

# **Berlin, NH**

## **Hazard Mitigation Plan Update 2024**



**This plan integrates the following:**

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

**Final for City Adoption  
January 10, 2024**

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**Prepared for the City of Berlin and NH Homeland Security & Emergency  
Management**

**By  
The Berlin Planning Team**

**With assistance from Mapping and Planning Solutions**

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

*-Dwight D. Eisenhower*

#### HAZARD MITIGATION PLAN DEFINITIONS

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

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

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



**Plan Prepared and Authored By**

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**Cover Photo: Berlin**

**Photo Credit: <https://www.berlinnh.gov/>**

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## Acknowledgments

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

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

**This plan is an update to the most recent Berlin Hazard Mitigation Plan, approved on August 10, 2016.  
This plan was funded under the Pre-disaster Mitigation Grant Program (PDM19)**

**Approval Notification Dates for 2024 Update**

Approved Pending Adoption (APA).....January 9, 2024  
Jurisdiction Adoption: ....., 2024  
CWPP Approval: ....., 2024  
**\*Plan Approval Date (FEMA): ....., 2024**  
Receipt of FEMA Letter ....., 2024  
Plan Distribution (MAPS):....., 2024

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

### CITY OF BERLIN HAZARD MITIGATION PLANNING TEAM (HMPT)

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

- Jon Goodreau.....Berlin WWT&CS Super.
- Jim Wheeler.....Berlin City Manager (former)
- James Watkins .....Berlin Fire Chief & EMD
- Craig Carrigan .....Berlin Water Works Super.
- Pam Laflamme.....Berlin Director of Strategic Initiatives
- Morgan Phillips .....Berlin EMS Director
- Roland Theberge .....Berlin City Council
- Peter Donovan.....Berlin Assistant Fire Chief
- Steve Lefebvre.....Berlin Water Works Super.
- Donny Labrecque .....Berlin Water Department Super.
- Mark Lapointe.....Berlin Public Works AD
- Phil Warren .....Berlin City Manager
- Jennifer Gilbert .....NH DBEA/OSI
- Lynne Doyle .....NH HSEM
- John Smith .....NH HSEM
- June Garneau.....MAPS
- Olin Garneau.....MAPS

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

Acronyms or abbreviations associated with the above list:

AD ..... Assistant Director  
EMD ..... Emergency Management Director  
Super..... Superintendent  
WWT&CS ..... Wastewater Treatment and Collection System

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## Executive Summary

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



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

This project was held virtually due to the Covid-19 pandemic; the plan's final writing was completed as the pandemic continued. References to Covid-19 and its impact on Berlin are discussed in Chapter 5, Section C, Infectious Diseases.

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

### NATURAL HAZARDS

- |                                      |                                |
|--------------------------------------|--------------------------------|
| 1) Severe Winter Weather             | 7) Wildfires                   |
| 2) Extreme Temperatures              | 8) Earthquakes                 |
| 3) Infectious Diseases               | 9) Solar Storm & Space Weather |
| 4) Inland Flooding                   | 10) Drought                    |
| 5) Tropical & Post-Tropical Cyclones | 11) Lightning & Hail           |
| 6) High Wind Events                  | 12) Landslide & Erosion        |

### TECHNOLOGICAL HAZARDS

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

### HUMAN-CAUSED HAZARDS

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

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

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

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

In summary, finding mitigation action items for every hazard that affects a community can be difficult. With economic constraints, cities and towns are less likely to have the financial ability to complete certain mitigation action items, such as burying power lines. In preparing this plan, the Berlin 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:

Berlin Hazard Mitigation Plan Update 2024 .....	the plan or this plan
Berlin.....	the City 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 Berlin 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 City of Berlin will reduce the impacts of natural hazards and other potential disasters through implementing mitigation measures, public education, and deliberate capital expenditures within the community. Homes and businesses will be safer and the community's ISO rating may be improved.



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

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

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

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

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

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

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

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

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

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

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

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

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

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

### **C. JURISDICTION**

This plan addresses one jurisdiction – the City of Berlin, Coos County, New Hampshire.

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

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

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

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

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

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

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

## E. PUBLIC & STAKEHOLDER INVOLVEMENT

Public and stakeholder involvement was stressed during the initial meeting, and community officials were given a matrix of potential team members (see below). Community officials were urged to contact as many people as possible to participate in the planning process, including residents, officials, and residents from surrounding communities. The City of Berlin 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 Berlin. A press release (see below) was posted on the City Hall Bulletin Board, the City's Twitter Account, the City's website, and the City's calendar (see the following page). The press release was used to notify businesses and private and non-profit organizations that work with underserved communities and socially vulnerable populations that meetings were taking place, and they were invited to attend.

### HAZARD MITIGATION POTENTIAL TEAM MEMBERS

#### FEDERAL

- USDA Forest Service

#### STATE

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

#### LOCAL

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

#### OTHER OR SPECIAL INTEREST

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

*Mapping and Planning Solutions  
PO Box 283  
Twin Mountain, NH 03595*

### **Press Release**

#### **FOR IMMEDIATE RELEASE**

Updated: July 16, 2021

Contact: June Garneau  
603-991-9664

#### **THE CITY OF BERLIN COMMENCES HAZARD MITIGATION PLANNING**

The Emergency Management Director of the City of Berlin will meet with June Garneau of Mapping and Planning Solutions and other team members from Berlin to continue work on the required five-year update to the **2016 Berlin Hazard Mitigation Plan**. As a result of this meeting, Mapping and Planning Solutions is conducting a series of meetings on the Hazard Mitigation Plan over the next few months.

Through this series of public meetings, the planning team will address issues such as flooding, hurricanes, drought, landslides, and wildfires and determine efforts the city can undertake to mitigate the effects of both natural and human-caused hazards. The team will also examine potential 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 are required to complete a local Hazard Mitigation Plan to qualify for Federal Emergency Management Administration funding should a natural disaster occur. The planning processes are made possible by grants from FEMA.

The Hazard Mitigation Planning Team is currently being formed. Berlin citizens and any interested stakeholders are invited to participate. The second meeting is scheduled for **Thursday, August 12, 2021, from 10:00 AM to 12:00 PM** via "Zoom". The public is encouraged to attend all meetings. All interested parties should contact Fire Chief & EMD, James Watkins, by email, [jwatkins@berlinnh.gov](mailto:jwatkins@berlinnh.gov) if they wish to be included in the process; you will be added to the Zoom meeting invitation list.

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

**City of Berlin, NH**  
38 Tweets



**City of Berlin, NH**  
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**Tweets** Tweets & replies Media Likes

**City of Berlin, NH** @cityofberlinnh · 7m  
[berlinnh.gov/home/news/pres...](http://berlinnh.gov/home/news/pres...) Participate with the City's Hazard Mitigation Planning Team!

**Berlin, New Hampshire**  
18m · 🌐

The City is updating its Hazard Mitigation Plan and the public is welcome to participate. See the press release on the City's website to learn more and sign up to attend the next meeting on Thursday August 12th at 10:00am. Meetings for this effort are currently being held via Zoom. See the press release for more information.

[https://www.berlinnh.gov/.../berl\\_hazard\\_mitigation...](https://www.berlinnh.gov/.../berl_hazard_mitigation...)



**CITY OF BERLIN**  
NEW HAMPSHIRE

Government Departments Upcoming Meetings Open for Business

**Press Release - Berlin Hazard Mitigation Planning**  
The City of Berlin commences Hazard Mitigation Planning  
POSTED ON: JULY 19, 2021 - 2:24PM

The Emergency Management Director of the City of Berlin will meet with June Garneau of Mapping and Planning Solutions and other team members from Berlin to continue work on the required five-year update to the 2016 Berlin Hazard Mitigation Plan. As a result of this meeting, Mapping and Planning Solutions is conducting a series of meetings on the Hazard Mitigation Plan over the next few months. See full press release here.

Home » Calendar: Public Meeting

**Calendar: Public Meeting**

Calendar Posting Event Request


Month Week Day Year

September 2021

Sun	Mon	Tue	Wed	Thu	Fri	Sat
29	30	31	1	2	3	4
5	6 City Council Meeting 6:30pm to 8:00pm	7	8	9 Hazard Mitigation Meeting 10:00am to 12:00pm	10	11
12 City Council Work Session 6:30pm to 8:00pm	13 Planning Board Meeting 6:30pm to 8:00pm	14	15	16	17	18
19 City Council Meeting 6:30pm to 8:00pm	20	21	22	23	24	25
26 City Council Work Session 6:30pm to 8:00pm	27	28	29	30	1	2




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



### Upcoming Zoom Meetings

(Highlighted by "Counties" as of February 2, 2022)



Day	Date	Time	Town/Location	Plan Type	HSEM Field Rep	County
Monday	2/7/22	6:30 PM	Wentworth Zoom Meeting	MP	N/A	Grafton
Wednesday	2/9/22	9:00 AM	Gorham Zoom Meeting	HMP	Courtney Jordan	Coos
Thursday	2/10/22	10:00 AM	Berlin Zoom Meeting	HMP	Courtney Jordan	Coos
Tuesday	2/15/22	1:00 PM	Danville Zoom Meeting	HMP	Vacant	Rockingham
Thursday	2/17/22	9:00 AM	Lincoln Zoom Meeting	HMP	Paul Hatch	Grafton
Tuesday	2/22/22	9:00 AM	Belmont Zoom Meeting	EOP	Vacant	Belknap
Wednesday	2/23/22	6:30 PM	Chester Zoom Meeting	HMP	Vacant	Rockingham
Wednesday	2/23/22	6:00 PM	Haverhill Zoom Meeting	MP	N/A	Grafton
Monday	3/7/22	6:30 PM	Wentworth Zoom Meeting	MP	N/A	Grafton
Thursday	3/10/22	10:00 AM	Berlin Zoom Meeting	HMP	Courtney Jordan	Coos

Team composition can be impacted in some communities due to lower population and because many people “wear more than one hat”. Attracting citizens to participate in town and city government is often challenging. In smaller communities, government workers generally hold full-time jobs and volunteer in various positions. Depending on the population, the percentage of interested citizens in a community’s planning processes may be diminished. Due to the availability of jobs, a high elderly population, and other economic factors, smaller communities have a dwindling number of young people interested in politics. By northern New Hampshire standards, Berlin is not a smaller community. Berlin is the largest community in population north of the “notches” and the only city in the north country.

Berlin had excellent participation in developing this plan; the Emergency Management Director (EMD)/Fire Chief, Assistant Fire Chief, and members of the Department of Public Works, EMS, Pollution Control, and Water Departments participated in meetings. The City Manager, the Director of Strategic Initiatives, and a member of the City Council also participated in the meetings. Comments made by all team members were integrated into the narrative discussion and incorporated into the document. Although the public was informed about the planning meetings, no one from the public attended Berlin’s meetings.

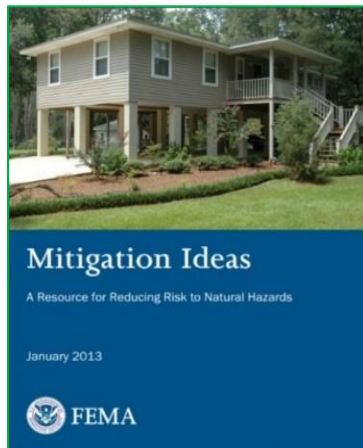
§201.6(b) requires that there be an open public involvement process in the formation of a plan. This process shall provide an opportunity for the public to comment on the plan during its formation as well as an opportunity for any neighboring communities, businesses, and others to review any existing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

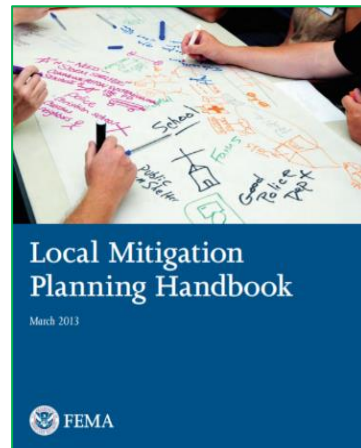
The planning process included a complete review of the Berlin Hazard Mitigation Plan 2016 for updates, development changes, and accomplishments. The team worked with the planner to identify pertinent information from the reviewed documents; this information was then added to the appropriate place in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

The Berlin Hazard Mitigation Plan 2016.....	Compare & Contrast
Berlin Master Plan (2022).....	Community Information
Berlin Annual Reports (2021) .....	Fire Report & Development
Other Hazard Mitigation Plans (Holderness, Enfield, Bethlehem).....	Formats & Mitigation Ideas
The Berlin Subdivision Regulations (1998) .....	New Development Regulations
The Berlin Site Plan Review Regulations (1998).....	Commercial Regulations
The Berlin Zoning Ordinance (2017).....	Zoning Regulations
Floodplain Development Ordinance (Part of Zoning).....	Floodplain Regulations
Census 2020 Data .....	Population Data
The NH DRA Summary of Inventory of Valuation MS-1 2022 for Berlin.....	Structure Evaluation
The Economic & Labor Market Information Bureau Community Profile .....	Population Trends
The American Community Survey (ACS 2017-2021) .....	Population Trends
Mitigation Ideas, FEMA, January 2013 .....	Mitigation Strategies
The Department of Cultural & Natural Resources (DNCR).....	DNCR Fire Report
The NH Bureau of Economic Affairs (BEA).....	Flood Losses
Property Tax Valuation (Department of Revenue Administration).....	Property Information

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



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



[https://www.fema.gov/sites/default/files/2020-06/fema-local-mitigation-planning-handbook\\_03-2013.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 goals in the State of New Hampshire Multi-Hazard Mitigation Plan Update 2018. These goals are detailed below.

### KEY GOALS

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

### NATURAL HAZARD OBJECTIVES

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

### TECHNOLOGICAL HAZARD OBJECTIVES

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

### HUMAN-CAUSED HAZARD OBJECTIVES

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

## H. HAZARD MITIGATION PLANNING PROCESS & METHODOLOGY

The planning process consisted of twelve steps; some were accomplished independently, while others were interdependent. Many factors affected the planning process's sequence, such as the number of meetings, community preparation, attendance, and other community needs. The planning process resulted in significant 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 City

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

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

*Table 6.1 – Current Plans, Policies & Mutual Aid*

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

*Table 7.1 – Accomplishments since the last Plan*

Step 09: Evaluate and categorize potential mitigation action items

*Tables 8.1 - Potential Mitigation Strategies & the STAPLEE*

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

*Table 9.1 – The Mitigation Action Plan*

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

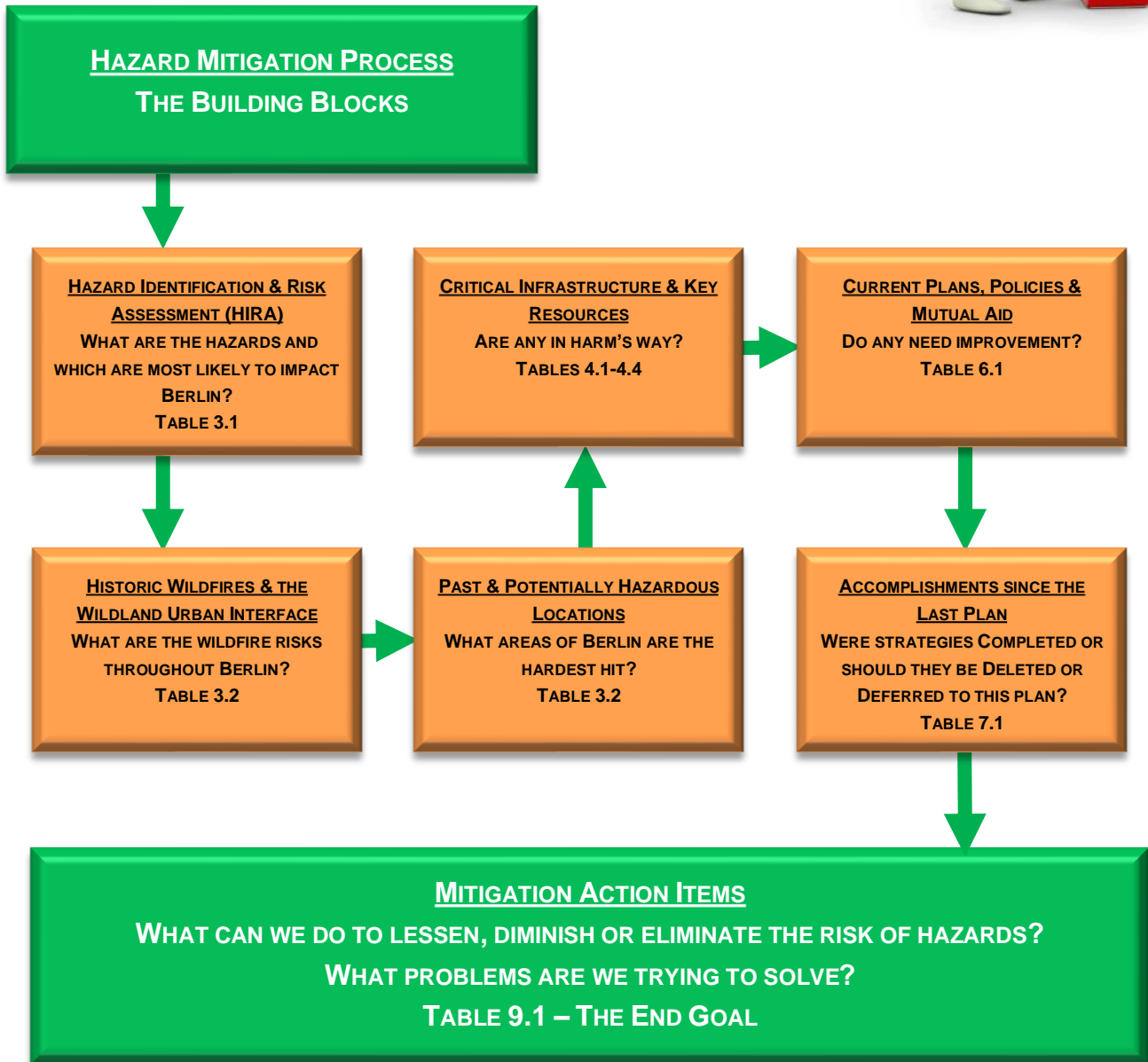
Step 12: Adopt and monitor the plan



## I. HAZARD MITIGATION BUILDING BLOCKS & TABLES

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

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



## J. NARRATIVE DESCRIPTION OF THE PROCESS

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

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

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

### MEETING 1, JULY 8, 2021

The first virtual meeting of the Berlin Hazard Mitigation Team was held on July 8, 2021. Meeting attendance included Jon Goodreau (Pollution Control), Jim Wheeler (City Manager), James Watkins (Fire Chief & Emergency Management Director), Craig Carrigan (Water Superintendent), Pam Laflamme (Community Development Director), Morgan Phillips (Berlin Emergency Medical Services), Olin Garneau (Mapping and Planning Solutions), and June Garneau (Mapping & Planning Solutions).

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

Work then began on *Table 2.1, City Statistics*. The planner explained that this table would provide a snapshot of the community and include data needed to write the plan.

Most of the work on Table 2.1 was completed at the meeting; a few items would be determined through GIS or gotten later.

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

#### Meeting 1 – July 8, 2021

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

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

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

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

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

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

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

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

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

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

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

- a) Thursday, August 12, 2021 @ 10:00 AM
- b) Thursday, September 9, 2021 @ 10:00 AM

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 the interruption of service?
- The Probability ..... What is the likelihood of this occurring within 25 years?

