/divisions/hsem/>
- US Geological Survey; <https://www.usgs.gov/mission-areas/water-resources/science/land-subsidence>
- Department of Environmental Services; <https://www.des.nh.gov/>
- The Disaster Center (NH); <https://www.disastercenter.com/newhamp/tornado.html>
- The NFIP; <https://www.floodsmart.gov/>
- NOAA, National Weather Service; <https://w1.weather.gov/glossary/>
- NOAA, Storm Prediction Center; <https://www.spc.noaa.gov/faq/tornado/beaufort.html>
- National Weather Service; <https://www.weather.gov/safety/cold>
- Center for Disease Control; <https://www.cdc.gov/disasters/winter/index.html>
- Slate; <https://slate.com/news-and-politics/2003/12/outbreaks-vs-epidemics.html>
- NH Bureau of Economic Affairs; <https://www.nheconomy.com/office-of-planning-and-development>
- Code of Federal Regulations; Title 14, Aeronautics and Space; Part 1, Definitions and Abbreviations; <https://www.ecfr.gov/current/title-14/chapter-I/subchapter-A/part-1>
- US Legal, Inc.; <https://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 suffering³⁴:

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 can apply for funding. The funding amount is pre-calculated, based on historical FMAG declarations, and reassessed every fiscal year.

FLOOD MITIGATION ASSISTANCE (FMA)

FMA is a competitive grant program funding 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). An annual congressional appropriation funds the program 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.

³⁴ 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 funding is based on a 6% set-aside for FEMA's assistance following major disaster declarations through the Public Assistance and Individuals and Households Program. The BRIC program was designed to foster innovation and provide a yearly grant cycle, offering applicants a consistent funding source.

PRE-DISASTER MITIGATION (PDM)

PDM is a grant program that helps 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 with 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 submitting 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.³⁵

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*
HMGP	75 / 25
HMGP Post Fire	75 / 25
BRIC	75 / 25
BRIC (Economically Disadvantaged Rural Communities**)	90 / 10
FMA (Community Flood Mitigation, Project Scoping, Individual Mitigation of Insured Properties, and Planning Grants)	75 / 25
FMA (Repetitive loss properties)	90 / 10
FMA (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.

³⁵ 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

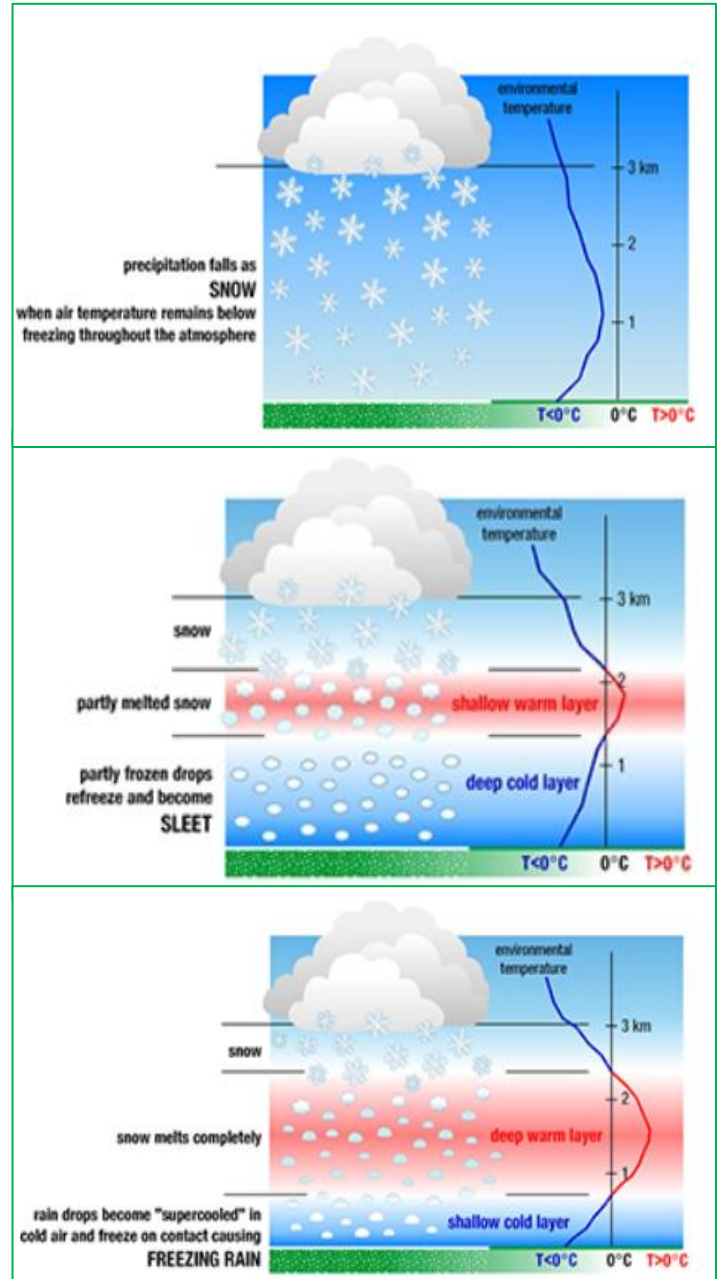
A winter storm can range from moderate snow to blizzard conditions. Blizzard conditions are considered blinding wind-driven snow over 35 mph that lasts several days. A severe winter storm deposits four or more inches of snow for 12 hours or six inches for 24 hours.

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.”³⁶



Types of Severe Winter Weather
NOAA – National Severe Storms Laboratory

³⁶ 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 predicted ice storms.³⁷

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

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

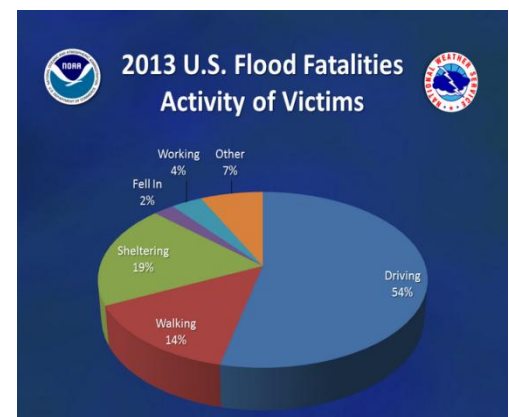
(Categories of damage are based upon combinations of precipitation totals, temperatures and wind speeds/directions.)

*INLAND FLOODING

General Flooding Conditions

Floods are defined as a temporary overflow of water onto lands 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 too much 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.



³⁷ The Weather Channel, <https://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 pond³⁸. 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 manner³⁹:

Classification	Description	Inspection Intervals
Non-Menace	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
Low Hazard	A dam that has a low hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in 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
Significant Hazard	A dam that has a significant hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in 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
High Hazard	A dam that has a high hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in probable loss of human life as 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

³⁸ <https://www.des.nh.gov/sites/g/files/ehbemt341/files/documents/2020-01/vol2-appC.pdf>

³⁹ <https://www.des.nh.gov/sites/g/files/ehbemt341/files/documents/2020-01/db-15.pdf>

Flooding (local, road erosion)

Today, the risk of flooding is a serious concern with changes in land use, aging roads, 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.

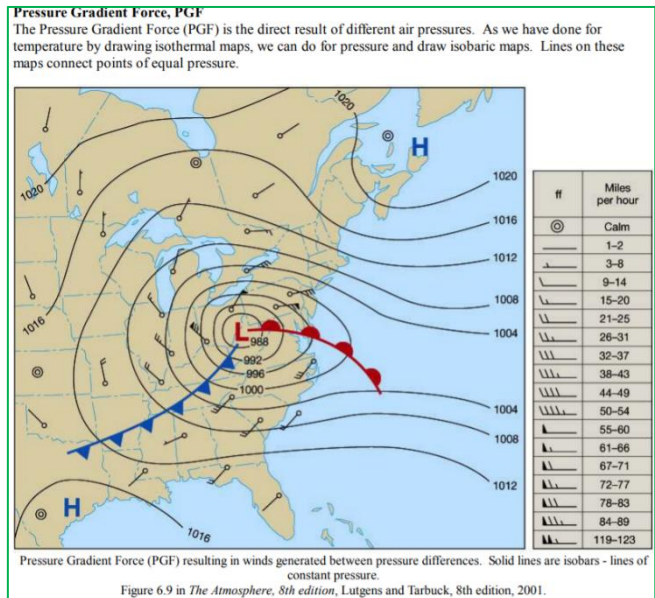
Erosion

Erosion is the wearing away of land, 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 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.⁴⁰

*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.^{41 42}



⁴⁰ https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf

⁴¹ NOAA; <https://w1.weather.gov/glossary/index.php?letter=w>

⁴² 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

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. 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.”⁴³ The chart (right), adapted from wunderground.com, compares the Fujita Scale to the Enhanced Fujita Scale.

EF SCALE	OLD F-SCALE	TYPICAL DAMAGE
EF-0 (65-85mph)	F0 (65-73 mph)	Light damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
EF-1 (86-110 mph)	F1 (74-112 mph)	Moderate damage. Roofs are severely stripped; mobile homes are overturned or badly damaged; loss of exterior doors, windows, and other glass is broken.
EF-2 (111-135 mph)	F2 (113-157 mph)	Considerable damage. 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.
EF-3 (136-165 mph)	F3 (158-206 mph)	Severe damage. 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.
EF-4 (166-200 mph)	F4 (207-260 mph)	Devastating damage. Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
EF-5 (>200 mph)	F5 (261-318 mph)	Incredible damage. 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	F6-F12 (319 mph to speed of sound)	Inconceivable damage. 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, and automobiles, will create secondary damage to structures.