The rankings were then calculated to reveal the hazards which pose the most significant risks to the community. Twelve natural, six technological, and four human-caused hazards were identified. After analyzing these hazards in Table 3.1, Severe Winter Weather, Extreme Temperatures, Infectious Diseases, and Inland Flooding were designated as “High Risk” hazards.

With time running out, the planner shared with the team what would occur at the next meeting. The date was set for August 12, 2021, and the meeting was adjourned.

### **MEETING 2, AUGUST 12, 2021**

Meeting attendance included Jon Goodreau, Jim Wheeler, James Watkins, Roland Theberge (City Council), Peter Donovan (Assistant Fire Chief), Olin Garneau, and June Garneau.

The meeting began with reviewing the previous meeting’s work, including *Table 2.1, City Statistics*, to ensure that the City data was accurate; minor changes were made. The planner then reviewed *Table 3.1, Hazard Identification & Risk Assessment (HIRA)*, to ensure the team felt the hazards were in the correct order for the City; no changes were made to this table.

Having completed Table 3.1, the team started working on descriptions of each hazard and how they could impact the community. To gain more knowledge of these hazards' impact, the planner asked the team to describe each hazard as it relates explicitly to Berlin. For example, some of the questions asked were:

- *How often do these hazards occur?*
- *Do the hazards damage either the roads or structures?*
- *Have the hazards resulted in the loss of life?*
- *Are the elderly and functional needs populations 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 hazards or diminish their impact?*

In addition to bringing more awareness to the hazards, these questions helped further analyze the identified hazards' impact. The planner noted that these descriptions would be used in Chapter 5.

#### **Meeting 2 – August 12, 2021**

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

- a) Reviewed planning process, purpose, funding & collaboration.
- b) Reviewed of community involvement and stakeholders
- c) Worked on....
  - i) Table 2.1, City Statistics
  - ii) Table 3.1, Hazard Identification & Risk Assessment (HIRA)

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

- a) Review....
  - i) Table 2.1, City Statistics
  - ii) Table 3.1, Hazard Identification & Risk Assessment (HIRA)
- b) Work on....
  - i) Hazard Descriptions
  - ii) Table 4.1-4.4, Critical Infrastructure & Key Resources
  - iii) Table 3.2, Historic Hazard Identification
  - iv) Table 6.1, Current Plans, Policies & Mutual Aid (time allowing)
  - v) 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) Thursday, September 9, 2021 @ 10:00 AM

With time running out before the hazard descriptions were completed, the planner advised the team that the remaining hazard descriptions would be completed at the next meeting. The planner asked the team to think about Critical Infrastructure & Key Resources (CIKR) and past events that have affected the City. The next meeting was scheduled for Wednesday, September 22, 2021, but was changed to January 13, 2022.

### **MEETING 3, JANUARY 13, 2022**

Virtual meeting attendance included Jon Goodreau, James Watkins, Peter Donovan, Olin Garneau, and June Garneau.

First on the agenda was the completion of the hazard descriptions started at the previous meeting. While discussing the local hazards, development trends were also discussed.

Next on the agenda were *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 2016 plan were examined. A few minor adjustments were made for this plan. The evacuation routes, helicopter landing zones, dams, and bridges on the evacuation routes were also identified. Lastly, each Critical Infrastructure & Key Resources was analyzed for their “Hazard Risk”.

With time running out, the planner reviewed the next meeting's agenda and thanked the team. The next meeting was set for February 10, 2022.

### **MEETING 4 – FEBRUARY 10, 2022**

Virtual meeting attendance included Jon Goodreau, James Watkins, Pam Laflamme, Peter Donovan, Olin Garneau, and June Garneau.

First, the planner asked the team about development trends in the community. The team noted that development was slowly rising and that more people seemed to be moving to the area. Next, the planner took the team through a review of *Tables 4.1-4.4, Critical Infrastructure & Key Resources*. Some minor changes were made to these tables, and a lengthy discussion on dams occurred.

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

#### **Meeting 3 – January 13, 2022**

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

- a) Reviewed....
  - i) Table 2.1, City Statistics
  - ii) Table 3.1, Hazard Identification & Risk Assessment (HIRA)
- b) Worked on....
  - i) Hazard Descriptions (did not finish)

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

- a) Finish....
  - i) Hazard Descriptions
- b) Work on....
  - i) Table 4.1-4.4, Critical Infrastructure & Key Resources
  - ii) Table 3.2, Historic Hazard Identification
  - iii) Table 6.1, Current Plans, Policies & Mutual Aid (time allowing)
  - 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) Thursday, February 10, 2022 @ 10:00 AM

#### **Meeting 4 – February 10, 2022**

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

- a) Finished....
  - i) Hazard Descriptions
- b) Worked on....
  - i) Table 4.1-4.4, Critical Infrastructure & Key Resources

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

- a) Review....
  - i) Table 4.1-4.4, Critical Infrastructure & Key Resources
- b) Work on....
  - i) Table 3.2, Historic Hazard Identification
  - ii) Table 6.1, Current Plans, Policies & Mutual Aid
  - iii) Table 7.1, Accomplishments since the prior Plan

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

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

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

- a) Thursday, March 10, 2022 @ 10:00 AM

With Table 3.2 complete, the team set March 10, 2022, as the next meeting date, and the planner adjourned the meeting.

### **MEETING 5 – MARCH 10, 2022**

Meeting attendance included Jon Goodreau, James Watkins, Pam Laflamme, Peter Donovan, Steve Lefebvre (Water Department), Donny Labrecque (Water Department), Mark Lapointe (Department of Public Works), Olin Garneau, 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 the area in which the urban environment interfaces with the wildland environment and is the most wildfire-prone.

*Table 7.1, Accomplishments since the Last Plan*, also pre-populated with data from the 2016 plan, was the next agenda item. The planner led the team through each strategy to determine which of these was “Completed”, should be “Deleted”, or should be “Deferred” as a new mitigation action item. Several action items from the 2016 plan had been completed or partially completed. Some were deleted as they were no longer useful or considered emergency preparedness, while others were deferred or carried over for consideration as new action items for this plan.

Next, the team began working on *Table 6.1, Current Plans, Policies & Mutual Aid*; like other tables, this table was pre-populated with information from the 2016 plan. Looking closely at the existing policies from the last plan and the current mechanisms 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 that those items that needed improvement would be deferred or carried over to become new action items for this plan. These new action items would be discussed again and prioritized in our final table, *Table 9.1, The Mitigation Action Plan*.

Table 6.1 was not completed within the timeframe of the meeting. The planner promised to write statements to support the concepts and ideas expressed in Table 6.1 to be reviewed at the next meeting. The planner also asked the DPW Director to prepare a list of road, culvert, and other drainage projects that must be completed within the next five years. The next meeting was scheduled for April 7, 2022.

#### **Meeting 5 – March 10, 2022**

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

- a) Discussed....
  - i) Development Trends
- b) Reviewed....
  - i) Table 4.1-4.4, Critical Infrastructure & Key Resources
- c) Worked on....
  - i) Table 3.2, Historic Hazard Identification

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

- a) Review....
  - i) Table 3.2, Historic Hazard Identification
- b) Work on....
  - i) Table 6.1, Current Plans, Policies & Mutual Aid
  - ii) Table 7.1, Accomplishments since the prior Plan

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

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

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

- a) Thursday, April 7, 2022 @ 9:00 AM
- b) Thursday, May 12, 2022 @ 9:00 AM

**MEETING 6 – APRIL 7, 2022**

Meeting attendance included Jon Goodreau, James Watkins, Peter Donovan, Olin Garneau, and June Garneau.

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

Next, the team finished the portions of Table 6.1 that were not completed at the previous meeting. Work on Table 6.1 resulted in 19 new action items, some of which were also in Table 7.1.

Although the attendance was light for the meeting, the team decided to move forward with the final two tables, *Table 8.1, Potential Mitigation Strategies & the STAPLEE*, and *Table 9.1, The Mitigation Action Plan*. The planner explained that these tables were combined for the meeting but would become separate tables in the final plan. The planner also explained that these tables had been pre-populated with the action items carried over 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 required, and the action's estimated cost (see Chapter 9, Section B).

Work on this table included the STAPLEE process, as explained in Chapter 8. Referring to this explanation, the team examined each identified action item to determine any issues or pushbacks that might result. Most importantly, the STAPLEE process enabled the team to consider the cost-benefit of each action item. The STAPLEE analysis would later become *Table 8.1, Potential Mitigation Action Items & the STAPLEE*.

Tables 8.1 and 9.1 were about halfway finished, leaving some action items to complete at the next meeting. Also, the ranking and prioritizing of each action item were yet to be completed. The planner explained the ranking and prioritizing process (Chapter 9, Section A) and adjourned the meeting.

The next meeting was scheduled for May 12, 2022.

**Meeting 6 – April 7, 2022****1) Last Meeting**

- a) Reviewed...
  - i) Table 3.2, Historic Hazard Identification
- b) Worked on....
  - i) Table 7.1, Accomplishments since the prior Plan
  - ii) Table 6.1, Current Plans, Policies & Mutual Aid (did not finish)

**2) Today's Topics**

- a) Review...
  - i) Table 7.1, Accomplishments since the prior Plan
- b) Work on & review...
  - i) Table 6.1, Current Plans, Policies & Mutual Aid
- c) Start thinking about mitigation ideas
- d) Table 9.1, Mitigation Action Plan (time allowing)
- e) STAPLEE (time allowing)

**3) Homework**

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

**4) Future Meetings**

- a) Thursday, May 12, 2022 @ 9:00 AM



## MEETING 7 – MAY 12, 2022

Meeting attendance included Jon Goodreau, James Watkins, Peter Donovan, and June Garneau.

The meeting began where we had left off in Tables 9.1 and 8.1. After each strategy from Tables 6.1 and 7.1 was considered, the team considered additional mitigation items, which some the planner had suggested from other plans and others which had been discussed earlier. After discussion and careful review, the team ultimately settled on thirty-seven “Mitigation Action Items” that they felt were achievable and could diminish the impact of natural hazards in the future.

The team then reviewed additional potential action items. One of those sources, the FEMA document Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards, January 2013, can be found in Chapter 12, Appendix F. Other mitigation strategies were also shown to the team; these included mitigation strategies derived from FEMA, HSEM, and other hazard mitigation plans and can be found in Chapter 8, Sections A & B.

### Meeting 6 – April 2, 2018

#### 5) Last Meeting

- a) Reviewed...
  - i) Table 7.1, Accomplishments since the Last Plan
- b) Worked On...
  - i) Table 9.1, Mitigation Action Items
  - ii) Work on the STAPLEE process

#### 6) Today's Topics

- a) Review Action Items
- b) Ranking and prioritizing (time allowing)
- c) Process going forward

#### 7) Homework

- a) Review materials sent by MAPS – TRACK YOUR TIME!
- b) Digital Photos – contributions welcome

#### 8) Future Meeting

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

### Link to explore – FEMA Mitigation Ideas:

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

Once the mitigation action items were determined and the STAPLEE was completed, the team was ready to rank and prioritize.

The planner had pre-ranked the action items based on the time frame, the City's authority to accomplish the strategy, the type of strategy, and the STAPLEE score. They were then placed in four categories, as Chapter 9, Section A shows. Then, within each rank, the team assigned a priority. For example, if seven action items were ranked in category “A”, the priority rank was A-1 through A-7. In this fashion, the team determined which action items were the most important within their rankings and in what order they would accomplish.

The team's work was complete, except for the final review, with Tables 8.1 and 9.1 completed. The planner agreed to write the final “draft” plan and email a copy for the team's review. The planner explained the process from this point forward and thanked the team for their hard work. No additional meetings were scheduled.

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.

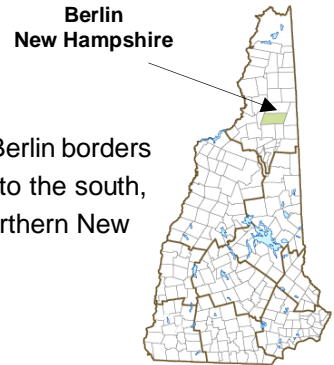
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## Chapter 2: Community Profile

### A. INTRODUCTION

Berlin is a beautiful community in Coos County in the northeast part of New Hampshire. Berlin borders Milan to the north, Success (unincorporated place) to the east, Gorham and Randolph to the south, and Kilkenny (unincorporated place) to the west. Berlin is in the White Mountains of northern New Hampshire and is within the Great North Woods Tourism Region.



### CITY GOVERNMENT

A nine-member City Council governs the City of Berlin, with a City Manager overseeing the City's day-to-day operations. The City's departments include but are not limited to Fire, Police, Public Works, Recreation, Planning, Zoning, Library, Industrial Development, Park Authority, Water, and School. The largest employer in Berlin is Androscoggin Valley Hospital, with 360+ employees.

### DEMOGRAPHICS & HOUSING

Berlin's population has decreased from 11,889 in 1990 to 9,425 in 2020, showing a decrease of 2,464, according to the US Census 2020.<sup>4</sup> This data represents a negative growth rate of approximately 20.73%.

There are an estimated 4,714 housing units, most of which are occupied (3,988), while vacant housing units total 726.<sup>5</sup> The estimated median household income is \$39,479, and the median age is 43.9 years.<sup>6</sup>

### EDUCATION & CHILD CARE

Berlin students in grades K-5 attend Berlin Elementary School. Students in grades 6-8 and 9-12 attend Berlin Middle High School, respectively. White Mountains Community College and Tri-County CAP Head Start are also located in the City, along with three childcare facilities with a capacity of 134.<sup>7</sup>

**Incorporated:** 1829

**Origin:** This community was first granted in 1771 as Maynesborough in honor of Sir William Mayne, an associate of Governor John Wentworth in the West Indies trade. The area was not settled by the original grantees, and the town was renamed Berlin in 1829 by new settlers originally from Berlin, Massachusetts. According to historical information from the City of Berlin website, the first attempt at building a sawmill powered by the river was in the early 1820s. This was the start of a booming lumber and paper business in Berlin, and at one time it was the largest newsprint supplier in the world. Berlin was incorporated as a city in 1897, and is the northernmost city in New Hampshire.

**Villages and Place Names:** Cascade, Berlin Mills

**Population, Year of the First Census Taken:** 73 residents in 1830

**Population Trends:** Population in Berlin decreased by 3,380 over 41 years, from 13,084 in 1980 down to 9,704 in 2021. The largest decennial percent change was a 13 percent decline between 1990 and 2000. The 2021 Census estimate for Berlin was 9,704 residents, which ranked 30th among New Hampshire's incorporated cities and towns.

**Population Density and Land Area, 2021 (US Census Bureau):** 157.9 persons per square mile of land area. Berlin contains 61.5 square miles of land area and 0.7 square miles of inland water area.

Source: <https://www.nhes.nh.gov/elmi/products/cp/profiles-htm/berlin.htm>

<sup>4</sup> US Census 2020

<sup>5</sup> 2020 DEC Redistricting Data

<sup>6</sup> American Community Survey (ACS) 5-Year Estimate Data

<sup>7</sup> 2021 NH Licensed Child Care Facilities (DHHS-Bureau of Child Care Licensing)

### NATURAL FEATURES

The City of Berlin covers approximately 61.5 square miles of land area and 0.7 square miles of inland water. The lowest elevation in the City is 1,020' above sea level. The entire community is over 1,000 feet above sea level, leaving it vulnerable to ice storms. The community is dominated by the mountains and hills of northern New Hampshire. The highest peak is Mount Weeks, 3,901' above sea level.

Vegetation is typical of northern New England, including deciduous and conifer forests, open fields, swamps, and riverine areas. The terrain lends itself to many small ponds, streams, and rivers, most notably the Androscoggin River, the Dead River, Jericho Lake, Head Pond, York Pond, and Godfrey Pond.

### TRANSPORTATION

Two major roadways run through Berlin, NH Route 16 and NH Route 110. NH Route 16 travels from Gorham in the City's southeast corner to Milan in the northeast. NH Route 110 begins in the City's center, intersecting with Route 16 and traveling northwest into Milan. Other more minor and less traveled roadways lend access to other city areas.

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

### EMERGENCY OPERATIONS CENTER & EMERGENCY MANAGEMENT DIRECTOR

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

### FIRE DEPARTMENT & EMS

The Berlin Fire Department is a municipal fire department providing quality fire services to the residents and visitors of Berlin 24 hours a day, 365 days a year. The department staffs a full-time Chief, Assistant Chief, and eighteen firefighters and operates one station within the community. The Berlin Fire Department participates with the Northern NH Fire Mutual Aid District and other area departments. Berlin EMS provides emergency medical transportation for the City. The EMS Department staffs a full-time Director, Assistant Director, nine EMS personnel, and six part-time personnel.

### POLICE DEPARTMENT

The Berlin Police Department is a full-time department providing quality law enforcement services to the residents and visitors of Berlin. The department staffs a full-time Chief and Deputy Chief, thirty full-time, two part-time, and fourteen per-diem officers. The Berlin Police Department has mutual aid with the NH State Police, the Coos County Sheriff's Office, and surrounding towns.

### DEPARTMENT OF PUBLIC WORKS (DPW)

The Berlin Department of Public Works (DPW) operates year-round, 24 hours daily, as needed. The department staffs a full-time Director, an Assistant Director, twenty-eight full-time, and four seasonal employees. The department's mission is to support the citizens of Berlin through the safe operation, proper maintenance, and future development of highways, supporting infrastructure and utilities cost-consciously without sacrificing quality. The department does not belong to the NH Public Works Mutual Aid Association.

### **MEDICAL FACILITIES**

Berlin's closest medical facility is Androscoggin Valley Hospital in Berlin (local). Weeks Medical Center in Lancaster (28 miles) and Memorial Hospital in Conway (33 miles) are alternative medical facilities.

### **EMERGENCY SHELTER(S)**

The primary shelter is where evacuees are directed during an emergency. The designated primary shelter in Berlin is the Berlin High School, which offers a large sleeping area, restrooms, showers, and kitchen facilities. It has a permanent generator to keep the building operational during power outages. The designated secondary shelter for the City is the Recreation Department.

## ***C. BERLIN'S CURRENT & FUTURE DEVELOPMENT TRENDS***

Nearly every New Hampshire community experienced a significant drop in new home construction after the Great Recession of 2008. Most communities began to rebound just prior to Covid-19. However, single-family home construction remained slow and steady in Berlin, with four potential single-family home permits submitted in 2022, a considerable increase for the City where new single-family home construction has been infrequent.

Since the pandemic's beginning in 2020, development in New England has undergone several changes. One of the most significant changes was occasionally used homes modified as permanent residents for those wishing to flee the cities. Lot line adjustments and minor subdivisions were also quite common. Then real estate boomed, at least during 2021 and through most of 2022, only to settle to more moderate levels by the fall. The purchase of second homes increased as Jericho State Park became more well-known, and of the 40 units registered for short-term rentals, the rate increased by 25% from 2020 to 2021. Rental vacancies went from 15% to .06% during this period and remain low today.

In Berlin, development has been steady and very well-regulated. No large-scale subdivisions are being considered now, and most development in 2022 consisted of new single-family homes. One large-scale project is the Big Green House Project, a collaboration of 80 north country growers that produces salad greens and tomatoes for wholesale distribution. Part of the 20-acre property involved the floodplain and wetlands. However, the Planning Board and the Department of Environmental Services (DES) worked with the project to fully mitigate all hazardous issues before permitting was complete.