⁴³ Enhance Fujita Scale, <https://www.wunderground.com/prepare/hurricane-typhoon>

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. Both a microburst and a larger macroburst 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.⁴⁴

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.⁴⁵

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, and 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.	

⁴⁴ NOAA - https://www.noaa.gov/jetstream/wind_damage

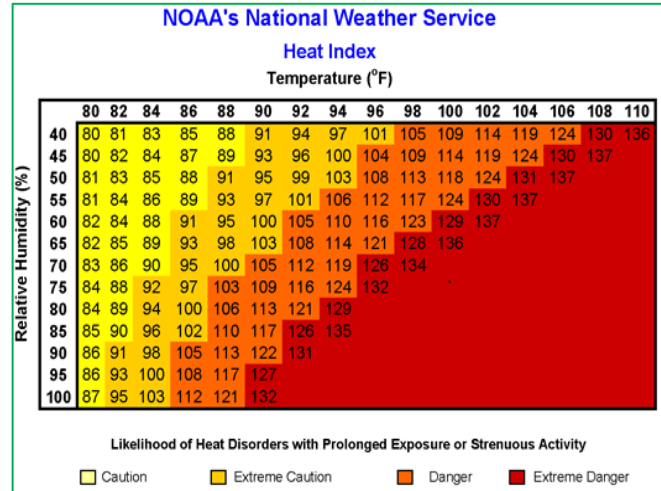
⁴⁵ NOAA, Storm Prediction Center, <https://www.spc.noaa.gov/faq/tornado/beaufort.html>

***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.

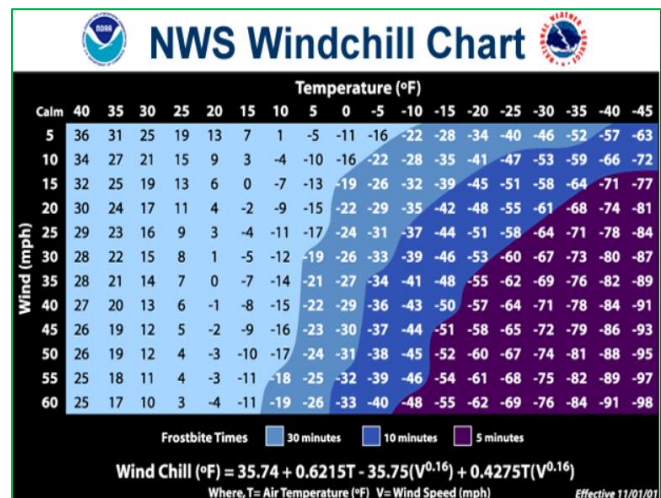
Most heat disorders occur when a victim is overexposed to heat or has overexercised for their age and physical condition. Older adults, young children, and those who are sick or overweight are more likely to succumb to extreme heat.



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. The chart above explains the likelihood of heat disorders that may result from high heat.⁴⁶

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. The National Weather Service Chart (to the right) shows wind chill due to wind and temperature.⁴⁷



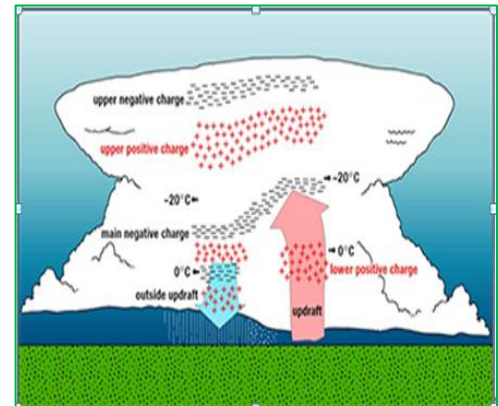
⁴⁶ NOAA; <https://www.weather.gov/safety/heat-index>

⁴⁷ National Weather Service; <https://www.weather.gov/safety/cold-wind-chill-chart>

LIGHTNING*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."⁴⁸

Thunder, a result of lightning, is created when the "lightning channel heats the air to around 18,000 degrees Fahrenheit..."⁴⁹ 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 cloud-to-ground lightning frequency 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 coast. 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."⁵⁰

⁴⁸ NOAA National Severe Storms Laboratory, <https://www.nssl.noaa.gov/education/svrwx101/lightning>

⁴⁹ Ibid

⁵⁰ Ibid

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.	

<https://graphical.weather.gov/definitions/defineLAL.html>

*WILDFIRE

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.”*⁵¹

Two major potential losses from wildfire are 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.

⁵¹<https://codes.iccsafe.org/content/IWUIC2021P1/chapter-2-definitions#:~:text=WILDFIRE.,exposing%20and%20possibly%20consuming%20structures>

***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 page⁵²) 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."⁵³

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 and 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.⁵⁴

Category	Sustained Winds	Types of Damage Due to Hurricane Winds
1	74-95 mph 64-82 kt. 119-153 km/h	Very dangerous winds will produce some damage: 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	Extremely dangerous winds will cause extensive damage: 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	Devastating damage will occur: 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	Catastrophic damage will occur: 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	Catastrophic damage will occur: 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.

⁵² National Hurricane Center; <https://www.nhc.noaa.gov/aboutsshws.php>

⁵³ Ibid

⁵⁴ https://www.wpc.ncep.noaa.gov/research/mcs_web_test_test_files/Page1637.htm

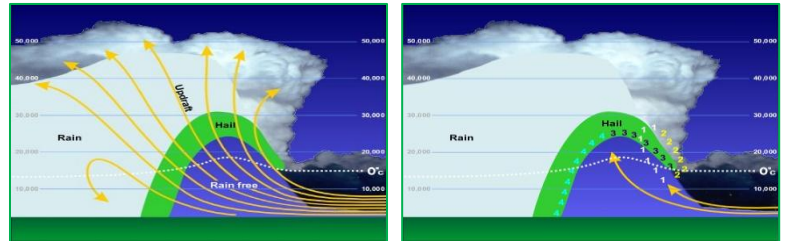
Hail

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."⁵⁵

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.⁵⁶ The charts to the right show how hail is formed.⁵⁷



*EARTHQUAKE

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.⁵⁸

It is well documented that fault lines run throughout New Hampshire, but high-magnitude earthquakes have not been common in New Hampshire's 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

⁵⁵ NOAA National Severe Storms Laboratory; <https://www.nssl.noaa.gov/education/svrwx101/hail/>

⁵⁶ <https://www.pinterest.com/pin/126171227030590678/>

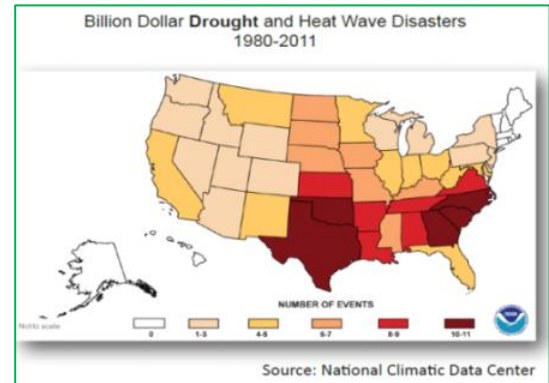
⁵⁷ <https://www.noaa.gov/jetstream/hail>

⁵⁸ <https://dnr.mo.gov/land-geology/hazards/earthquakes/science/relationship-between-richter-magnitude-modified-mercalli-intensity>

***DROUGHT**

A drought is a long period of abnormally low precipitation that adversely affects plants and animals' growing seasons or living conditions. Droughts are not 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 streamflow 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 to the right, 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
D0	Abnormally Dry	Going into drought: • short-term dryness slowing planting, growth of crops or pastures Coming out of drought: • some lingering water deficits • pastures or crops not fully recovered
D1	Moderate Drought	• Some damage to crops, pastures • Streams, reservoirs, or wells low, some water shortages developing or imminent • Voluntary water-use restrictions requested
D2	Severe Drought	• Crop or pasture losses likely • Water shortages common • Water restrictions imposed
D3	Extreme Drought	• Major crop/pasture losses • Widespread water shortages or restrictions
D4	Exceptional Drought	• Exceptional and widespread crop/pasture losses • Shortages of water in reservoirs, streams, and wells creating water emergencies

<https://www.nrcc.cornell.edu/services/blog/2018/06/28/index.html>; photo from US Drought Monitor

***LANDSLIDES**

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 affecting different geographic, topographic, and geologic areas. Therefore, the severity of the landslide event must be determined by considering many measurements.⁵⁹

***INFECTIOUS DISEASE**

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.⁶⁰

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.⁶¹

“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.”⁶²

⁵⁹ State of New Hampshire Multi-Hazard Mitigation Plan Update 2023 & <https://oas.org/dsd/publications/Unit/oea66e/ch10.htm>

⁶⁰ <https://www.mayoclinic.org/diseases-conditions/infectious-diseases/symptoms-causes/syc-20351173>

⁶¹ <https://www.dhhs.nh.gov/programs-services/disease-prevention/infectious-disease-control>

⁶² <https://www.webmd.com/a-to-z-guides/bacterial-and-viral-infections#1>

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. The Delta and Omnicron variants appeared in the US in December 2021, causing critical concerns about the possibility of overwhelming the country's hospital systems.