The Planning Board encourages development along NH Route 110, where ledge and wetlands areas are known but no natural hazards. The Board will continue to enforce city regulations to eliminate the potential impact in hazardous zones, such as floodplains and the Wildland Urban Interface (WUI). City officials are also considering a new Public Safety Building (PSB) to address the aging infrastructure emergency responders use. City officials ensure that any new PSB or other city facilities will be safe from the hazards mentioned in this plan.

The Berlin Planning Board's process for all subdivisions, site plans, and excavation applications is extensive and involves on-site examinations and the expertise of other departments and commissions as appropriate. Regulations ensure the board meets state and local regulations and maintains the community's local character. Berlin's regulations address wetland areas, stormwater flow, and fire protection. All development that has occurred or is proposed in hazard-prone areas has been closely monitored and mitigated to reduce the City's hazard vulnerability.

The City 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 Director of Strategic Initiatives, the Code Enforcement Officer, and the City Council will monitor and guide growth and development using the Master Plan, Subdivision Regulations, the Site Plan Review process, and the Zoning Ordinance. Building permits are required.

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

Conserved Land as a Percent of Land in the Community (GIS Analysis; 2022 Conservation Files, Granit, UNH)		
	Square Miles	Percent of City Land
Approximate Square Miles in Community	61.50	100.0%
Approximate Total Un-Conserved Land	22.88	37.2%
Approximate Total Conserved Land	38.62	62.8%
Municipal/County Land (1)	0.32	0.5%
Federal Owned Land (2)	25.41	41.3%
State Owned Land (3)	12.88	20.9%
Quasi Private (4)	0.00	0.0%
Private Land (5)	0.00	0.0%

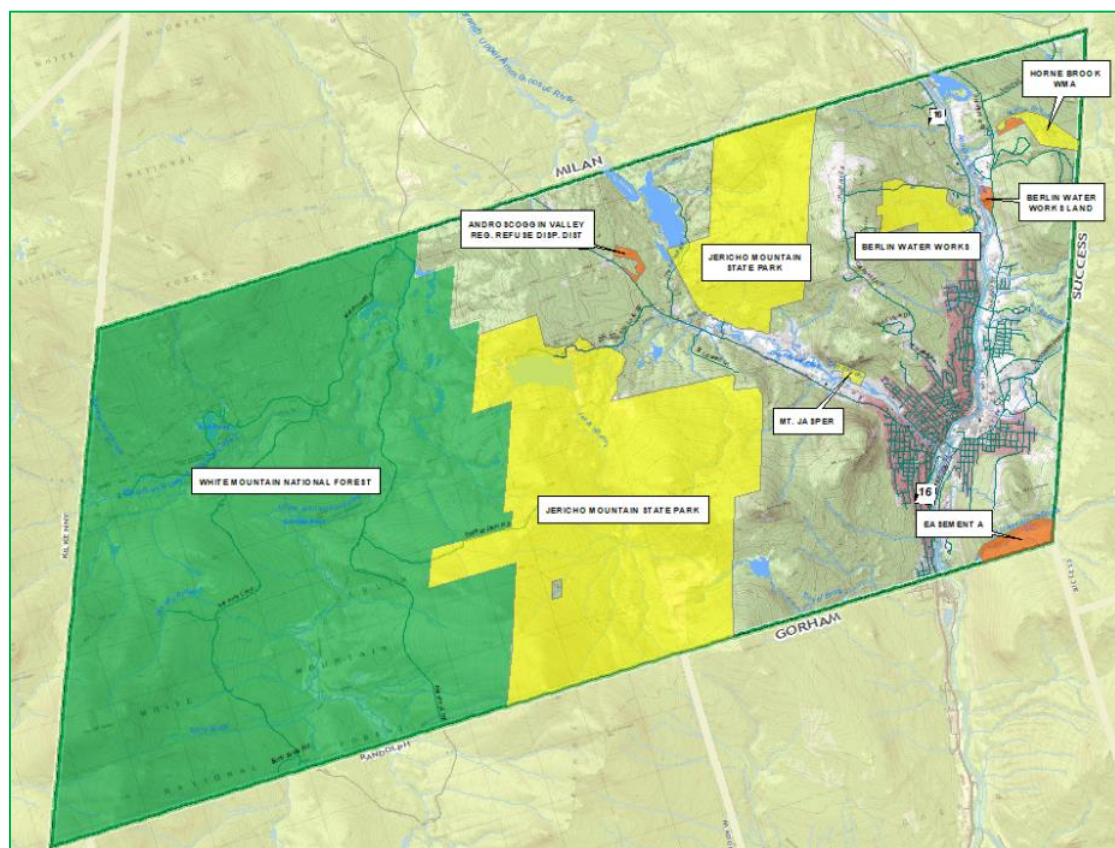


TABLE 2.1: CITY STATISTICS

Table 2.1 - City Statistics				
Census Population Data	2020	2010	2000	1990
Berlin, NH - Census Population Data	9,425	10,051	10,331	11,889
Coos County	31,268	33,055	33,156	34,879
Elderly Population-% over 65 (2021 ACS 5-year)	18.8%			
Median Age (2021 ACS 5-year)	43.9			
Median Household Income (2021 ACS 5-year)	\$39,479			
Individuals below the poverty level (2021 ACS 5-year)	13.9%			
Change in Population-Summer (%)	5%			
Change in Population-Winter (%)	5%			
Change in for Special Events (%)	80%			
Housing Statistics (2020 DEC Redistricting Data)				
Total Housing Units	4,714			
Occupied Housing Units	3,988			
Vacant Housing Units	726			
Assessed Structure Value (2022-MS1)	Value		1% Damage	5% Damage
Residential	\$401,257,860		\$4,012,579	\$20,062,893
Manufactured Housing	\$3,000,400		\$30,004	\$150,020
Commercial	\$45,672,157		\$456,722	\$2,283,608
Discretionary Preservation Easement	\$0		\$0	\$0
Tax Exempt	\$510,449,228		\$5,104,492	\$25,522,461
Utilities	\$176,672,800		\$1,766,728	\$8,833,640
Totals	\$1,137,052,445		\$11,370,524	\$56,852,622
The assessed Structure Value chart shows the 2022 MS1 structure values provided by the City on March 6, 2023. These values estimate structure loss "value" due to natural hazards (see Chapter 5), based on a loss of 0-1% or 1-5% of structures.				
Regional Coordination				
County	Coos			
Tourism Region	Great North Woods			
Municipal Services & Government				
City Manager	Yes, appointed			
City Mayor	Yes, elected			
City Council (9 member)	Yes, elected			
Planning Board	Yes, appointed			
School Board	Yes, elected			
Zoning Board of Adjustment	Yes, appointed			
Conservation Committee	No			
Master Plan	Yes, August 6, 2022			
Emergency Operation Plan (EOP)	Yes, September 9, 2020			
Hazard Mitigation Plan (HMP)	Yes, August 10, 2016			
Zoning Ordinances	Yes, 2017			



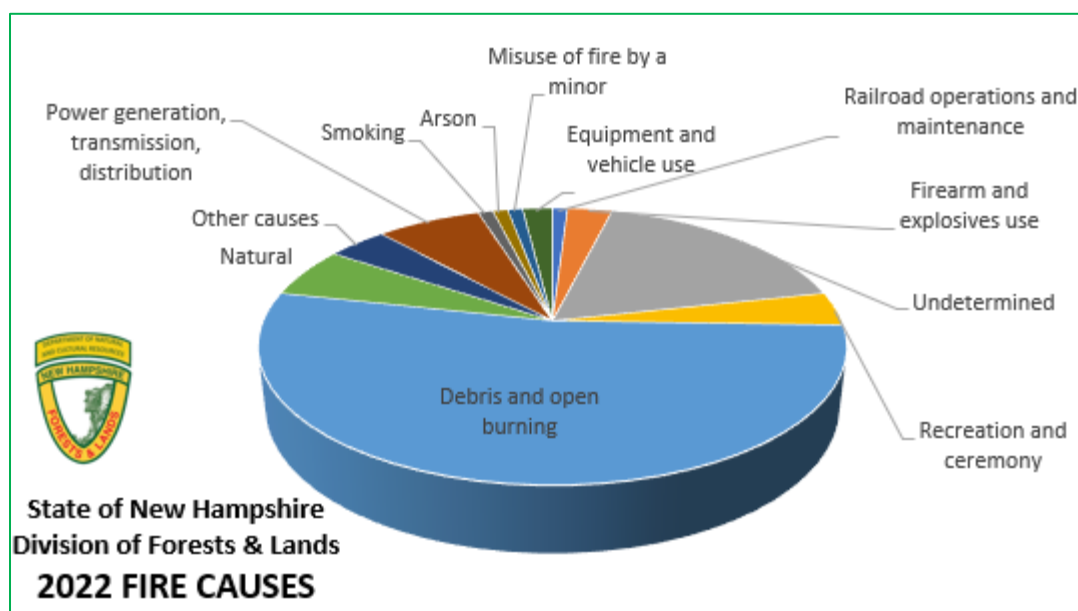
Table 2.1 - City Statistics	
<i>Subdivisions Regulations</i>	Yes, 1998
<i>Site Plan Review Regulations</i>	Yes, 1998
<i>Capital Improvement Plan (CIP)</i>	Yes, reviewed annually
<i>Capital Reserve Funds (CRF)</i>	Yes, segregated funds
<i>Building Permits Required</i>	Yes
<i>City Web Site</i>	Yes, www.berlinnh.gov
<i>Floodplain Ordinance</i>	Special Flood Hazard Area Overlay Zone (Sec. 17-153 of the Berlin Zoning Ordinance)
<i>Member of NFIP</i>	Yes, June 15, 1982
<i>Flood Insurance Rate Maps (DFIRMS)</i>	February 20, 2013
<i>Flood Insurance Rate Study (FIS)</i>	February 20, 2013
Percent of Local Assessed Valuation by Property Type - 2021 (NH Department of Revenue)	
<i>Residential Buildings</i>	59.0%
<i>Commercial Land &amp; Buildings</i>	9.8%
<i>Other (including Utilities)</i>	31.2%
Emergency Services	
<i>City Emergency Warning System(s)</i>	CodeRED (free through PD)
<i>School Emergency Warning System(s)</i>	One Call
<i>Emergency Management Services</i>	Yes (under "Department" tab)
<i>Facebook Pages</i>	City, Police Department, Fire Department, EMS, Recreation, Library
<i>Other Social Media</i>	No
<i>ListServ or Subscription Service</i>	Yes, sign up on the City's website
<i>Local Newspapers</i>	Berlin Sun, Berlin Reporter
<i>Public Access TV</i>	No
<i>Local TV Stations</i>	WMUR (9), WMTV (8), WGME (13), WCSH (6)
<i>Local Radio</i>	NPR (107.1), WHOM (94.9), WPKQ (103.7)
<i>Police Department</i>	Yes, full-time Chief, 30 full-time, 2 part-time, 14 per-diem
<i>Police Dispatch</i>	Police Dispatch
<i>Police Mutual Aid</i>	NH State Police, surrounding towns
<i>Animal Control Officer</i>	No - managed by the Police Department
<i>Fire Department</i>	Yes, full-time Chief, 1 Assistant Chief, 18 full-time
<i>Fire Dispatch</i>	Fire Dispatch (self)
<i>Fire Mutual Aid</i>	Gorham and Milan
<i>Fire Stations</i>	One
<i>Fire Warden</i>	Yes
<i>Emergency Medical Services</i>	Yes, full-time Director, Assistant Director, 9 full-time, 6 part-time
<i>EMS Dispatch</i>	EMS Dispatch (self)
<i>Emergency Medical Transportation</i>	Berlin EMS
<i>HazMat Team</i>	Contact NH HSEM
<i>Established Emergency Management Director (EMD)</i>	Yes

**Table 2.1 - City Statistics**

<i>Established Deputy EMD</i>	No
<i>Line of Succession (should EMD be out of the area)</i>	1st...Police Lieutenant
	2nd...City Manager or designee
	3rd...City Mayor or designee
<i>Public Health Network</i>	North Country 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 (although PD has carried this role in the past)
<i>Nearest Hospital</i>	Androscoggin Valley Hospital, Berlin (25 beds)
<i>Alternate Hospital(s)</i>	Weeks Medical Center, Lancaster (28 miles, 25 beds)
	Memorial Hospital, Conway (33 miles, 25 beds)
<i>Local Humane Society or Veterinarians</i>	Conway Area Humane Society (Conway), Above the Notch Humane Society (Littleton), North Country Animal Hospital (Gorham); Lancaster Animal Hospital (Lancaster)
<i>Primary EOC</i>	Police Station (generator)
<i>Secondary EOC</i>	Fire Station (generator)
<i>Primary Shelter</i>	Berlin High School (generator, not capable of the whole building)
<i>Secondary Shelter</i>	Recreation Department (generator)
<b>Utilities</b>	
<i>City Sewer</i>	Municipal & Private septic
<i>Department of Public Works</i>	Yes, full-time Director, 29 full-time, 4 seasonal (includes sewer, drainage, highway, recreation, wastewater treatment plant, parks, solid waste)
<i>Miles of Class V Roads</i>	60 total paved miles
<i>NH Public Works Mutual Aid</i>	No, (mutual aid with Gorham)
<i>Water Supply</i>	Berlin Water Works & Private wells
<i>Wastewater Treatment Plant</i>	Yes
<i>Electric Supplier</i>	Eversource Energy
<i>Natural Gas Supplier</i>	TransCanada
<i>Cellular Telephone Access</i>	Yes
<i>Solar Arrays</i>	No large arrays
<i>Pipelines</i>	TransCanada Natural Gas Pipeline
<i>High-speed Internet</i>	Yes
<i>Telephone Company</i>	Consolidated Communications & Spectrum
<b>Transportation</b>	
<i>Primary Evacuation Routes</i>	NH Route 16 & 110
<i>Secondary Evacuation Routes</i>	East Milan Road, Hutchins Street, Success Pond Road, Western Avenue
<i>Nearest Interstate</i>	I-93, Exit 35 (40 miles)
<i>Nearest Airstrip</i>	Berlin Municipal, Milan (5,200 ft. asphalt runway)

**Table 2.1 - City Statistics**

<i>Nearest Commercial Airport(s)</i>	Portland (ME) International (115 miles)
	Manchester-Boston Regional (135 miles)
<i>Public Transportation</i>	North Country Transit (NCT); Concord Trailways
<i>Railroad</i>	St. Lawrence & Atlantic Railroad (active freight line)
<b>Education &amp; Childcare</b>	
<i>Elementary School</i>	Berlin Elementary School (K-5)
<i>Berlin Middle High School</i>	Berlin Middle School (6-8)
	Berlin High School (9-12)
<i>Private School</i>	No
<i>School Administrative Unit</i>	SAU 3
<i>Colleges or Universities</i>	White Mountains Community College
<i>Licensed Childcare Facilities</i>	3 facilities, 134 capacity
<i>Other Educational Facilities</i>	Tri-County CAP Head Start
<b>Fire Statistics (NH Division of Forests &amp; Lands, Fire Warden Report &amp; the City)</b>	
<i>Wildfire Fires (2020)</i>	4-acre fire on Tinker Brook
<i>Coos County Fire Statistics (2022)</i>	5 wildfires, 57.99 acres
<i>State Forest Fires Statistics (2022)</i>	59 wildfires fires, 202.95 acres
<p><i>Unless otherwise noted, the information found in Table 2.1 was derived from the City, the US Census 2020, and the Economic &amp; Labor Market Information Bureau, NH Employment Security, October 2021. Community Response Received 5/10/2022, <a href="https://www.nhes.nh.gov/elmi/products/cp/profiles-pdf/berlin.pdf">https://www.nhes.nh.gov/elmi/products/cp/profiles-pdf/berlin.pdf</a>.</i></p>	





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

### A. HAZARD IDENTIFICATION

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

Some hazards in Table 3.1 include subcategories of hazards. For instance, Severe Winter Weather includes snowstorms, ice storms, blizzards, and nor'easters. In such instances<sup>8</sup>, the analysis included a discussion of the subcategories. However, ultimately, the final analysis was based on the category in general, as shown in Table 3.1.

The NH State Hazard Mitigation Plan includes many of the same potential hazards identified in Berlin. However, several of the state's hazards were excluded from this plan. These hazards, which scored a zero during the HIRA process (see page 35), include the following:

<u>State Hazard</u>	<u>Reason for exclusion from this plan</u>
Coastal Flooding .....	Distance away from the sea
Avalanches .....	No known areas of avalanches
Radiological .....	Distance away from radiological sites

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

### B. RISK ASSESSMENT

The plan demonstrates each hazard's likelihood of occurrence and its potential effect on the City. The hazards listed in Table 3.1 were classified based on the "Relative Threat" score as calculated in Column F; these were then separated into three categories using Jenks Optimization, also known as the natural breaks classification<sup>9</sup>. The "Relative Threat" score was then labeled into three categories, *High Risk*, *Medium Risk*, and *Low Risk*, as shown in Table 3.1, Column G; these categories are also indicated in Chapter 5, Sections B-D. This process illustrates a comprehensive hazard statement and helps the City understand which hazards should receive the most attention.

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

<sup>8</sup> Inland Flooding (Riverine, 100-year, local road flooding, ice jams, dam failure); Extreme Temperatures (hot & cold); High Wind Events (Tornadoes & Downbursts); Infectious Diseases (too many to list)

<sup>9</sup> The natural breaks classification process is a method of manual data classification partitions data into classes based upon natural groups within the data distribution; ESRI, <http://support.esri.com/en/knowledgebase/GISDictionary/term/natural%20breaks%20classification>

### C. PROBABILITY

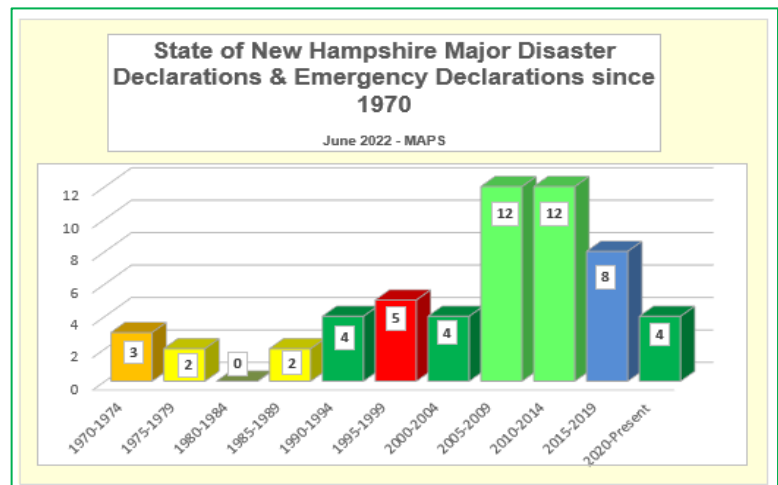
The determination of the probability of occurrence is contained within Column D in Table 3.1, which assesses hazards based on the likelihood that the hazards will occur within 25 years. The probability scores indicate whether the identified hazard has a *Very Low, Low, Moderate, High, or Very High* probability.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

Berlin is reasonably safe from natural, technological, and human-caused hazards. However, due to Berlin's geographic location, within 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. *"The challenges posed by climate change, such as more intense storms, frequent heavy precipitation, heat waves, drought, extreme flooding, and higher sea levels, could significantly alter the types and magnitudes of hazards impacting states in the future"*, FEMA stated in its State Mitigation Plan Review Guide<sup>10</sup>. FEMA recognizes climate change by including climate change in the hazard mitigation guide for state planners.