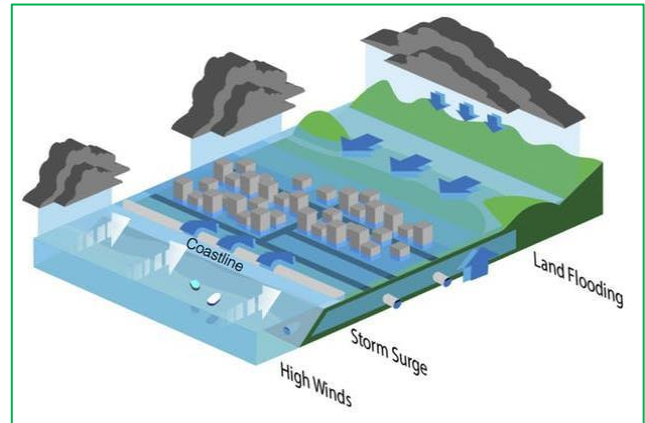
The pandemic remains an evolving worldwide crisis, affecting millions of workers in the United States and presenting significant economic consequences. Although most people confirmed with COVID-19 eventually recover, and many have been vaccinated, the virus remains a risk for the elderly and compromised individuals.

The extent of infectious diseases is generally described by the level and occurrence of a particular disease as follows:

- 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
- EpidemicDisease 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
- OutbreakDisease 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

COASTAL FLOODING

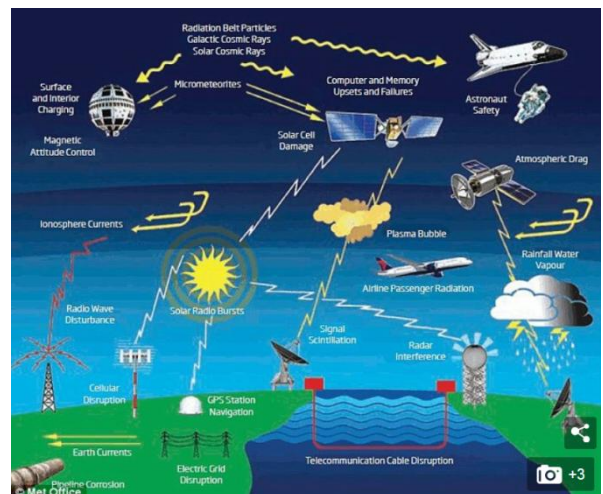
Coastal areas are particularly susceptible to flooding, erosion, storm surge, and sea-level rise due to tropical and post-tropical cyclones, heavy rain events, gale-force winds, and other natural phenomena. The 2023 State Hazard Mitigation Plan states, “Coastal flooding is defined by the National Oceanic and Atmospheric Administration (NOAA) as flooding which occurs when there are significant storms, such as tropical and extratropical cyclones (NWS Internet Services Team, 2009).”⁶³



The State Plan goes on to discuss problems associated with coastal flooding, “These problems can include but are not limited to—beach and shoreline erosion; loss or submergence of wetlands, other coastal ecosystems, and developed land; impacts from saltwater intrusion and high groundwater tables; loss of coastal structures (sea walls, piers, bulkheads, bridges, or buildings); overwhelmed public infrastructure; water quality impairments; and hazardous waste exposure. Loss of life and property damage can be more severe in coastal storm events due to velocity of wave action and accompanying winds.”⁶⁴

*SOLAR STORMS & 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 infrastructure 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.⁶⁵

⁶³ New Hampshire State Hazard Mitigation Plan, 2023 Update; <https://prd.blogs.nh.gov/dos/hsem/wp-content/uploads/2023/10/2023-NH-State-Hazard-Mitigation-Plan-Signed-10.5.23.pdf>; page 127

⁶⁴ Ibid, page 127

⁶⁵ <https://www.dailymail.co.uk/sciencetech/article-3764842/A-solar-storm-destroy-planet-unless-create-massive-magnetic-shield-protect-Earth-warns-expert.html>

Solar Storms & Space Weather Extent⁶⁶

Geomagnetic Storms				
Scale	Description	Effect	Physical Measure	Average Frequency (1 cycle = 11 years)
G 5	Extreme	Power systems: Widespread voltage control problems and protective system problems can occur; some grid systems may experience complete collapse or blackouts. Transformers may experience damage. Spacecraft operations: May experience extensive surface charging, problems with orientation, uplink/downlink, and tracking satellites. Other systems: 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	Power systems: Possible widespread voltage control problems and some protective systems will mistakenly trip out key assets from the grid. Spacecraft operations: May experience surface charging and tracking problems; corrections may be needed for orientation problems. Other systems: 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	Power systems: Voltage corrections may be required; false alarms are triggered on some protection devices. Spacecraft operations: Surface charging may occur on satellite components, drag may increase on low-Earth-orbit satellites, and corrections may be needed for orientation problems. Other systems: 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	Power systems: High-latitude power systems may experience voltage alarms; long-duration storms may cause transformer damage. Spacecraft operations: Corrective actions to orientation may be required by ground control; possible changes in drag affect orbit predictions. Other systems: 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	Power systems: Weak power grid fluctuations can occur. Spacecraft operations: Minor impact on satellite operations possible. Other systems: 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 >=10 MeV particles)	Average Frequency (1 cycle = 11 years)
S 5	Extreme	Biological: 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. Satellite operations: 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. Other systems: 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	Biological: Unavoidable radiation hazard to astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk. Satellite operations: May experience memory device problems and noise on imaging systems; star-tracker problems may cause orientation problems, and solar panel efficiency can be degraded. Other systems: Blackout of HF radio communications through the polar regions and increased navigation errors over several days are likely.	10 ⁴	3 per cycle

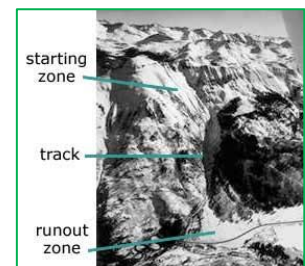
⁶⁶ Extent charts taken from <https://www.weather.gov/akq/SpaceWeather>

Solar Radiation Storms				
S 3	Strong	Biological: 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. Satellite operations: Single-event upsets, noise in imaging systems, and a slight reduction of efficiency in solar panels are likely. Other systems: Degraded HF radio propagation through the polar regions and navigation position errors likely.	10^{-3}	10 per cycle
S 2	Moderate	Biological: Passengers and crew in high-flying aircraft at high latitudes may be exposed to elevated radiation risk. Satellite operations: Infrequent single-event upsets are possible. Other systems: 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	Biological: None. Satellite operations: None. Other systems: 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	HF Radio: Complete HF (high frequency) radio blackout on the entire sunlit side of the Earth, lasting for a number of hours. This results in no HF radio contact with mariners and on-route aviators in this sector. Navigation: Low-frequency navigation signals used by maritime and general aviation systems experience outages on the sunlit side of the Earth for many hours, causing loss in positioning. Increased satellite navigation errors in positioning for several hours on the sunlit side of Earth, which may spread into the night side.	$X20 (2 \times 10^{-3})$	Less than 1 per cycle
R 4	Severe	HF Radio: HF radio communication blackouts on most of the sunlit side of Earth for one to two hours. HF radio contact lost during this time. Navigation: Outages of low-frequency navigation signals cause increased 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	HF Radio: Wide area blackout of HF radio communication, loss of radio contact for about an hour on sunlit side of Earth. Navigation: Low-frequency navigation signals degraded for about an hour.	$X1 (10^{-4})$	175 per cycle (140 days per cycle)
R 2	Moderate	HF Radio: Limited blackout of HF radio communication on the sunlit side, loss of radio contact for tens of minutes. Navigation: 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	HF Radio: Weak or minor degradation of HF radio communication on sunlit side, occasional loss of radio contact. Navigation: Low-frequency navigation signals are degraded for brief intervals.	$M1 (10^{-5})$	2000 per cycle (950 days per cycle)

AVALANCHE

According to the National Snow & Ice Data Center, an avalanche is a rapid snow flow 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 every month of the year.⁶⁷



⁶⁷ Copyright Richard Armstrong, NSIDC, <https://nsidc.org/learn>

All that is necessary for an avalanche is a mass of snow and a slope 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 not 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.”⁶⁸

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 daily or hourly.”*⁶⁹

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.⁷⁰

⁶⁸ NSIDC, <https://www.sierraavalanchecenter.org/introduction-north-american-avalanche-danger-scale>

⁶⁹ Copyright Richard Armstrong, NSIDC, <http://nsidc.org/cryosphere/snow/science/avalanches.html>

⁷⁰ NSIDC, <https://www.sierraavalanchecenter.org/introduction-north-american-avalanche-danger-scale>