The chart to the right shows the increased frequency of Major Disaster Declarations (DR) and Emergency Declarations (EM) in New Hampshire, possibly indicating the impact of climate change.<sup>11</sup> The decade beginning in 2020 includes four disaster declarations: DR-4516 and EM-3445 (Covid-19), DR-4622 (Cheshire County), and DR-4624 (Cheshire and Sullivan Counties).



Communities in New Hampshire, such as Berlin, are becoming increasingly aware of climate change's impact on the hazards they already experience. Berlin anticipates an increase in natural hazard probability in the future and is beginning discussions on solar capabilities at city facilities. No specific projects are in the works.

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

Any potential disaster in Berlin 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 City's elderly and vulnerable citizens. The food supply of individual citizens could become quickly depleted should a power failure last for a week or more. When combined with a long-term utility outage, any hazard's effects could have a higher probability of damaging impacts on the community.

<sup>10</sup> State Mitigation Plan Review Guide, FEMA, Released March 2015, Effective March 2016, Section 3.2, page 13

<sup>11</sup> Derived from FEMA's record of disasters; categorized by decade since 1970 by the planner; 2020-2029 includes Covid-19

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

Table 3.1 - Hazard Identification & Risk Assessment (HIRA)							
Scoring for Probability (Columns A, B & C)	Column A	Column B	Column C	Column D	Column E (A+B+C)/3	Column F D x E	Column G Risk
1=Very Low (0-20%)	What is the probability of death or injury?	What is the probability of physical losses & damage?	What is the probability of interruption of service?	What is the probability of this occurring within 25 years?	Average of Human, Property & Business Impact	Relative Threat	<b>High</b> 13.0-21.9  <b>Medium</b> 6.0-12.9
2=Low (21-40%)							
3=Moderate (41-60%)							
4=High (61-80%)	Human Impact	Property Impact	Business Impact	Probability of Occurrence	Severity	Risk Severity x Occurrence	<b>Low</b> 0-5.9
5=Very High (81-100%)							
Natural Hazards							
1) Severe Winter Weather	4.00	4.00	5.00	5.00	4.33	21.67	High
2) Extreme Temperatures	3.00	3.00	3.00	5.00	3.00	15.00	High
3) Infectious Diseases	5.00	1.00	5.00	4.00	3.67	14.67	High
4) Inland Flooding	2.00	4.00	2.00	5.00	2.67	13.33	High
5) Tropical & Post-Tropical Cyclones	4.00	4.00	4.00	3.00	4.00	12.00	Medium
6) High Wind Events	4.00	4.00	4.00	2.00	4.00	8.00	Medium
7) Wildfires	2.00	4.00	3.00	2.00	3.00	6.00	Medium
8) Earthquakes	5.00	5.00	5.00	1.00	5.00	5.00	Low
9) Solar Storm & Space Weather	5.00	5.00	5.00	1.00	5.00	5.00	Low
10) Drought	1.00	2.00	2.00	3.00	1.67	5.00	Low
11) Lightning & Hail	2.00	2.00	2.00	2.00	2.00	4.00	Low
12) Landslide & Erosion	5.00	5.00	1.00	1.00	3.67	3.67	Low
Technological Hazards							
1) Aging Infrastructure	4.00	5.00	3.00	5.00	4.00	20.00	High
2) Conflagration	4.00	5.00	4.00	4.00	4.33	17.33	High
3) Dam Failure	5.00	5.00	5.00	2.00	5.00	10.00	Medium
4) Long Term Utility Outage	5.00	3.00	5.00	2.00	4.33	8.67	Medium
5) Hazardous Materials	5.00	5.00	3.00	2.00	4.33	8.67	Medium
6) Known & Emerging Contaminants	2.00	1.00	1.00	1.00	1.33	1.33	Low
Human-Caused Hazards							
1) Transport Accidents	5.00	4.00	4.00	3.00	4.33	13.00	High
2) Cyber Events	1.00	1.00	5.00	5.00	2.33	11.67	Medium
3) Mass Casualty Incidents	5.00	2.00	2.00	3.00	3.00	9.00	Medium
4) Terrorism & Violence	5.00	5.00	5.00	1.00	5.00	5.00	Low

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

Berlin entered the National Flood Insurance Program (NFIP) Member on June 15, 1982. Berlin has a relatively small floodplain with approximately 2.04 square miles of land in the 100-year floodplain<sup>12</sup>, including .7 square miles of inland water. Berlin's floodplain makes up less than 3.3% of the land in the community. The floodplain areas of Berlin are primarily along the Androscoggin and the Dead Rivers and along Jericho, Horne, and Tinker Brooks. Other small streams and brooks throughout the City may also experience flooding.

Berlin will likely experience flooding on several roads and along most rivers and streams. Flood control capabilities along the Androscoggin help, but the overall flood risk due to riverine and 100-year flood events is moderate. The latest Flood Insurance Rate Studies (FIRS) and Digital Flood Insurance Rate Maps (DFIRMS) are dated February 20, 2013. The latest DIRM and FIS are "incorporated by reference" when amended in the Berlin Special Flood Hazard Area Overlay Zone.

According to the Office of Strategic Initiatives (OSI), there are 26 NFIP policies in effect in Berlin, including nineteen single-family, four 2-4 family, and three non-residential policies. There have been four paid losses for a total of \$10,297. The BEA/OSI also reports no repetitive losses.<sup>13</sup>

### SPECIAL FLOOD HAZARD AREA OVERLAY ZONE

Article XIV, Natural Resources Overlay Zones, Section, Section 17-153, Special Flood Hazard Area Overlay Zone states, *"This provision, formerly known as the Floodplain Development Ordinance, is incorporated into this Article of the zoning ordinance (Natural Resource Overlay Zones) as the "Special Flood Hazard Area Overlay Zone" pursuant to RSA 674:16. The regulations in this section overlay and supplement the Zoning Ordinance of the City of Berlin."*<sup>14</sup>

Berlin established the Floodplain Development Ordinance as part of Article XIV, Natural Resources Overlay Zones, Section 17-153, Special Flood Hazard Area Overlay Zone. Section 17-153 contains the usual components of a New Hampshire flood ordinance and details the exact specifications for building or substantial improvements in the flood zone in eleven subsections.<sup>15</sup>

- Subsection 1, states the purpose of the Special Flood Hazard Area Overlay zone.
- Subsection 2, *"The following regulations in this Ordinance shall apply to all lands designated as special flood hazard areas by the Federal Emergency Management Agency (FEMA) in its "Flood Insurance Study for the County of Coos NH", dated February 20, 2013, together with the associated Flood Insurance Rate Maps*



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

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

Source:

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

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

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

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

<sup>12</sup> GIS Analysis of Coos County DFIRM (Digital Flood Insurance Rate Map)

<sup>13</sup> NH Office of Strategic Initiatives (OSI); Jennifer Gilbert, October 10, 2022

<sup>14</sup> [https://www.berlinnh.gov/sites/g/files/vyhlf2811f/uploads/chapter\\_17\\_zoning\\_ordinance\\_1-3-22.pdf](https://www.berlinnh.gov/sites/g/files/vyhlf2811f/uploads/chapter_17_zoning_ordinance_1-3-22.pdf), Section 17-153

<sup>15</sup> Italic font indicates direct language from the ordinance

*dated February 20, 2013, which are declared to be a part of this ordinance and are hereby incorporated by reference. These maps and study are on file with the City Clerk, the Planning Department, and the Building Inspector.”<sup>16</sup>*

- Subsection 3 is the definition of terms.
- Subsection 4 states that all building projects in the overlay zone will require a building permit issued by the Building Inspector.
- Subsection 5 discusses assurances that sites *“will be reasonably safe from flooding”*.
- Subsection 6 discusses replacement water and sewer systems and the requirements to be *“...designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters....”*
- Subsection 7 discusses the as-built elevation and the need for certification of flood-proofing.
- Subsection 8 describes the submittal of the proposed project to the Special Use Permit Granting Authority (SUPGA), the Public Works Director, and the Water Works superintendent for their approval.
- Subsection 9 details expectations in riverine situations and the regulatory floodway and states, *“No encroachments, including fill, new construction, substantial improvements, and other developments are allowed within the floodway that would result in any increase in flood levels within the community during base flood discharge.”*
- Subsection 10 goes into more detail about flood elevation determinations, manufactured homes, and recreational vehicles.
- Subsection 11 discusses the variance and appeals process.

The City uses the Special Flood Hazard Area Overlay Zone to guide development and ensure compliance and enforcement of NFIP standards. The Planning Board (initiator) and the City Council (enforcer) adhere to the rules, regulations, and requirements outlined in the ordinance. The Berlin Zoning Ordinance can be found on the City’s website.<sup>17</sup>

Berlin’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.

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<sup>16</sup> Ibid

<sup>17</sup> [https://www.berlinnh.gov/sites/g/files/vyhlf2811f/uploads/chapter\\_17\\_zoning\\_ordinance\\_1-3-22.pdf](https://www.berlinnh.gov/sites/g/files/vyhlf2811f/uploads/chapter_17_zoning_ordinance_1-3-22.pdf)

The team understands that the benefits of the NFIP also extend to structures not in the 100-year floodplain. They felt it worthwhile to have NFIP brochures and information available at City Hall for current homeowners and potential developers. The Team also indicated they would review the floodplain ordinance after a significant event to determine if changes could be made to provide further mitigation for flooding. Flood-related mitigation strategies have been added to this plan. The City will continue to work with the Office of Planning & Development (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 Berlin.**

**TABLE 3.2: HISTORIC HAZARD IDENTIFICATION**

**Key for Table 3.2**

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

**Table 3.2 includes the following sections:**

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

Type of Event	Date of Event	Location	Description	Source
<b>A. Inland flooding includes riverine, heavy rainfall, rapid snowmelt, ice jam flooding, flooding due to dam failure, and local road flooding:</b> Riverine flooding is the most common disaster event in the State of NH. Significant riverine flooding in some areas of the state occurs in less than ten-year intervals and seems to be increasing with climate change. The entire State of NH has a high flood risk. Flood events have the potential to impact the community on a citywide basis. No significant flooding events have occurred in Berlin since October 29-November 1, 2017.				
<b>A summary of flood events, including Major Disaster &amp; Emergency Declarations in the state &amp; regionwide</b>				
<b>Flooding</b> Prior to 1970	1927, 1936, 1938, 1943 (2), 1953, 1955, 1959		Spring and fall flooding events resulting from severe storms and heavy snowmelt	See below
<b>Flooding</b> 1970-1979	1972 ( <b>DR-327</b> ), 1973 ( <b>DR-399</b> ), 1974 ( <b>DR-411</b> ), 1976, 1978 ( <b>DR-549</b> ), 1979 ( <b>EM-3073</b> )			
<b>Flooding</b> 1980-1989	1986 ( <b>DR-771</b> ), 1987 ( <b>DR-789</b> )			
<b>Flooding</b> 1990-1999	1990 ( <b>DR-876</b> ), 1991 ( <b>DR-923</b> ), 1991 ( <b>DR -917</b> ), 1995, 1996 ( <b>DR-1077</b> ), 1996 ( <b>DR-1144</b> ), 1998 ( <b>DR-1231</b> )			
<b>Flooding</b> 2000-2009	2003 ( <b>DR-1489</b> ), 2005 ( <b>DR-1610</b> ), 2006 ( <b>DR-1643</b> ), 2007 ( <b>DR-1695</b> ), 2008 ( <b>DR-1787</b> ), 2008 ( <b>DR-1799</b> )			



Type of Event	Date of Event	Location	Description	Source
<b>Flooding</b> 2010 - Present	2010 (DR-1892), 2010 (DR-1913), 2011 (DR-4006), 2012 (DR-4065), 2013 (DR-4139), 2015 (DR-4206), 2017 (DR-4329), 2017 (DR-4355), 2018 (DR-4370), 2019 (DR-4457)			
<b>A detailed summary of flood events in the community</b>				
Riverine Flooding (including ice jams)	1953	Pleasant & Main Streets	The Dead River flooded in 1953, causing significant damage to Pleasant and Main Street.	2016 HMPT
Flooding	Spring 1969	Citywide	Heavy snowmelt caused major flooding everywhere	2010 HMPT
Flooding	June & July 1998	Citywide	Saw major flooding	2010 HMPT
<b>Inland Flooding</b> (Heavy Rain)	April 15-23, 2007	All Ten NH Counties	<b>Major Disaster Declaration DR-1695:</b> FEMA & SBA obligated more than \$27.9 million in disaster aid for flood damages following the April nor'easter. (Tax Day Storm). No significant impact in Berlin.	FEMA, 2016 HMPT2024
<b>Inland Flooding</b> (Heavy Rain & Tornado)	July 24-August 14, 2008	Belknap, Carroll & Grafton & Coos	<b>Major Disaster Declaration DR-1787:</b> A period of severe storms and flooding from July 24 to August 14, spawning a tornado on July 24, 2008. No significant impact in Berlin.	FEMA & 2024 HMPT
<b>Inland Flooding</b> (Heavy Rain)	May 26-30, 2011	Coos & Grafton County	<b>Major Disaster Declaration DR-4006:</b> Flooding and hail occurred due to a severe storm from May 26-30, 2011, in Coos & Grafton County (Memorial Day Weekend Storm). No significant impact in Berlin.	FEMA, 2016 HMPT & 2024 HMPT
<b>Inland Flooding</b> (Tropical Storm Irene)	August 26- September 6, 2011	<b>EM 3333:</b> All Ten NH Counties <b>DR-4026:</b> Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, & Sullivan	<b>Major Disaster Declaration DR-4026 &amp; Emergency Declaration EM-3333:</b> See below, Section C	FEMA & 2024 HMPT
<b>Inland Flooding</b> (Heavy Rain)	July 1-2, 2017	Grafton & Coos	<b>Major Disaster Declaration DR-4329:</b> The Federal Emergency Management Agency (FEMA) announced that federal disaster assistance was available to supplement state and local recovery efforts in the areas affected by severe storms and flooding from July 1, 2017, to July 2, 2017, in two New Hampshire Counties. No significant impact in Berlin.	FEMA & 2024 HMPT

Type of Event	Date of Event	Location	Description	Source
<b>Inland Flooding</b> (Heavy Rain) <b>Long Term Utility Outage</b>	October 29- November 1, 2017	Sullivan, Grafton, Coos, Carroll, Belknap & Merrimack	<b>Major Disaster Declaration, DR-4355:</b> The Federal Emergency Management Agency (FEMA) announced that federal disaster assistance is available to New Hampshire to supplement state and local recovery efforts in the areas affected by severe storms and flooding from October 29-November 1, 2017, in five New Hampshire Counties. In Berlin, floodwaters impacted multiple homes and roadways. Enman Hill, Forbush, Hillsboro, Coos, Grafton, and Howland roads all had damage. Winds brought down trees and power lines, causing local outages in the community. FEMA post-disaster funding was received for road work.	FEMA & 2024 HMPT
Flooding	Re-occurring	Glen Avenue	Road flooding on Glen Avenue (near the Irving Station) has occurred in the past and can potentially occur again.	2016 HMPT
Flooding	Re-occurring	Industrial Park Road	Road flooding on Industrial Park Road has occurred in the past and can potentially occur again.	2016 HMPT
Flooding	Re-occurring	Watson Street	Road flooding on Watson Road has occurred in the past and can potentially occur again, causing the road and some basements to flood.	2016 HMPT
<b>B. Wildfires:</b> New Hampshire is heavily forested and is therefore vulnerable to wildfire, particularly during periods of drought. The proximity of many populated areas to the state's forested land exposes these areas to the potential impact of wildfire. Wildfires have the potential to impact the community on a citywide basis. No significant wildfire events have occurred in Berlin since the Jericho Lake Road fire in the Fall 2020.				
<b>A summary of wildfire events, including Major Disaster &amp; Emergency Declarations in the state and other recent large fires</b>				
<b>Wildfire</b> (Shaw Mountain)	July 2, 1953	Carroll County	<b>Major Disaster Declaration DR-11:</b> This wildfire occurred in Carrol County at Shaw Mountain. This fire did not reach Coos County or Berlin.	FEMA & 2024 HMPT
<b>Wildfire</b> (Bayle Mountain)	May 2015	Carroll County	<b>The Bayle Mountain Fire:</b> This Class D fire burned 275 acres and took five days to put out on rocky and steep terrain in Ossipee, NH. Blackhawk and private helicopters and fire crews from all over the state assisted in extinguishing this fire. The Bayle Mountain Fire did not damage homes. This fire did not reach Coos County or Berlin.	Local Resources
<b>Wildfire</b> (Stoddard)	April 2016	Cheshire County	<b>Fire Management Assistance Declaration, FM-5123:</b> Stoddard, NH. The Stoddard Fire burned 190 acres in April 2016 and caused the evacuation of 17 homes; Class D fire. This fire did not reach Coos County or Berlin.	FEMA & 2024 HMPT
<b>Wildfire</b> (Covered Bridge Fire)	November 2016	Carroll County	<b>The Covered Bridge Fire:</b> A brush fire near the Albany Covered Bridge grew to 329 acres, primarily on White Mountain National Forest land. No structures were lost; Class E fire. This fire did not reach Coos County or Berlin.	Local Resources



Type of Event	Date of Event	Location	Description	Source
<b>Wildfire</b> (Dilly Cliff)	October 2017	Grafton County	<b>The Dilly Cliff Fire</b> in the Lost River Gorge Trail in North Woodstock off Route 112 (Lost River Road); Class C: Human-caused; 75 acres. The Dilly Cliff Fire was determined to be extinguished 36 days after it began. This fire did not reach Coos County or Berlin.	Local Resources
<b>A detailed summary of wildfire events in the community</b>				
Wildfire	Early 1990's	Cates Hill Road	Local and cause unknown.	2016 HMPT
Wildfire	1995	York Pond Road	Kilkenny side; 6-7 acres	2016 HMPT
Wildfire	2002	Mt. Jasper	6-7 acres	2016 HMPT
Wildfire	2003	Mt. Jasper	6-7 acres	2016 HMPT
Wildfire	2003	Behind Hospital	3-4 acres	2016 HMPT
Wildfire	April 2006	Cascade Mt.	Cascade Mountain (Gorham); 98 acres; smoking; Class C fire; Berlin was first to be called in, although this fire was actually in Gorham.	2016 HMPT
Wildfire	May 2015	Wentworth Avenue	Unpermitted and unattended brush fire; Class 4 red flag day; 3-4 acres; no structural damage; fire in woods and destroyed two snowmobiles.	2016 HMPT
Wildfire	September 21, 2020	Tinker Brook	An unattended campfire caused a four-acre fire. A helicopter spotted the fire and called the fire department with coordinates. The Fire Department called NH Forests & Lands for help. The fire took four days to extinguish due to drought season and spot fires starting underground and coming up in different areas.	2024 HMPT
Wildfire	Fall 2020	Jericho Lake Road	An unattended campfire caused a 1/4-acre fire on private land. The fire was quickly extinguished.	2024 HMPT
<b>No wildfires of significance have occurred in Berlin since the 2016 Hazard Mitigation Plan was completed, except for the Tinker Brook fire noted above.</b>				2024 HMPT
<b>C. High Wind Events including Tropical &amp; Post-Tropical Cyclones, Tornadoes, Downbursts &amp; Windstorms:</b> Tornadoes are spawned by thunderstorms and occasionally by hurricanes; tornadoes may occur singularly or in multiples. A downburst is a severe localized wind blasting down from a thunderstorm. Downburst activity is prevalent throughout NH and is becoming more common with climate change; most downbursts go unrecognized unless significant damage occurs. Hurricanes develop from tropical depressions which form off the coast of Africa. New Hampshire's exposure to direct and indirect impacts from hurricanes is real but modest compared to other New England states. A hurricane that is downgraded to a tropical storm is more likely to have an impact in New Hampshire. Tornadoes and other wind events have the potential to impact the community on a citywide basis. Since the prior hazard mitigation plan, no significant high wind events have occurred in Berlin.				
<b>A summary of high wind events and tropical and post-tropical cyclone events, including Major Disaster &amp; Emergency Declarations in the state &amp; regionwide</b>				
<b>Tropical &amp; Post-Tropical Cyclones</b>	1804, 1869, 1938, 1944, 1954 (2), 1960, 1976, 1978, 1985, 1991 ( <b>DR-917</b> ), 1999 ( <b>DR-1305</b> ), 2005 ( <b>EM-3258</b> ), 2011 ( <b>EM-3333 &amp; DR-4026</b> ), 2012 ( <b>EM-3360</b> )	Number 4 (1938), Number 7 (1944), Carol (1954), Edna (1954), Donna (1960), Belle (1976), Amelia (1978), Gloria (1985), Bob (1991), Floyd (1999), Katrina (2005), Irene (2011), Sandy (2012)		See below