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
DR-4812	Inland Flooding	July 10-13, 2024	Coos & Grafton	Major Disaster Declaration, DR-4812: FEMA announced that federal disaster assistance is available to the state of New Hampshire to supplement recovery efforts in the areas affected by the severe storms and flooding on July 10-13, 2024
DR-4799	Severe Winter Storm	April 3-5, 2024	Carroll, Belknap, Sullivan & Rockingham	Major Disaster Declaration, DR-4799: A late winter snowstorm on April 4, 2024, brought heavy, wet snow accumulating up to two feet in four NH counties.
DR-4771	Inland Flooding	January 9-14, 2024	Grafton & Rockingham	Major Disaster Declaration DR-4771: A significant winter rain event caused local road and riverine flooding in two counties.
DR-4761	Inland Flooding	December 17-21, 2023	Coos, Grafton & Carroll	Major Disaster Declaration, DR-4761: A significant rainstorm, similar to a 100-year flood event, struck multiple areas in New Hampshire, causing widespread damage to rivers, roads, and bridges.
DR-4740	Inland Flooding	July 9-17, 2023	Coos, Grafton, Belknap, Sullivan & Cheshire	Major Disaster Declaration, DR-4740: Severe storms brought significant summer rains and flooding to towns within five counties in New Hampshire.
DR-4693	Inland Flooding	December 22-25, 2022	Belknap, Grafton, Carroll & Coos	Major Disaster Declaration, DR-4693: A severe winter storm occurred December 22-25, 2022. Heavy, wet snow caused trees and power lines to fall; some roadways were closed. Flooding also occurred in several communities. The declaration was declared in four of the State's ten counties.
DR-4624	Inland Flooding	July 29-July 30, 2021	Cheshire & Sullivan	Major Disaster Declaration, DR-4624: 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.
DR-4622	Inland Flooding	July 17-19, 2021	Cheshire	Major Disaster Declaration, DR-4622: The Federal Emergency Management Agency announced a major disaster declaration for one New Hampshire county during a period of severe storms and flooding from July 17-19, 2021.
DR-4516	Infectious Disease	January 20, 2020 ongoing	All Ten NH Counties	Major Disaster Declaration, DR-4516: 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).
EM-3445	Infectious Disease	January 20, 2020 ongoing	All Ten NH Counties	Emergency Declaration EM-3445: A ten-county declaration to provide individual assistance and public assistance as a result of the impact of COVID-19
DR-4457	Severe Storm & Flooding	July 11-12, 2019	Grafton	Major Disaster Declaration, DR-4457: 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.

Number	Hazard	Date of Event	Counties	Description
DR-4371	Severe Winter Storms	March 13-14, 2018	Carroll, Strafford & Rockingham	Major Disaster Declaration, DR 4371: The Federal Emergency Management Agency announced a major disaster declaration on June 8, 2018, for a period of severe winter storms from March 13-14, 2018.
DR-4370	Severe Storm & Flooding	March 2-8, 2018	Rockingham	Major Disaster Declaration, DR 4370: 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.
DR-4355	Severe Storms, Flooding	October 29-November 1, 2017	Sullivan, Grafton, Coos, Carroll, Belknap & Merrimack	Major Disaster Declaration, DR-4355: 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 to November 1, 2017, in five New Hampshire Counties.
DR-4329	Severe Storms, Flooding	July 1-2, 2017	Grafton & Coos	Major Disaster Declaration DR-4329: 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
DR-4316	Severe Winter Storms	March 14-15, 2017	Belknap & Carroll	Major Disaster Declaration DR-4316: Severe winter storm and snowstorm in Belknap & Carroll Counties; disaster aid was provided to supplement state and local recovery efforts.
FM-5123	Forest Fire	April 21-23, 2016	Cheshire	Fire Management Assistance Declaration, FM-5123: Stoddard, NH
DR-4209	Severe Winter Storms	January 26-28, 2015	Hillsborough, Rockingham & Stafford	Major Disaster Declaration DR-4209: Severe winter storm and snowstorm in Hillsborough, Rockingham, and Strafford Counties; disaster aid was provided to supplement state and local recovery efforts.
DR-4139	Severe Storms, Flooding	July 9-10, 2013	Cheshire, Sullivan & Grafton	Major Disaster Declaration DR-4139: Severe storms, flooding, and landslides occurred from June 26 to July 3, 2013, in Cheshire, Sullivan, and southern Grafton Counties.
DR-4105	Severe Winter Storm	February 8, 2013	All Ten NH Counties	Major Disaster Declaration DR-4105: Nemo; heavy snow in February 2013.
DR-4095	Hurricane Sandy	October 26-November 8, 2012	Belknap, Carroll, Coos, Grafton, Rockingham & Sullivan	Major Disaster Declaration DR-4095: The declaration covers damage to property from the storm that spawned heavy rains, high winds, high tides, and flooding from October 26 to November 8, 2012.
EM-3360	Hurricane Sandy	October 26-31, 2012	All Ten NH Counties	Emergency Declaration EM-3360: 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.
DR-4065	Severe Storm & Flooding	May 29-31, 2012	Cheshire	Major Disaster Declaration DR-4065: Severe Storm and Flood Event May 29-31, 2012, in Cheshire County.
DR-4049	Severe Storm & Snowstorm	October 29-30, 2011	Hillsborough & Rockingham	Major Disaster Declaration DR-4049: Severe Storm and Snowstorm Event October 29-30, 2011, in Hillsborough and Rockingham Counties.
EM-3344	Severe Snowstorm	October 29-30, 2011	All Ten NH Counties	Emergency Declaration EM-3344: Severe storm during October 29-30, 2011, in all ten counties in New Hampshire (Snowtober).