Type of Event	Date of Event	Location	Description	Source
<b>High Wind Events</b> (Tornadoes)	1814, 1890, 1951, 1953, 1957, 1961, 1963, 2008 (DR-1782)		All listed tornadoes were reported as F2, except for the June 1953 tornado, which was reported as an F3.	See below
<b>A detailed summary of high wind and tropical and post-tropical cyclone events in the community.</b>				
<b>Tropical &amp; Post-Tropical Cyclone</b> (Great New England Hurricane)	September 21, 1938	All Ten NH Counties	<b>The Great New England Hurricane:</b> Statewide there were multiple deaths, and damages in NH were about \$12.3 million in 1938 dollars (about \$200 million now). 20,000 structures, 26,000 automobiles, 6,000 boats, and 325,000 sugar maples were lost or damaged throughout New Hampshire. 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 Berlin. (Source <a href="http://nhpr.org/post/75th-anniversary-new-englands-greatest-hurricane">http://nhpr.org/post/75th-anniversary-new-englands-greatest-hurricane</a> )	FEMA & 2024 HMPT
<b>Tropical &amp; Post-Tropical Cyclone</b> (Hurricanes Carol & Edna)	August 31, 1954	All Ten NH Counties	<b>Hurricanes Carol &amp; Edna:</b> Hurricane Carol resulted in an extensive amount of trees being blown down and damage to damage and significant crop losses. Localized flooding and winds measuring over 100 mph also occurred. Hurricane Carol was followed by Hurricane Edna just 12 days later, which caused already weakened trees to fall. Although there was no local recollection, it was expected that damage would have been similar to the rest of the state in Berlin. (Source: <a href="http://www.wmur.com/Timeline-History-Of-NH-Hurricanes/11861310">http://www.wmur.com/Timeline-History-Of-NH-Hurricanes/11861310</a> )	FEMA & 2024 HMPT
<b>Tropical &amp; Post-Tropical Cyclone</b> (Hurricane Katrina evacuation)	August 29-October 1, 2005	All Ten NH Counties	<b>Emergency Declaration EM-3258:</b> Assistance was provided to evacuees from the area struck by Hurricane Katrina and 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 and all 10 New Hampshire counties. There was no recollection of any evacuees or pets coming to Berlin.	FEMA, 2016 HMPT & 2024 HMPT
Tornado	Summer 2010	Berlin	A tornado did touch down in Berlin in 2010, causing minor property and tree damage.	2016 HMPT
<b>Tropical &amp; Post-Tropical Cyclone</b> (Tropical Storm Irene)	August 26-September 6, 2011	<b>EM 3333:</b> All Ten NH Counties <b>DR-4026:</b> Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, & Sullivan	<b>Major Disaster Declaration DR-4026 &amp; Emergency Declaration EM-3333:</b> Tropical Storm Irene, August 26th- September 6, 2011, occurred in seven New Hampshire counties, causing flood and wind damage. In addition, an Emergency Declaration was declared for all ten New Hampshire counties. Tropical Storm Irene brought flooding to several areas, including the sanitation system, Lancaster Street (several homes had flood damage), and some flood damage to the water system; mitigation projects were completed after receiving FEMA funding.	FEMA, 2016 HMPT & 2024 HMPT

Type of Event	Date of Event	Location	Description	Source
<b>Tropical &amp; Post-Tropical Cyclone</b> (Hurricane Sandy)	October 26- November 8, 2012	<b>DR-4095:</b> Belknap, Carroll, Coos, Grafton, Rockingham & Sullivan <b>EM-3360:</b> All Ten NH Counties	<b>Major Disaster Declaration DR-4095 &amp; Emergency Declaration EM-3360:</b> The declaration covers damage to property from the storm that spawned heavy rains, high winds, high tides, and flooding from October 26-November 8, 2012. Hurricane Sandy came ashore in NJ, bringing high winds, power outages, and heavy rain to six New Hampshire counties. No significant impact in Berlin.	FEMA, 2016 HMPT & 2024 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 have the potential to impact the community on a citywide basis. No significant winter weather events have occurred in Berlin since Winter Storm Nemo on February 8, 2013.

**A summary of severe winter weather events, including Major Disaster & Emergency Declarations in the state & nationwide**

<b>Severe Winter Weather</b> (Ice Storms)	1942, 1969, 1970, 1979, 1991, 1998 <b>(DR-1199), 2008 (DR-1812)</b>	The major ice storms that have occurred causing major disruptions to power, transportation, and public and private utilities.	FEMA & 2024 HMPT
<b>Severe Winter Weather</b> (Snowstorms)	1920, 1929, 1940, 1950, 1952, 1958 (2), 1960, 1961, 1969, 1978, 1982, 1993 <b>(EM-3101)</b> , 2001 <b>(EM-3166)</b> , 2003 <b>(EM-3177)</b> , 2003 <b>(EM-3193)</b> , 2004, 2005 <b>(EM-3207)</b> , 2005 <b>(EM-3208)</b> , 2005 <b>(EM-3211)</b> , 2008 <b>(EM-3297)</b> , 2009, 2011 <b>(EM-3344 &amp; DR-4049)</b> , 2013 <b>(EM-1405)</b> , 2015 <b>(DR-4209)</b> , 2017 <b>(DR-4316)</b> , 2018 <b>(DR-4371)</b>	The severe winter weather events marked by snowfalls exceeding 2' in parts of the state which resulted in disruptions to power and transportation systems.	FEMA & 2024 HMPT

**A detailed summary of severe winter storm events in the community**

<b>Severe Winter Weather</b> (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 in addition to 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. Total accumulation for the 1968-69 winter was hefty; the area saw several major snowstorms, one of which resulted in nearly 50" of snow in 24 hours; Notre Dame Arena collapsed, resulting in one fatality.	FEMA, 2016 HMPT & 2024 HMPT
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Type of Event	Date of Event	Location	Description	Source
<b>Severe Winter Weather</b> (High Winds, Coastal Flooding & Snowstorm)	February 16, 1978	All Ten NH Counties	<b>Major Disaster Declaration DR-549:</b> The Blizzard of '78, a regionwide blizzard severely affecting southern New England, resulted in high snow accumulations throughout New England and New Hampshire. Recorded accumulations show up to 28" in northeast New Hampshire, 25" in west-central New Hampshire, and 33" along coastal New Hampshire. This storm also brought hurricane-force winds, which made this storm one of the more intense this century across the northeastern United States. There was no recollection of events in Berlin; however, it is expected that snow amounts in Berlin were similar to accumulation in the rest of the state. The Department of Public Works handled the heavy snow accumulation in Berlin.	FEMA & 2024 HMPT
<b>Severe Winter Weather</b> (Snowstorm & High Winds)	March 13-17, 1994	All Ten NH Counties	<b>Emergency Declaration EM-3101:</b> The heavy snow accumulation in Berlin was handled by the Department of Public Works.	FEMA & 2024 HMPT
<b>Severe Winter Weather</b> (Ice Storm) <b>Long Term Utility Outage</b>	January 7-25, 1998	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, Strafford & Sullivan	<b>Major Disaster Declaration DR-1199:</b> A significant ice storm struck nearly every part of the state, with a more significant impact in northern communities and areas over 1,000 feet above sea level. Berlin received heavy forest damage at elevations of 1,000' feet or more; some slash remains on the forest floor; some road closures, including Cates Hill Road; loss of power in the City for over a day. Due to icing, the DPW had difficulty keeping up with icing roads and trees down. The power was out in other city areas for up to two weeks.	FEMA, 2016 HMPT & 2024 HMPT
<b>Severe Winter Weather</b> (Snowstorm)	March 5-7, 2001	Cheshire, Coos, Grafton, Hillsborough, Merrimack, & Strafford	<b>Emergency Declaration EM-3166:</b> The emergency declaration covers jurisdictions with record and near-record snowfall from a late winter storm that occurred in March 2001 and affected six New Hampshire counties. The Department of Public Works handled the heavy snow accumulation in Berlin.	FEMA & 2024 HMPT
<b>Severe Winter Weather</b> (Snowstorm)	December 6-7, 2003	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack & Sullivan	<b>Emergency Declaration EM-3193:</b> The emergency declaration covers jurisdictions with record and near-record snowfall that occurred from December 6-7, 2003, and affected eight New Hampshire counties. The Department of Public Works handled the heavy snow accumulation in Berlin.	FEMA & 2024 HMPT

Type of Event	Date of Event	Location	Description	Source
<b>Severe Winter Weather</b> (Snowstorms)	January 22-23, 2005 February 10-11, 2005 March 11-12, 2005	All Ten NH Counties	<b>Emergency Declaration EM 3208-002:</b> The Federal Emergency Management Agency (FEMA) had obligated more than \$6.5 million to reimburse state and local governments in New Hampshire for costs incurred in three snowstorms that hit the state in 2005. The total aid for all three storms was \$6,892,0237 (January: \$3,658,114; February: \$1,121,727; March: \$2,113,182). The Department of Public Works handled the heavy snow accumulation in Berlin.	FEMA & 2024 HMPT
<b>Severe Winter Weather</b> (Snowstorm & Ice Storm)	December 11-23, 2008	All Ten NH Counties	<b>Major Disaster Declaration DR-1812 &amp; Emergency Declaration EM-3297:</b> Damaging ice storm impacted the entire state, including all 10 New Hampshire counties, resulting in fallen trees and large-scale power outages. Nearly \$15 million in federal aid was obligated by May 2009. There was no significant damage in Berlin, and the Department of Public Works handled the heavy snow accumulation in Berlin.	FEMA & 2024 HMPT
<b>Severe Winter Weather</b> (Snowstorm)	October 29-30, 2011	<b>DR-4049:</b> Hillsborough & Rockingham <b>EM-3344:</b> All Ten NH Counties	<b>Major Disaster Declaration DR-4049 &amp; Emergency Declaration EM-3344:</b> A severe winter storm occurred in two New Hampshire counties on October 29-30, 2011. <b>EM-3344:</b> The emergency declaration for snow removal and damage repair included all ten NH countries (Snowtober). The Department of Public Works handled the heavy snow accumulation in Berlin.	FEMA & 2024 HMPT
<b>Severe Winter Weather</b> (Snowstorm)	February 8, 2013	All Ten NH Counties	<b>Major Disaster Declaration DR-4105:</b> A severe winter storm resulted in heavy snow in February 2013 in all ten New Hampshire counties (Nemo). The Department of Public Works handled the heavy snow accumulation in Berlin.	FEMA & 2024 HMPT
<b>Severe Winter Weather</b> (Snowstorm) <b>Long Term Utility Outage</b>	December 22-25, 2022	Belknap, Grafton, Coos & Carroll	<b>Major Disaster Declaration, DR-4693:</b> A severe winter storm occurred December 22-25, 2022. Heavy, wet snow caused trees and power lines to fall; some roadways were closed. The declaration was declared in four of the state's ten counties.	FEMA & 2024 HMPT

Type of Event	Date of Event	Location	Description	Source
<b>E. Earthquakes:</b> According to the NH State Hazard Mitigation Plan, New Hampshire is considered to lie in an area of "moderate" seismic activity compared to other areas of the United States. New Hampshire is bordered to the north and southwest by "major" activity areas. Generally, earthquakes in NH cause little or no damage and have not exceeded a magnitude of 5.5 since 1940. Earthquakes have the potential to impact the community on a citywide basis. Since the prior hazard mitigation plan, no significant earthquakes have occurred in Berlin.				
A summary of earthquakes with a magnitude of 4.0 or greater in the state and regionwide				
Earthquakes	6/11/1638 (Central NH, 6.5), 10/29/1727 (Off Coastline, 6.0-6.3), 11/18/1755 (Off Coastline, 5.8), 11/10/1810 (Portsmouth, NH, 4.0), 7/23/1823 (Off Hampton, NH, 4.1), 12/19/1882 (Concord, NH, Unknown), 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 (Ossipee, NH, 5.5-5.8), 12/24/40 (Ossipee, NH, 5.5-5.8), 1/19/1982 (Laconia, NH, 4.0), 11/20/1988 (Berlin, NH, 4.0), 4/6/1989 (Berlin, NH, 4.1), 10/16/2012 (Hollis Center, ME, 4.0)		Occurrences of earthquakes with a magnitude of 4.0 or greater in recorded New Hampshire History	State of NH Multi-Hazard Mitigation Plan, Update 2018
A detailed summary of earthquakes that were felt in the community since 1940 with a magnitude of 3.0 or greater				
Earthquake	December 20, 1940	Ossipee, NH	Magnitude 5.5	State of NH Multi-Hazard Mitigation Plan, Update 2018, 2016 HMPT & 2024 HMPT
Earthquake	December 24, 1940	Ossipee, NH	Magnitude 5.5	
Earthquake	June 15, 1973	Quebec Border / NH	Magnitude 4.8	
Earthquake	January 18, 1982	Franklin, NH	Magnitude 4.5	
Earthquake	October 20, 1988	Berlin, NH	Magnitude 4.0, felt in Berlin, minor damage reported	
Earthquake	April 6, 1989	Berlin, NH	Magnitude 4.1, felt in Berlin, but no reported damage.	
Earthquake	April 20, 2002	Plattsburg, NY	Magnitude 5.1	
Earthquake	June 23, 2010	Ontario-Quebec Border	Magnitude 5.0	
Earthquake	September 26, 2010	Boscawen, NH	Magnitude 3.1	
Earthquake	October 16, 2012	Hollis Center, ME	Magnitude 4.0; felt in Berlin, but no reported damage.	



Type of Event	Date of Event	Location	Description	Source
<b>F. Drought:</b> Drought is generally less damaging and disruptive than floods and other hazards and is more difficult to define. A drought is a natural hazard that evolves over months or even years and can last as long as several years to as short as a few months. According to the NH State Hazard Mitigation Plan, New Hampshire has a low probability, severity, and overall risk for drought. Droughts have the potential to impact the community on a citywide basis. No significant droughts have occurred in Berlin since the Summer of 2021.				
A summary of drought in the state & regionwide				
Drought	1775, 1840, 1882, 1910's, 1929-1936, 1939-1944, 1947-1950, 1960-1969, 1999; 2001-2002, 2016-2017, 2020-2021		Occurrences of serious droughts in recorded New Hampshire history.	State of NH Multi-Hazard Mitigation Plan, Update 2018
A summary of drought in the community since 1929				
Drought	1929-1936	Statewide	Regional	State of NH Multi-Hazard Mitigation Plan, Update 2018 & 2024 HMPT
Drought	1939-1944	Statewide	Severe in the southeast and moderate elsewhere	
Drought	1947-1950	Statewide	Moderate	
Drought	1960-1969	Statewide	Regional longest recorded continuous spell of less than 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 Berlin with the loss of a few dug wells and springs.	
Drought	2020-2021	Statewide	Declared drought for the summer of 2020 and into 2021, moderating from extreme in southern New Hampshire to dry in the most northern communities. The drought affected Berlin with the loss of a few dug wells and springs.	
<b>G. Miscellaneous Past or Potential Hazards:</b> Natural, technological, and human-caused hazards and other unusual hazardous events have been noted throughout New Hampshire. Among others, one concern is transporting hazardous material through communities by rail and tractor-trailer. Other natural, technological, or human-caused hazards have the potential to impact the community on a citywide basis. Covid-19 is currently ongoing in Berlin.				
Hailstorm	Summer of 2014	City Wide	An unusual hailstorm hit Berlin, causing minor property and vehicle damage	2016 HMPT
Severe Thunder & Lightning	Past	Several Locations	Lightning has struck several buildings in Berlin. A building on Jericho Road was struck by lightning and destroyed. The antenna at the Fire Station was struck, and the radio systems were taken out. St. Anne's Church was struck by lightning, causing slate shingles to fall off the roof. A home on Washington Street was struck in 2014.	2016 HMPT
Extreme Temperatures	Winter 2014-2015	City Wide	Berlin experienced a colder-than-usual winter. There were problems with the City's water system; 250 homes had to have their waterlines thawed; the ground had 6-7' of frost.	2016 HMPT

Type of Event	Date of Event	Location	Description	Source
<b>Infectious Disease</b>	January 20, 2020 – ongoing	All Ten NH Counties	<p><b>Major Disaster Declaration, DR-4516:</b> The Federal Emergency Management Agency ("FEMA") within the US Department of Homeland Security is giving public notice of its intent to assist the State of New Hampshire, local and tribal governments, and certain private nonprofit organizations under the major disaster declaration issued by the President on April 3, 2020, as a result of the Coronavirus Disease 2019 ("COVID-19").</p> <p>In the early stages of the pandemic, public buildings were shut down, and all employees worked from home. The first case in June 2020 was at the Fire Station. Four members had to quarantine at the Fire Station for four days; others quarantined at home. City Hall reopened in July 2020 with precautions and improved ventilation (still used). An alternated public works force (typically 30 daily) 1/2 stayed home until the threat of everyone getting sick diminished. They staggered workdays for the DPW to ensure distancing. Schools developed a hybrid schedule for the fall and, with added precautions, went back in early winter.</p>	FEMA & 2024 HMPT
<b>Infectious Disease</b>	January 20, 2020 – ongoing	All Ten NH Counties	<b>Emergency Declaration EM-3445:</b> Ten county declaration to provide individual assistance and public assistance as a result of the impact of COVID-19	FEMA & 2024 HMPT
<b>Landslide, Erosion &amp; Mudslide</b>	Potential	Hillside near Godfrey Dam	There is potential for a landslide to occur near the Godfrey Dam in the Kilkenny Range (public water source), which could damage a water transmission line.	2016 HMPT
<b>Landslide, Erosion &amp; Mudslide</b>	Potential	City Wide	Due to erosion, there is potential for aging retaining walls throughout the City to cave in. Due to the steepness of the terrain, many of these walls built many years ago hold back substantial development. One wall on East Milan Road adjacent to Androscoggin River could damage the road if it failed.	2016 HMPT
<b>Landslide, Erosion &amp; Mudslide</b>	Potential	City Wide	The potential for new ATV/Snowmobile trails to erode, particularly on the trails to Mount Jasper, could affect the infrastructure near High School.	2016 HMPT
<b>Flooding (dam failure)</b>	Potential	Jericho Lake Dam	Depending on the degree of the breach, damage to structures could occur if the earthen dam at Jericho Lake failed. A large floodplain could mitigate some of the impact.	2016 HMPT

Type of Event	Date of Event	Location	Description	Source
Flooding (dam failure)	Potential	Aziscohos Dam	A dam failure upstream at the Aziscohos Dam (a controlled dam) could devastate the City of Berlin; other dams could fail in a domino effect. Although it is expected to take five days to reach Berlin, the flood waters could submerge the White Mountains Community College, Main Street, and a good part of downtown Berlin. It is predicted that it will follow the 100-year floodplain.	2016 HMPT
H. Other Hazards: Identified hazards with no specific example of occurrence.				
Natural Hazards		<p>Although the team did not identify specific examples or past occurrences of these hazards, it felt worthwhile to list them as potential hazards to the City. These hazards can potentially impact the community locally or on a citywide basis.</p> <p>See <i>Table 3.1, Hazard Threat Analysis</i>, and Chapter 5 for more details on these hazards.</p>		
Solar Storm & Space Weather				
Technological Hazards				
Aging Infrastructure				
Conflagration				
Hazardous Materials				
Known & Emerging Contaminants				
Human-caused				
Transport Accidents				
Cyber Events				
Mass Casualty Incidents				
Terrorism & Violence				

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

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

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

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

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

Emergency Response Facilities (ERF)			
ERFs are primary facilities and resources that may be immediately needed during an emergency response.			
Facility	Expected use of the Facility	Hazard Risk	
Police Station (generator)	Primary EOC & Law Enforcement	All Hazards & HazMat Transport	2
Berlin Fire Station (generator)	Secondary EOC & Fire/EMS	All Hazards	1
Berlin Ambulance (generator)	EMS	All Hazards	1
Androscoggin Valley Hospital (generator)	Medical Services	All Hazards & Wildfire, HazMat Fixed	2
Public Works Garage (generator)	Heavy Equipment, Sand, Gravel	All Hazards & HazMat Transport	2
Berlin High School (partial generator)	Primary Shelter	All Hazards & Wildfire	1
Towers on Cates Hill	Communications	All Hazards & High Winds, Wildfire	2
City Hall (no generator)	Public Health & City Government	All Hazards & Flood	1
Helicopter Landing Zones (ERFH)			
Androscoggin Valley Hospital	Helicopter Landing Zone	All Hazards & Wildfire, HazMat Fixed	2
Berlin Ball Fields	Helicopter Landing Zone	All Hazards	1
Berlin Municipal Airport (Milan)	Helicopter Landing Zone	All Hazards	1
Jericho Mountain State Park (several)	Helicopter Landing Zone	All Hazards & Wildfire	2
Bridges and Culverts on the Evacuation Routes or Access Routes to Evacuation (ERFB)			
Cleveland Bridge @ Androscoggin	Bridge on Evacuation Route	All Hazards	1
Main Street Bridge @ Dead River	Bridge on Evacuation Route	All Hazards & Flooding	2
East Milan Road @ Horne Brook	Bridge on Evacuation Route	All Hazards & Flooding	1
Hutchins Street @ Bean Brook	Bridge on Evacuation Route	All Hazards & Flooding	1
Coos Street Box Culvert	Bridge on Evacuation Route	All Hazards & Flooding	1
Twelfth Street Bridge @ Androscoggin	Bridge to the Evacuation Route	All Hazards	1
Cole Street Bridge @ Dead River	Bridge to the Evacuation Route	All Hazards & Flooding	2
Mason Street @ Androscoggin (span 1)	Bridge to the Evacuation Route	All Hazards	1
Mason Street @ Androscoggin (span 2)	Bridge to the Evacuation Route	All Hazards	1
RR Bridge Cascade Hill @ Androscoggin	Bridge to the Evacuation Route	All Hazards	1
Footbridge on Bridge Street @ Androscoggin	Bridge to the Evacuation Route	All Hazards	1
Pleasant Street @ Dead River	Bridge to the Evacuation Route	All Hazards & Flooding	2

Emergency Response Facilities (ERF)			
Evacuation Routes			
NH Route 16	Primary Evacuation Route	All Hazards & Flooding	2
NH Route 110	Primary Evacuation Route	All Hazards & HazMat Transport	1
East Milan Road	Primary Evacuation Route	All Hazards	1
Hutchins/Coos Street	Primary Evacuation Route	All Hazards	1
Success Pond Road	Secondary Evacuation Route	All Hazards & Flooding	1
Western Avenue	Secondary Evacuation Route	All Hazards	1

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

Non-Emergency Response Facilities (NERFs)			
NERFs are facilities that, although critical, are not necessary for immediate emergency response efforts; this includes facilities to protect public health and safety, utilities, and backup to emergency facilities.			
Facility	Expected use of the Facility	Hazard Risk	
Berlin Water Works (Willow Street) <i>*Water Works has five backup generators</i>	Water Department	All Hazards	1
Berlin Water Works (St. Laurent Lane)	Water Treatment Plant (Primary)	All Hazards & Wildfire	1
Berlin Water Works (East Milan Road)	Water Treatment Plant (Off-line); Aquifer and Wells; active backup supply	All Hazards & HazMat Transport	2
Wastewater Treatment Plant (Shelby Street) <i>*Water Pollution has eight backup generators</i>	Wastewater Treatment & Main Office	All Hazard	1
Watson Street Pump Station	Wastewater Pump Station (Primary)	All Hazards & Flooding	3
Berlin Recreation Department (generator)	Secondary Shelter	All Hazards & HazMat Transport	2
Substation	Electric	All Hazards	1
Brookfield Power (main control office)	Flow of river north of Berlin	All Hazards & Flooding	2
Consolidated Communications	Communications	All Hazards	1

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

Facilities & People to Protect (FPP)			
FPPs are facilities that must be protected because of their importance to the City and residents who may need help during a hazard event.			
Facility	Expected use of the Facility	Hazard Risk	
Androscoggin Valley Hospital	Patients & Staff	All Hazards & Wildfire, HazMat Fixed	2
Berlin Elementary (Hillside Avenue, no generator)	School – K-5	All Hazards	1



Facilities & People to Protect (FPP)			
FPPs are facilities that must be protected because of their importance to the City and residents who may need help during a hazard event.			
Facility	Expected use of the Facility	Hazard Risk	
Berlin Middle/High School (Willard Street, partial generator)	School – 6-12	All Hazards & Wildfire	1
Tri-County Head Start (Sullivan)	School	All Hazards	1
White Mountains Community College (no generator)	Community College	All Hazards & Flooding, HazMat Fixed	2
Day by Day (Pleasant Street)	Child Care	All Hazards	1
Mini Mounties (Berlin Middle/High School)	Child Care	All Hazards & Wildfire	1
Enrich Learning Center (ELC) (Exchange Street)	School	All Hazards & HazMat Transport	2
Kids Only (Main Street)	Child Care	All Hazards	1
St. Kieran's Community Art Center (Emery)	Gathering of People	All Hazards	1
Service Credit Union Heritage Park (Main)	Gathering of People	All Hazards	1
Notre Dame Arena	Gathering of People	All Hazards & Flooding, HazMat Transport	2
White Mt. Chalet (E. Milan Road)	Gathering of People	All Hazards & Flooding, Wildfire	1
Northern NH Correctional Facility	Prison	All Hazards & Wildfire	1
FCI Berlin	Prison	All Hazards & Wildfire	1
St. Anne's Church (Historic Register)	Historic Significance	All Hazards & Lightning	1
Russian Orthodox Church (Historic Register)	Historic Significance	All Hazards	1
United Methodist Church (Historic Register)	Historic Significance	All Hazards	1
Logging Piers-Heritage Park	Historic Significance	All Hazards & Flooding	1
Brown House - Heritage Park (Historic Register)	Historic Significance	All Hazards	1
St. Vincent de Paul (Providence Avenue)	Nursing Home & Rehab	All Hazards	1
Coos County Nursing Home (Cates Hill Road)	Nursing Home	All Hazards & Wildfire	1
St. Regis House (Main Street)	Elderly Living	All Hazards	1
Northern Lights (25 Success Street)	Elderly Housing	All Hazards	1
Berlin Housing Authority (Cole)	Elderly Housing	All Hazards & HazMat Transport	2
Notre Dame Housing (School)	Elderly Housing	All Hazards	1
Cornerstone Housing (Main)	Elderly Housing	All Hazards & Flooding	2
Verdun Street Home (Verdun Street)	Group Home	All Hazards	1
Brookside Housing (Maynesboro)	Housing Project	All Hazards & Wildfire	1
Northern Human Services (Willard)	Functional Needs Population	All Hazards	1

Facilities & People to Protect (FPP)			
FPPs are facilities that must be protected because of their importance to the City and residents who may need help during a hazard event.			
Facility	Expected use of the Facility	Hazard Risk	
Nansen Ski Jump (Milan)	Historic Significance	All Hazards & Wildfire	1
Berlin Housing Authority (Church)	Elderly Housing	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 hazard event. Below is a list of local potential resources; for a complete list of potential resources, please refer to the Berlin Emergency Operations Plan (2020)	
Resource	Expected use of the Resource
Berlin School System Busses (SAU3)	Mass Transportation
Tri-County Cap	Mass Transportation
Caron Building Center	Lumber & Materials
White Mountain Lumber	Lumber & Materials
Rockingham Electric	Electrical Supplies
Couture Construction	General Contractor
AD Excavating	Heavy Equipment, Sand, Gravel
Presby Steel	Steel supply and manufacturing
Capone Industries	Steel supply and manufacturing
White Mt. Ridge Runners	Snowmobiles-Transportation
Androscoggin Valley ATV	OHRV-Transportation
State Prison	Human Resources
FCI Prison	Human Resources
Local Businesses	Human Resources
American Red Cross	Human Resources
Public Works/Fire Dept. other City employees	Human Resources
Neighboring Towns	Human Resources
NH DOT Division 1	Human Resources
Pharmacies & AVH	Medical Supplies
Nursing Homes	Medical Supplies
Coos County Family Health	Medical Supplies
Berlin Public Works	Can supply fuel remotely; fill up at Irving and supplies the City departments; Sand, Gravel & Heavy Equipment (portable generators at the Water Department)

Potential Resources (PRs)	
PRs are potential resources that could be helpful for emergency response in the case of a hazard event. Below is a list of local potential resources; for a complete list of potential resources, please refer to the Berlin Emergency Operations Plan (2020)	
Resource	Expected use of the Resource
NH DOT (Gorham)	Gasoline, diesel
National Guard Armory	Not being used now; could be reactivated
Berlin Schools	Food & Water
Nursing homes and senior meal sites	Food & Water
Local grocery for non-perishables	Food & Water
Pharmacies	Food & Water
City Fire Trucks (2)/500-gallon tanks	Water (non-potable)
WMUR	TV & Radio - Public Information

**TABLE 4.5 – CLASSIFIED DAMS**

Dams	Hazard Classification	Owner
Cross Power Dam	High Hazard	Brookfield Renewable
Smith Hydro Dam	High Hazard	CRP NH Smith LLC
Dead River Dam 1	High Hazard	NH DNCR
Godfrey Dam	Significant Hazard	City of Berlin
Riverside Hydro Dam	Low Hazard	Brookfield Power
Sawmill Hydro Dam	Low Hazard	Brookfield Power
York Pond Dam	Low Hazard	NH Fish & Game
Alpine Cascade Brook Dam	Low Hazard	Gorham Paper & Tissue
Dead River Dike	Low Hazard	NH DNCR
Bean Reservoir Dam	Non-menace	City of Berlin
Diversion Pond Dam	Non-menace	NH Fish & Game
Cold Brook Dam	Non-menace	NH Fish & Game
Flat Pond Dam	Non-menace	NH Fish & Game
West Branch Dam	Non-menace	NH Fish & Game
Cold Brook Dam III	Non-menace	NH Fish & Game
Cold Brook Dam ii	Non-menace	NH Fish & Game
Upper Trail Pond Dam	Non-menace	NH Fish & Game
No Name Pond Dam	Non-menace	NH Fish & Game
<p>All dams are expected to be at risk for inland flooding. In addition to the dams listed above, DES lists eight additional dams classified as ruins, exempt, or removed.</p>		

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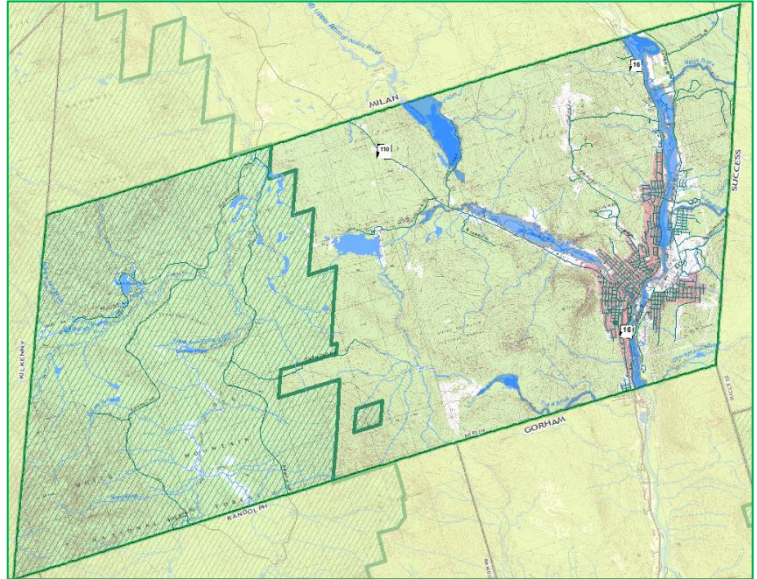
## Chapter 5: Hazard Effects in Berlin

### ***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 wildfire risk is also important, as the City is heavily forested.

#### ***Overall Flood Risk***

Berlin's CIKR were identified and listed in Chapter 4; each CIKR was analyzed for its flooding potential. This analysis and the transparent blue area in the GIS map snip to the right indicate the floodplain. The light red shading in the map represents Berlin's downtown areas, while the green hash-marked section in the west is the White Mountains National Forest. Multiple bridges are in the flood zone, but most of the City's CIKRs are outside. The 2.04 square miles of the flood zone make up approximately 3.3% of the total land area in Berlin.



When working on Table 4.1 and Table 4.2, it was noted that none of the Emergency Response Facilities (ERFs) are within the flood zone.

However, at least two Non - Emergency Facilities (NERFs), the Watson Street Pump Station and Brookfield Power's main control office, are at risk for flooding. Several bridges were also noted, the Main, Cole, and Pleasant Street Bridges, all over the Dead River. NH Route 16, a primary evacuation route, was also noted as being at a higher risk for flooding.

Table 4.2, Facilities & People to Protect (FPPs), indicates that the White Mountain Community College, the Notre Dame Arena, and Cornerstone Housing may also be at some level of flood risk. It is expected that there may be other structures and homes within the flood zone. City officials should consider all at-risk properties when a flood hazard is likely. For more information, please refer to Chapter 4, Tables 4.1-4.4, and Section C, Inland Flooding, this Chapter.

#### ***Overall Wildfire Risk***

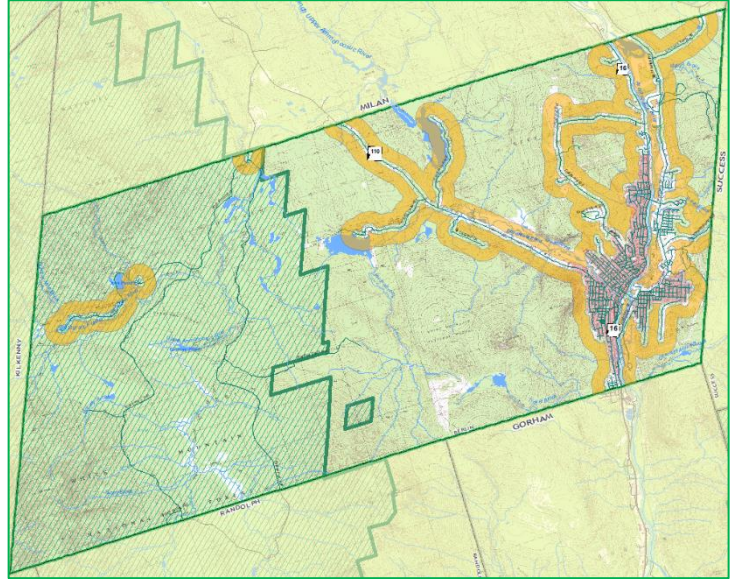
CIKR falling within the Wildland Urban Interface (WUI) were reviewed using the same methodology as flooding. Identifying these facilities helped the team create and prioritize wildfire mitigation action items.

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



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

As seen in the map snip, there are several dead-end streets in Berlin, some of which may have higher than average wildfire risk due to the distance between structures, the number of old-growth softwoods that line the streets, and of course, the lack of a second egress. The map image does not include Class VI private roads.



Using GIS, three of Berlin's CIKRs were found in the traditional WUI, the Pollution Control Facility, the Androscoggin Valley Regional Refuse Disposal Center, and the Berlin Middle High School and Library. CIKR at high risk for wildfires, not identified through GIS, were identified through team discussion while creating Tables 4.1-4.4. These include the Androscoggin Valley Hospital, the Berlin Middle High School, the communications tower on Cates Hill, Jericho Mountain State Park, Berlin Water Works, the White Mountain Chalet, the Northern NH Correctional Facility, FCI Berlin, the Coos County Nursing Home, Brookside Housing, and the Nansen Ski Jump complex (Milan). The most concerning of these would be the nursing homes, the hospital, and the prisons; these facilities are surrounded by forests and are likely to have immobile residents. The remaining primary facilities are within the 300' WUI buffer of roadways, therefore easily accessible by fire apparatus and hoses. Most of the City's CIKR have adequate defensible space.

It is expected that many additional structures in Berlin would be prone to wildfires, particularly, as suggested above, in neighborhoods with limited egress and a canopy of old-growth trees or where forests completely surround structures. Because Berlin is so forested outside of the city center, it can be assumed that many structures in Berlin are within the Wildland Urban Interface. Mitigation strategies were discussed to protect structures and educate the citizens about the wildfire risk. For more information, please see Tables 4.1-4.4 and Section C, Wildfires, in this Chapter.





## 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 City's structures. Structure damage depends on the nature of the hazard and whether or not the impact is localized.

MS-1 Assessed Value of All Structures Provided by the City on March 6, 2023			
Building Type	Value	1% Damage	5% Damage
<i>Residential</i>	\$401,257,860	\$4,012,579	\$20,062,893
<i>Manufactured Housing</i>	\$3,000,400	\$30,004	\$150,020
<i>Commercial</i>	\$45,672,157	\$456,722	\$2,283,608
<i>Tax Exempt</i>	\$510,449,228	\$5,104,492	\$25,522,461
<i>Utilities</i>	\$176,672,800	\$1,766,728	\$8,833,640
<b>Totals</b>	<b>\$1,137,052,445</b>	<b>\$11,370,524</b>	<b>\$56,852,622</b>

This plan assumes that the potential loss from the identified natural hazards would range from **\$0 to \$11,370,524** or **\$11,370,524 to \$56,852,622**, based on the 2022 MS1 total structure value of **\$1,137,052,445**. (See chart above)

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

## C. NATURAL HAZARDS

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

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

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) SEVERE WINTER WEATHER

Hazard Identification & Risk Assessment (HIRA)..... High  
 Probability..... Very High  
 Estimated Structure Loss Value ..... \$11,370,524 to \$56,852,622

#### **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. The effects of past winter storms felt in Berlin are power outages, extreme cold, and impacts on infrastructure. These impacts are a risk to the community, including isolation, especially to the elderly (18.8%) and other vulnerable populations. In addition, the ability to get in and out of the City 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.