Number	Hazard	Date of Event	Counties	Description
DR-4026	Tropical Storm Irene	August 26-September 6, 2011	Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, & Sullivan	Major Disaster Declaration DR-4026: Tropical Storm Irene Aug 26th- Sept 6, 2011, in Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, & Sullivan Counties.
EM-3333	Tropical Storm Irene	August 26-September 6, 2011	All Ten NH Counties	Emergency Declaration EM-3333: An emergency Declaration was declared for Tropical Storm Irene in all ten counties.
DR-4006	Severe Storm & Flooding	May 26-30, 2011	Coos & Grafton Counties	Major Disaster Declaration DR-4006: The May flooding event occurred May 26th-30th, 2011, in Coos & Grafton Counties (Memorial Day Weekend Storm).
DR-1913	Severe Storms & Flooding	March 14-31, 2010	Hillsborough & Rockingham	Major Disaster Declaration DR-1913: Flooding in two NH counties occurred, including Hillsborough and Rockingham counties.
DR-1892	Severe Winter Storm, Rain & Flooding	February 23 - March 3, 2010	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan	Major Disaster Declaration: DR-1892: 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.
DR-1812	Severe Winter Storm & Ice Storm	December 11-23, 2008	All Ten NH Counties	Major Disaster Declaration DR-1812: 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.
EM-3297	Severe Winter Storm	December 11, 2008	All Ten NH Counties	Emergency Declaration EM-3297: Severe winter storm beginning on December 11, 2008.
DR-1799	Severe Storms & Flooding	September 6-7, 2008	Hillsborough	Major Disaster Declaration: DR-1799: Severe storms and flooding began on September 6, 2008.
DR-1787	Severe Storms & Flooding	July 24-August 14, 2008	Belknap, Carroll & Grafton & Coos	Major Disaster Declaration DR-1787: 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	Major Disaster Declaration DR-1782: Tornado damage to several NH counties.
DR-1695	Nor'easters, Severe Storms & Flooding	April 15-23, 2007	All Ten NH Counties	Major Disaster Declaration DR-1695: 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	Major Disaster Declaration DR-1643: 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	Major Disaster Declaration DR-1610: 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	Emergency Declaration EM-3258: 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.

Number	Hazard	Date of Event	Counties	Description
EM-3211	Snow	March 11-12, 2005	Carroll, Cheshire, Hillsborough, Rockingham & Sullivan	Emergency Declaration EM-3211: March snowstorm; more than \$2 million has been approved to help pay for the costs of the snow removal; Total aid for the March storm is \$2,112,182.01 (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	Emergency Declaration EM-3208: 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 \$1,121,727.20 (Carroll: \$91,832.72; Cheshire: \$11,002.18; 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	Emergency Declaration EM 3208-002: 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)
EM-3207	Snow	January 22-23, 2005	Belknap, Carroll, Cheshire, Grafton, Hillsborough, Rockingham, Merrimack, Strafford & Sullivan	Emergency Declaration EM-3207: 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 \$3,658,114.66 (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	Emergency Declaration EM-3193: 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	Major Disaster Declaration DR-1489: 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	Emergency Declaration EM-3177: 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	Emergency Declaration EM-3166: 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	Major Disaster Declaration DR-1305: The declaration covers damage to public property from the storm that spawned heavy rains, high winds, and flooding from September 16-18.
DR-1231	Severe Storms & Flooding	June 12-July 2, 1998	Belknap, Carroll, Grafton, Hillsborough, Merrimack & Rockingham	Major Disaster Declaration DR-1231:

Number	Hazard	Date of Event	Counties	Description
DR-1199	Ice Storm	January 7-25, 1998	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, Strafford & Sullivan	Major Disaster Declaration DR-1199:
DR-1144	Severe Storms/Flooding	October 20-23, 1996	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan	Major Disaster Declaration DR-1144:
DR-1077	Storms/Floods	October 20-November 15, 1995	Carroll, Cheshire, Coos, Grafton, Merrimack & Sullivan	Major Disaster Declaration DR-1077:
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; <https://www.fema.gov/disaster/declarations>

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 Survey
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 IDEAS⁷¹

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

Hail

- HA1 Locate Safe Rooms to Minimize Damage
- HA2 Protect Buildings from Hail Damage
- HA3 Increase Hail Risk Awareness

Landslides

- 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

Inland Flooding

- 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

High Wind Events

- 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

⁷¹ 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 Structures 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: Bethlehem Emergency Services

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