As shown in Table 3.2, snowstorms and nor'easters have previously struck Berlin, but the Department of Public Works (DPW) could keep up with the accumulation. Fortunately, no debilitating snow or ice storms have occurred since the prior hazard mitigation plan. However, a major disaster declaration for Coos County due to a December 2022 snow event may be forthcoming from FEMA.

Although Berlin's Department of Public Works handles usual snow amounts without difficulty, Berlin's roads are often impacted by poor weather conditions. Travel can be difficult with heavy traffic, particularly on Routes 16 and 110, which are the state's responsibility; poor road conditions may hinder fire and other emergency responses.

The team reported that rain and sleet are more prevalent than high-accumulation snowstorms, possibly due to climate change. The number of below-zero days has also decreased. An annual average of about 75 inches of snow falls yearly, although 114 inches were recorded at the Pollution Control facility in 2018. Although heavy snow years and 1-2 foot storms burden the DPW, the department can deal with the accumulations.

Major Disaster Declaration #4693 was declared after the team's review period. No information was provided about this storm in Berlin. It is assumed that there was no significant impact on the City.

### ***Ice Storms***

Unlike typical snowstorms, which are generally handled well by the Department of Public Works, ice storms present significant problems. 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. Downed power lines and fallen trees make it difficult for the highway crew and emergency responders. School buses are also at risk.

There have been significant ice storms in New Hampshire, but there was no damage in Berlin in three of the most significant events (1979, 2008, and 2010). The 1998 Ice Storm, however, inflicted significant damage to the higher elevations (over 1,000 feet) of Berlin, causing ice on trees, downed power lines, closed roads, limited EMS access, and power outages. Mt. Forist was particularly hit hard. Cates Hill Road was closed during the 1998 Ice Storm, but other parts of the city were also impacted. Power outages lasted more than a week in some areas. The lumber industry was hit hard by the 1998 Ice Storm throughout Berlin and all of Coos County. Slash from this storm remains on the forest floor, a potential fuel for future wildfires.

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

## 2) EXTREME TEMPERATURES

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

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

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

Berlin has a relatively high elderly population (18.8%) and a high poverty rate (13.9%)<sup>18</sup>, making it one of the more susceptible communities in the region to the impacts of extreme temperatures. In addition, much of the housing stock in Berlin dates to the 1930s, so most homes do not have central air conditioners. No malls or city pools are available during extended heat waves, although the Recreation Center (see Action Item #8) is the designated cooling and warming center. Relief can be found at Jericho Lake; however, there is no public transportation to the lake.

The team reported that the City is likelier to experience extreme heat conditions, as winters seem milder. Extreme heat conditions, which seem more likely with climate change, bring temperatures above 95° for a week or more and can impact the elderly and other vulnerable populations. Some residents, particularly vulnerable populations, do not have air conditioners and are less able to cope with extreme heat. Since the prior hazard mitigation plan, no deaths or illnesses due to cold or heat have been reported in Berlin.

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

When combined with power failure, extreme temperatures are of the most concern; power failure could result in no water, heat, or air conditioning for the City's most vulnerable populations. City officials and the community as a whole should be concerned; they should look after their citizens to ensure that extreme temperatures do not create a life or property-threatening disaster. The City provides warnings and recommendations regarding extreme temperatures on the Emergency webpage and other social media. It has designated the Recreation Center as the "cooling or warming center (Action Item #8).

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 in 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.

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<sup>18</sup> Relative to 65+ and poverty rates in the region

### 3) INFECTIOUS DISEASES

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

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

*Some infectious diseases can be passed from person to person. Some are transmitted by bites from insects or animals. And others are acquired by ingesting contaminated food or water or being exposed to organisms in the environment.”<sup>19</sup>*

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



Berlin’s unique geography provides hikers, OHRVers, and summer and winter recreation enthusiasts many opportunities to visit the City. The City’s population shows a modest increase during summer and winter, although day traffic at Jericho Mountain State Park is significant. Children from other towns attend school in Berlin, and transient visitors arrive to visit not only the elderly population but also the two prisons that are in the City. With four extensive and one small elderly or subsidized housing facility and the federal and state prisons, visitors, employees, and residents are at a greater risk for influenza and other epidemics. Nearly every year, Berlin EMS is overwhelmed by the number of influenza victims that need transport to local and area hospitals.

Several facilities in Berlin hold events and activities that could increase the likelihood of spreading infectious diseases, including elementary schools, churches, meeting houses, and social facilities. The Berlin Middle/High School enrolls students from other towns in the north country, such as Dummer and Milan. Interactions between students and out-of-town sports teams and clubs can also bring infectious diseases.

With assistance from public health networks, city officials did their best to mitigate the onset of Covid-19 in Berlin. To help mitigate the crisis, City Hall initially closed and later reopened with mitigation measures in place. The public library was closed for a while, and initially, the schools went virtual, returning to a hybrid learning system in the fall. The City continues encouraging social distancing and protecting the City’s most vulnerable citizens.

<sup>19</sup> Infectious diseases, Overview, <https://www.mayoclinic.org/diseases-conditions/infectious-diseases/symptoms-causes/syc-20351173>

Berlin was very proactive in planning and operations during the pandemic. Developing a working group of key people from the City (the EMD), the hospital, the prison, the schools, and the long-term nursing facilities helped manage the response to the pandemic. Berlin was the first community in New Hampshire to go door to door with vaccines, working collaboratively with nursing students and the White Mountains Community College. The EMD and other support professionals established a vaccination center at the vacant Brown School. The DPW staggered their working hours to ensure a healthy workforce. Breakouts of the disease struck the Coos County Nursing Home, St. Vincent's, and the prisons.

As of March 2, 2023, 377,661 Covid-19 cases, 2,995 deaths, and 744 new cases were reported in the State of New Hampshire (see the chart on the right).<sup>20</sup> Deaths by the community are no longer available, but it was reported that there were 2,937 cumulative cases in Berlin, 8,331 cumulative cases in Coos County, and 134 cumulative deaths in Coos County.<sup>21</sup>

### COVID-19 Summary Report

(data updated as of March 2, 2023, 9:00 AM)

NH Total Case Count	377,661
New Cases for the Previous Week	744
Deaths Attributed to COVID-19	2,995
Total Current COVID-19 Cases	930
Current Hospitalizations Treated for COVID-19	30

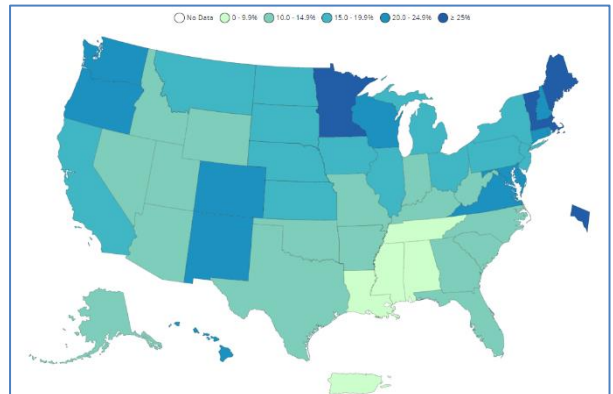
On March 8, 2023, the Center for Disease Control (CDC) reported 1,117,856 Covid deaths in the United States since the pandemic began.<sup>22</sup>

Covid-19, specifically the Omicron BA.5 and its variants, has raised concerns in New Hampshire, the United States, and the world. The virus has consistently changed since early 2020, and in late 2022, it seemed the deadly Delta was behind us, and the fast-spreading Omicron variants and subvariants seemed to be here to stay. Testing and vaccines are helping to keep severe illness to a minimum; vaccines are available for all persons, including young children and toddlers. Although vaccination rates continue to climb slowly, a portion of the public remains unwilling or unable to be vaccinated, thus increasing the threat to our hospital systems. Unvaccinated individuals continue to represent the majority of hospitalizations, severe illnesses, and deaths.

The CDC reported on March 1, 2023, that 81.2% of the US population had received at least one vaccine dose, 69.3% had completed the primary vaccine series, and 16.2% had received the updated (bivalent) booster dose.<sup>23</sup>

The CDC recommends that adults, particularly those who are medically compromised or over 65, receive two doses, two boosters, and a recently introduced vaccine that includes protection from the Omicron BA.5 variant and subvariants. Recommendations for children are slightly different.

The map to the right from the CDC shows the percentage of the population five years or older with an Updated (Bivalent) Booster Dose.<sup>24</sup> The darker the color, the more vaccines have been administered.



<sup>20</sup> <https://www.covid19.nh.gov/>

<sup>21</sup> <https://www.covid19.nh.gov/dashboard/map>

<sup>22</sup> <https://covid.cdc.gov/covid-data-tracker/#datatracker-home>

<sup>23</sup> [https://covid.cdc.gov/covid-data-tracker/#vaccinations\\_vacc-people-second-booster-pop65](https://covid.cdc.gov/covid-data-tracker/#vaccinations_vacc-people-second-booster-pop65)

<sup>24</sup> total doses administered reported to the CDC by State/Territory and for the Select Federal Entities per 100,000 of the total population; [https://covid.cdc.gov/covid-data-tracker/#vaccinations\\_vacc-people-booster-percent-pop5](https://covid.cdc.gov/covid-data-tracker/#vaccinations_vacc-people-booster-percent-pop5)



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

#### **4) INLAND FLOODING**

Hazard Identification & Risk Assessment (HIRA).....	High
Probability.....	Very High
Estimated Structure Loss Value .....	\$11,370,524 to \$56,852,622

#### ***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. Additionally, timber harvesting, if conducted improperly, undersized or aging culverts, and inadequate ditching are possible causes of local road flooding.

Based on the Coos County Floodplain Map and as described in Chapter 3, Section D, Berlin has a relatively small 100-year floodplain, with approximately 3.3% of the land in the floodplain. The floodplain is mainly along the Androscoggin and Dead Rivers. 100-year flood events are not common occurrences in Berlin. Table 3.2 details the inland flooding events, but no significant events have occurred since October 2017.

During the October 2017 storm, floodwaters impacted Derrah, Hutchins, Enman Hill, Forbush, Hillsboro, Coos, Grafton, and Howland roads. Winds brought down trees and power lines, causing local outages in the community. FEMA post-disaster funding was received for road work.



***Howland Street, October 2017  
Photo Credit: City of Berlin***

Specific areas of Berlin experience flooding from time to time. Watson Street and Glen Avenue (near the Irving Gas Station) are two areas that often experience floods from both heavy rains and, at times, riverine flooding. The Industrial Park road has experienced flooding two to three times in recent years. The City's sanitation system can also experience flooding with heavy rain events.

Improving the drainage systems in the area of "Moxie Alley" between Pleasant and Main Streets to mitigate flooding and damage to some Main Street buildings was an action item in the prior plan and this one (Action Item #29). This area, near the confluence of the Dead and Androscoggin Rivers, can be problematic during heavy rain events or, more significantly, should a significant dam failure occur upstream.



The Dead River flows to the Androscoggin River under residential and business buildings and Main Street; it includes at least a 25' by 12' aging box culvert. The existing culvert shows signs of collapse, and a part of Main Street is sinking. The river is up against the foundations of some buildings, causing damage and undermining structural integrity. The entire channel under Main Street needs to be rechanneled to combat flooding issues, aging infrastructure, and structural erosion.

While staying within its budget, the Department of Public Works has been proactive in maintaining and repairing 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, *The Mitigation Action Plan*.



**Main Street Berlin; Dead River flooding, 1953**  
**Photo Credit: City of Berlin**

The Department of Public Works cares for 60 miles of paved roads without gravel roads. In addition, the state maintains small portions of NH Routes 16 and 110. Nonetheless, significant rain, particularly if combined with rapid snow melt, can cause considerable damage to Berlin's roads.

Flooding can be severe enough to take out utilities and create areas of the City that become inaccessible to emergency responders. The expected loss value from inland flooding would be based on the cost of repairing roadways and the potential cost of damage to structures. 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.

## 5) TROPICAL & POST-TROPICAL CYCLONES

Hazard Identification & Risk Assessment (HIRA)..... Medium  
 Probability..... Moderate  
 Estimated Structure Loss Value ..... \$11,370,524 to \$56,852,622

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

Tropical Storm Irene, in August 2011, brought heavy rain and local flooding to Berlin. Several trees were downed, as were some power lines, although no roads were closed, and no significant power outages occurred. The sanitation collection system flooded and caused some damage to this critical facility, but no significant mechanical damage. The Lancaster Street area flooded during Irene because of an unmaintained culvert, which resulted in flood waters reaching several homes. In addition, with the heavy rains of Irene, ground erosion caused some transmission lines to be exposed; the City had to rebuild the shoreline and encase the lines.

For the most part, the City's bridges and roads held up during Tropical Storm Irene, and there was little or no impact from Tropical Storm Sandy in 2012, except for heavy rains. The City's dams also held up during Irene, although a wingway at Godfrey Dam gave way. Since the prior hazard mitigation plan, no tropical or post-tropical cyclones have reached Berlin.

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

## 6) HIGH WIND EVENTS

Hazard Identification & Risk Assessment (HIRA)..... Medium  
Probability..... Low  
Estimated Structure Loss Value ..... \$0 to \$11,370,524

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

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

High winds often occur in Berlin due to Berlin's location at the foothills of New Hampshire's White Mountains. Berlin's topography lends itself to down drafts, whether coming down from Jericho Mountain, Cates Hill, Mt. Forist, or the slopes of the Mahoosuc Range east of the Androscoggin River. The team also noted that the power companies have recently increased their trimming efforts. The Department of Public Works and the power companies repeatedly remove downed trees.

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

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

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

Microbursts are becoming more frequent and often result in damage. Like high winds, the effects would be primarily power outages and blowdowns; however, if a tornado, microburst, or macroburst were severe enough, property damage could also occur. In Berlin, a microburst would be more likely than a tornado.

In the past, Berlin has experienced minor downbursts that resulted in isolated property damage. One example was a 2010 tornado that touched down but caused only minor tree and property damage. The high elevations in Berlin and the surrounding mountains could deter the occurrence of tornadoes but may contribute to the formation of downbursts. Berlin has had no reports of microbursts or tornadoes since the previous hazard mitigation plan.

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

## 7) WILDFIRES

Hazard Identification & Risk Assessment (HIRA)..... Medium  
 Probability..... Low  
 Estimated Structure Loss Value ..... \$11,370,524 to \$56,852,622

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 Berlin.

The team described the forests of Berlin as consisting primarily of mixed forests. Some fires are felt to be “duff” fires, the burning of *“the layer of decomposing organic materials lying below the litter layer of freshly fallen twigs, needles, and leaves and immediately above the mineral soil.”*<sup>25</sup> However, with climate change, drought no longer has a low probability in New Hampshire, and more fires are likely to be surface fires. Burn permits are required in Berlin, as they are throughout the state, but often, burning occurs without the proper permits. Sometimes, it’s difficult for the fire department to monitor all conditions, and the occasional unauthorized burn will occur.

The team noted that two relatively small wildfires have occurred in Berlin since the completion of the last plan. One four-acre fire in Tinker Brook, spotted by a helicopter and called into the Berlin Fire Department, was more difficult to fight due to drought conditions in 2020. NH Forests and Lands assisted in putting this human-caused fire out after four days. Another small fire, in the area of Tinker Brook, occurred in 2020 when an unattended campfire caused a .25-acre fire on private land. This fire was quickly extinguished.

The largest fire in memory was the Cascade Fire (Gorham), which scorched approximately 100 acres in 2005. The Cascade Fire was thought to have been started by contractors who had started a small fire with either a cutting torch or cigarette; Berlin received the first call for this fire and assisted the City of Gorham and other mutual aid companies with fire suppression. Please see Table 3.2, Section B, Wildfires, for the history of wildfires in the City.

<sup>25</sup> <http://www.fs.fed.us/nwacfire/home/terminology.html>

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

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

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

### **8) EARTHQUAKES**

Hazard Identification & Risk Assessment (HIRA).....	Low
Probability.....	Very Low
Estimated Structure Loss Value .....	\$11,370,524 to \$56,852,622

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

The Berlin earthquakes occurred just five kilometers north of the City. No damage was reported as a result of either of these earthquakes. In October 2012, an earthquake with its epicenter in Hollis, ME, and a magnitude of 4.6 on the Richter scale occurred. The tremor was felt in most of New England and Berlin, but no damage was reported. Many small earthquakes such as this one frequently occur in New Hampshire.

Berlin has an older collection of brick public facilities – the Fire Station, the Library, the City Hall, and the Police Station – which makes them more susceptible to earthquakes. In addition, a pipeline (natural gas) and a penstock (water) travel through the City. Concrete dams also have a lower risk tolerance for earthquakes than earthen dams; three concrete dams are located along the Androscoggin River in Berlin. The biomass plant and the wastewater treatment facility's underground piping would also be susceptible, as would the five wind turbines in Jericho.

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

## 9) SOLAR STORM & SPACE WEATHER

Hazard Identification & Risk Assessment (HIRA)..... 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.”<sup>26</sup>*

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 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), affecting 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.

The Berlin planning team felt that recognizing Solar Storms and Space Weather was necessary for this hazard mitigation plan. However, they also understand that the City cannot truly mitigate this hazard; continued education, situational awareness, and monitoring of such events is the most they can do.

## 10) DROUGHT

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

An extended period without precipitation or drought 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.”<sup>27</sup>* A concern is that more frequent and longer-lasting droughts will occur with climate change. Only four significant droughts occurred before 2000, while three have occurred in just the past six years (2016, 2020, and 2022). In addition, drought conditions contributed to damage to the local forests and increased the risk of wildfire.

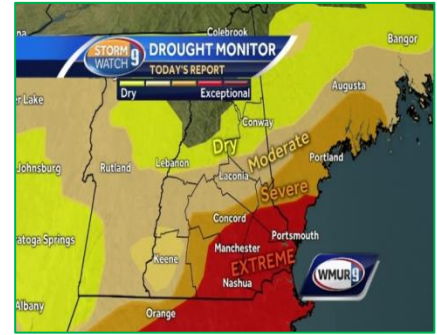
<sup>26</sup> What is space weather? [https://www.nasa.gov/mission\\_pages/sunearth/spaceweather/index.html#q2](https://www.nasa.gov/mission_pages/sunearth/spaceweather/index.html#q2)

<sup>27</sup> <https://www.des.nh.gov/climate-and-sustainability/storms-and-emergencies/drought#:~:text=In%20actuality%2C%20New%20Hampshire%20experiences,11%20of%20those%20%20years.>



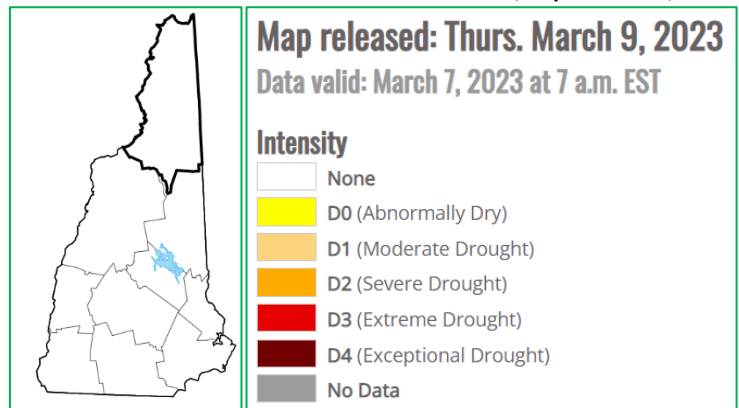
The 2016-2017 drought brought extreme drought conditions in the south and dry or no drought conditions in the north<sup>28</sup>; Berlin was in dry or no drought during most of the 2016 drought. There were reports of the loss of a few dug wells. Water for fire suppression was not impacted.

The 2020-2021 drought was less significant than the 2016 drought in southern NH but more significant in northern NH. Once again, there were reports of a few lost wells. The water table, rivers, and streams were down, but drafting capabilities remained.



WMUR Archives; September 15,

As of January 1, 2023, after the 2022 summer drought and periods of extreme to dry conditions, again moderating from south to north. The 2022 drought has abated, and the state has no drought.<sup>29</sup> The bold black line in the image to the right shows Coos County.



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

## 11) LIGHTNING & HAIL

Hazard Identification & Risk Assessment (HIRA).....	Low
Probability.....	Low
Estimated Structure Loss Value .....	\$0 to \$11,370,524

### Lightning

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

Although lightning is a potential problem, the City reports few occurrences, none of which were significant. In the past, a building was struck on Jericho Road, and a home was struck on Washington Street. The Fire Station has also been hit by lightning, resulting in a loss of radio capabilities, and St. Anne's Church was struck, taking slate shingles off the roof. Action Item #19 addresses lightning rods.

<sup>28</sup> <https://www.wmur.com/article/extreme-drought-conditions-worsen-in-new-hampshire/5269231>

<sup>29</sup> <https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?NH>



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

### ***Hail***

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

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

## **12) LANDSLIDE & EROSION**

Hazard Identification & Risk Assessment (HIRA)..... Low  
Probability..... Very Low  
Estimated Structure Loss Value ..... \$0 to \$11,370,524

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

Some areas along the Androscoggin River are worrisome, such as the riverbanks near the armory and north of the 12<sup>th</sup> Street Bridge, but there are no significant areas of concern. Riverine erosion is ongoing and possible; no structural damage has resulted from river erosion in the past.

Years of erosion have caused damage to many of the stone retaining walls throughout the City; some of these walls, holding back soil on steep properties, risk collapse. Erosion also takes its toll on the snowmobile and OHRV trails. Lastly, lumber company clear-cuts create the potential for soil erosion on properties downslope.

There are no known specific areas where a landslide is likely. However, the 2016 Hazard Mitigation Plan recognized the potential for a landslide in the Kilkenny Range within the National Forest that could affect Godfrey Dam.

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

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

## D. TECHNOLOGICAL HAZARDS

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

### 1) AGING INFRASTRUCTURE

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

*“Infrastructure is the backbone of our community. While we don’t always acknowledge it, the condition of our infrastructure has a very real impact on our lives. We all depend on roads and bridges to get us where we are going, water infrastructure that delivers clean on-demand water, electricity to light our home and office, and schools that will facilitate a learning environment.”<sup>30</sup>*

Aging infrastructure is the continued deterioration of roads, bridges, culverts, ports, railroads, wastewater facilities, airports, dams, utilities, and public water and sewage systems. The State Multi-Hazard Mitigation Plan states that the average lifespan of a bridge is 50 years; the current average age of state-owned bridges in New Hampshire is 52-56 years.<sup>31</sup> The American Society of Civil Engineers gave NH an overall C- in its 2017 report card.<sup>32</sup>

Aging infrastructure is a concern in Berlin as it is throughout New Hampshire and the United States. In Berlin, older roads and aging culverts are part of the City’s aging infrastructure. Steep roadways cause additional issues as washouts are more common during heavy rain events. In addition, City Hall, the Fire Station, and the Police Station were all built pre-1950. The water and wastewater treatment facilities are in good shape, and there are no city-owned red-listed bridges. Please refer to Section C, Inland Flooding, in this chapter for more information on road, highway, and infrastructure concerns in Moxie Alley.

Mitigation action items in Table 9.1 are included in this plan to address aging infrastructure. Among them are solving the Moxie Alley drainage issues and building a new Public Safety Building.

### 2) CONFLAGRATION

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

*“Conflagration is an uncontrolled burning that threatens human life, health, property, or ecology. A conflagration can be accidentally or intentionally created.”<sup>33</sup>*

In Berlin, the risk and probability of a sizeable uncontrolled fire threatens the City, particularly in the downtown area and along Main Street. Empty buildings, dry conditions, and high winds make the threat more significant.

Downtown Berlin is a collection of older structures, some with brick fronts but wood inside. Some buildings are in disrepair, while others may not be occupied. When combined with high winds, a sizeable uncontrolled fire could

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

<sup>31</sup> NH Multi-hazard Mitigation Plan, 2018, page 156

<sup>32</sup> Ibid

<sup>33</sup> Fire Definitions; HotAsBlazes.com

spread from building to building across the community. Fire could potentially 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 them.

A conflagration could result in explosions, affect the transportation infrastructure, hamper communications and power systems, shut down numerous businesses along Main Street, and close NH Route 16, a major north-south highway. The impact on communication, power, and transportation would likely be temporary, but damage to homes and businesses could be significant.

### 3) DAM FAILURE

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

Dams on the Androscoggin River include three high-hazard dams in Berlin and several upstream, including Middle and Lower Dams, Errol Dam, and Pontook Dam. However, the dam of most concern is the Aziscohos Dam in northern Maine. Failure of the Aziscohos Dam and an overburden on dams downstream could cause a “domino” effect and put large parts of Berlin underwater.

According to the Aziscohos Dam Plan, water from a catastrophic failure would reach Berlin in about five days, providing ample warning for evacuations. The resulting flood waters, however, would put the White Mountains Community College underwater and flood most of Main Street and downtown Berlin at the confluence of the Dead and Androscoggin Rivers. Other areas of the City that are in the 100-year floodplain could also be inundated.

Jericho Lake Dam, a large earthen dam in Jericho State Park, is also at some risk of breach, although it has not been breached in its history. Depending on the degree of dam failure, flood waters from Jericho Lake could be absorbed by a large floodplain below, or some structures could be damaged if the breach is significant.

Eighteen active dams are listed by the Department of Environmental Services (DES) in Berlin. As stated above, three dams are high-hazard, Cross Power Dam, Smith Hydro Dam, Dead River Dam 1, and one is a significant-hazard dam, the Godfrey Dam. The City of Berlin owns only the Godfrey Dam.

Berlin’s Department of Strategic Initiatives is fully aware of projects required by the Federal Energy Regulatory Commission (FERC) and the Department of Environmental Services (DES). The City is very proactive in obtaining FERC reports and maintaining current copies of Emergency Action Plans for the high-hazard dams in the city and upstream. Although minor repairs have recently been made at Smith Dam, no significant issues exist at other city dams.



*Smith Hydro Station*

*Photo Credit: Bob Gundersen,*

*<https://www.flickr.com/photos/psnh/6869841861>*

#### 4) LONG-TERM UTILITY OUTAGE

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

Although rare, long-term utility outages of five or more days have occurred in Berlin 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 vulnerable populations. The team reported that long-term power outages have diminished due to utility companies' efforts to trim trees and branches near power lines.

Long-term utility outage is still a concern, particularly when combined with the above natural hazards. An extended power failure's most significant impact would be the inconvenience caused by the inability to pump water for residents who rely on wells. It is also noted that many services, including large grocers, are located out of the City; driving during severe weather events to obtain necessities can be difficult due to poor road conditions. The team felt that many residents are self-sufficient, as many are now equipped with generators and woodstoves.

City officials are generally aware of people who may need help in emergencies. Nonetheless, a long-term utility outage could have a significant impact.

#### 5) HAZARDOUS MATERIALS

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

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

Hazardous material in a fixed location is concerning in Berlin, principally due to the natural gas pipeline traveling through parts of the City. Although safety precautions are in place, a natural gas leak could occur and not be noticed as natural gas is odor-free. Small leaks in the pipeline have been reported from time to time but are generally handled by the owners of the pipeline. One event caused by a forklift striking the natural gas line in the Industrial Park resulted in a Fire Department response and a satellite station shutdown of the line. The Industrial Park was shut down, and a perimeter was set up.

Many other hazardous materials locations are scattered throughout the City, from small gas stations to the biomass facility, which keeps 10,000 gallons of #2 fuel oil onsite. The Fire Department receives eight Tier II reports annually.

Residents on private property may also store hazardous materials onsite. To help its residents, the City participates in collecting household waste, such as paint. The team did not report any hazardous materials leaks, spills, or explosions since the previous hazard mitigation plan.

Though the probability of a hazardous material event is low, entire buildings could be susceptible to explosion and fire. The resulting losses could be substantial in terms of structure loss and loss of business revenue for local merchants.

## 6) KNOWN & EMERGING CONTAMINANTS

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

Known contaminants in drinking water occur naturally or when introduced by humans. Damage to the environment, the local flora and fauna, a reduction in land values, restrictions on public water sources, and an increase in short and long-term health issues are just some of the impacts of contaminants. There may also be a need for more robust water treatment equipment. However, emerging contaminants have not been historically monitored due to either a lack of laboratory capabilities or an understanding of the risk posed to human health.<sup>34</sup>

Naturally occurring contaminants could include trace elements such as arsenic, lead, manganese, and uranium. The most concerning of these to private well water is arsenic; arsenic is naturally occurring and common in groundwater. The NH State Multi-hazard Mitigation Plan states that “...*health studies of New Hampshire residents have demonstrated the connection between arsenic and the increased prevalence of conditions such as bladder and other cancers and developmental effects on children.*”<sup>35</sup>

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

Although some private wells exist, most of Berlin's residents rely on public water. Berlin Water Works monitors water conditions in the public water supply to guard against contamination. Those on private wells should be aware of potential contaminants such as radon and arsenic and test their water. City officials encourage testing by individual homeowners for known and emerging contaminants (Action Item #7).

## E. HUMAN-CAUSED HAZARDS

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

### 1) TRANSPORT ACCIDENTS

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

The probability of vehicular accidents involving hazardous materials is identified as moderate in Berlin. The City's two major roads, NH Routes 16 and 110, see a high volume of vehicular traffic; truck traffic is exceptionally high on these routes. In addition, rail traffic carries significant amounts of hazardous materials such as liquid petroleum gas, sulfuric acid, hydrochloric acid, anhydrous ammonia, and other chemicals. The downtown biomass facility receives hazardous materials deliveries, including fuel, hydraulic oil, and ammonia. The paper mill, just over the city line in

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<sup>34</sup> NH Multi-hazard Mitigation Plan-2018

<sup>35</sup> Ibid

Gorham, receives piped-in methane gas. Lastly, the flight path for the Berlin Municipal Airport, located a few miles away in Milan, is over the City of Berlin. The airport is large enough to have welcomed Air Force 2 and commercial planes.

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

Losses could be relatively high in property and structural damage in a hazardous materials incident, depending on the scope and location of the incident. The losses are expected to be localized and unlikely in densely populated areas, where the speed limit is reduced. Since the last hazard mitigation plan, no significant transportation incidents have occurred in Berlin.

## 2) CYBER EVENTS

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

Presidential Policy Directive (PDD-41) describes a cyber incident as *“An event occurring on or conducted through a computer network that actually or imminently jeopardizes the integrity, confidentiality, or availability of computers, information or communications systems or networks, physical or virtual infrastructure controlled by computers or information systems, or information resident thereon. For purposes of this directive, a cyber incident may include vulnerability in an information system, system security procedures, internal controls, or implementation that could be exploited by a threat source.”*<sup>36</sup>

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

Security on computer networks, off-site backup, and user education are vital for protecting sensitive city information and data. The City utilizes an offsite server to store essential documents at the Berlin Police Department, which is backed up daily by a cloud-based storage system. The Berlin planning team did not report any cyber-attacks on city departments since the last hazard mitigation plan. However, it did report a week-long threat to Coos County Family Health.

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<sup>36</sup> PDD-41; <https://obamawhitehouse.archives.gov/the-press-office/2016/07/26/presidential-policy-directive-united-states-cyber-incident>



### **3) MASS CASUALTY INCIDENTS**

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

A Mass Casualty Incident (MCI) is defined as “*any number of casualties that exceed the resources normally available from local resources*”<sup>37</sup>. MCIs have been known to occur due to bus, auto, train, and aircraft accidents and incidents involving large crowds. MCIs can also result from natural hazards such as hurricanes, floods, earthquakes, and tornadoes.

An MCI could happen anywhere in Berlin, but more likely on NH Routes 16 and 110. These roads are heavily traveled year-round but are particularly dangerous during winter storms. Animal crossings and poor weather can set up the conditions for an MCI. In addition, with students traveling to and from school and participating in school sports programs, the potential for an MCI is increased. Fortunately, there have been no reported MCIs since the last hazard mitigation plan; however, it was noted that the Fire Department gets calls for accidents on the ATV trails in Jericho at least once a week.

### **4) TERRORISM & VIOLENCE**

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

Terrorism is feared throughout our country and the world; the disruption at soft targets is often the result of terrorist incidents. “*Soft Targets and Crowded Places (ST-CPs) are locations that are easily accessible to large numbers of people and that have limited security or protective measures in place making them vulnerable to attack.*”<sup>38</sup>

Berlin has many soft targets, including the middle, high, and elementary schools, the White Mountains Community College, a state park, two prisons, City Hall, three high-hazard dams, one significant-hazard dam, an ice arena, a biomass plant, and multiple other business and commercial ventures. Terrorist activity at one of the three high-hazard dams in Berlin could significantly impact the floodway, including the potential flooding of Main Street. Godfrey Dam is monitored; however, a human-caused breach at Godfrey Dam could also cause significant flooding downstream. The Berlin public water supply is also at risk, although well-head protection plans are in place. With easy access to and from Canada via Berlin’s major highways, the City could also be a stopping point for would-be terrorists.

Highways could also be targets - any closure of NH Routes 16 or 110 in Berlin would cause state-wide disruptions in the transportation system. Disruption of these significant routes could affect Berlin’s businesses and the local economy.

As with many small cities, terrorism is possible, although threats and incidents are rare. If a terrorist incident were to occur, it would most likely be a homegrown terrorist event. There has been no significant terrorist or violent incident since the prior hazard mitigation plan.

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

<sup>38</sup> [https://www.cisa.gov/sites/default/files/publications/DHS-Soft-Target-Crowded-Place-Security-Plan-Overview-052018-508\\_0.pdf](https://www.cisa.gov/sites/default/files/publications/DHS-Soft-Target-Crowded-Place-Security-Plan-Overview-052018-508_0.pdf)

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## Chapter 6: Capabilities Assessment

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

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

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

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

**TABLE 6.1: CAPABILITIES ASSESSMENT**

#### KEY TO EFFECTIVENESS

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

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

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

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

Current Program or Activity	Description	Managing Department	Effectiveness	Improvements Needed
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 (Emergency Responders)  Inadequate (City Officials)	<b>Improvements Needed:</b> Most first responders have done NIMS and ICS training. Although this is preparedness, this strategy is deferred to this plan to continue providing NIMS (IS-700) & ICS (ICS 100 & ICS 200) training to new first responders and new city officials as they become elected and appointed. <b>Action Item #5 (also in Table 7.1)</b>
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 & Police Departments	Good	<b>Improvements Needed:</b> The City has worked hard to educate the public on the importance of proper E-911 signage and, as a result, is about 90% compliant. This strategy is deferred to consider ways to reach 100% compliance so that emergency responders can better assist the public in their time of need. Use public outreach opportunities such as the Emergency Management Services web page or social media to promote better compliance. Explore and develop other means of increasing compliance. <b>Action Item #1 (also in Table 7.1)</b>

Current Program or Activity	Description	Managing Department	Effectiveness	Improvements Needed
Geographic Information System (GIS)	A Geographic Information System (GIS) allows the City to map and analyze data about natural and human-caused hazards and assist the City with future planning and development modeling.	Multi-Departmental	Good	<b>Improvements Needed:</b> Although the City has established a Geographic Information System (GIS) and worked with the Water and Sewer, this system needs further development, improvements, and integration into other City departments to ensure its best use in understanding the impact of natural hazards. <b>Action Item #2 (also in Table 7.1)</b>
Pressurized, Dry Hydrants & other Water Resources	Berlin Water Works maintains the City's pressurized hydrants. Drafting sites are the responsibility of the Fire Department.	Berlin Fire Department & Berlin Water Works	Good	<b>Improvements Needed:</b> Pressurized hydrants and drafting sites throughout Berlin provide water resources for firefighting. This strategy is deferred to continue maintaining the community's pressurized and other water resources to help mitigate the effects of structure fires and wildfires. <b>Action Item #3 (also in Table 7.1)</b>
Tree Removal Program	Tree Removal Program to reduce damage from fallen trees and limbs to power lines, stormwater ditches, and structures and to reduce the risk of wildfire.	Department of Public Works	Good	<b>Improvements Needed:</b> As trees become damaged and threaten structures on city roads, the Department of Public Works removes them. The NH Department of Transportation (NHDOT) and Eversource do this for state roads and utilities. This strategy is 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. <b>Action Item #4 (also in Table 7.1)</b>
Emergency Response Training Fire, Police, EMS & HazMat	Fire Department, EMS, and Police Department personnel train for all emergencies and the many aspects of emergency response, including, but not limited to, medical, conflagration, wildfire, mass casualty, active shooter, a HazMat incident, and terrorism.	Fire Chief/EMD, EMS & Police Chief	Good	<b>Improvements Needed:</b> Training of emergency responders is coordinated by the Emergency Management Director, the Fire Chief, the EMS Director, and the Police Chief as needed and required. Training includes the many aspects of emergency response, including, but not limited to, medical, conflagration, wildfire, mass casualty, HazMat response, active shooter, and terrorism. This strategy is deferred for continued training for Berlin's emergency responders through the life of this plan. <b>Action Item #6</b>

Current Program or Activity	Description	Managing Department	Effectiveness	Improvements Needed
Public Education & Awareness	Berlin is very well situated to provide public information and outreach to its citizens through various means.	Emergency Management Director & Other Departments	Good	<b>Improvements Needed:</b> The Fire Department has a website with some emergency-related links, and an Emergency Management Services web page is accessible under Departments. An emergency web page is a great way to provide outreach to residents on emergency preparedness and mitigation techniques property owners can use to reduce or eliminate the impact of natural hazards. This strategy is deferred to develop and provide more robust information and links on the Emergency Management Services webpage to educate the public on general and seasonal mitigation techniques. Consider moving the Emergency Management Services link to the City website's homepage. The City can also get information via social media platforms (see Table 2.1). <b>Action Item #7 (also in Table 7.1)</b>
Culvert & Stormwater Maintenance Plan	A Culvert & Storm Water Maintenance Plan includes an inventory of all culverts and ditches in the community along with a record of the location, size, etc. The Berlin Department of Public Works and the NH DOT clean the drainage basins annually after major flooding events, and culverts are repaired as needed.	Department of Public Works	Poor (not developed at this time)	<b>Improvements Needed:</b> Although the Department of Public Works does a good 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 is deferred for continued drainage system maintenance and to develop a written Culvert & Stormwater Maintenance Plan. The Culvert & Storm Water Maintenance Plan should detail the size, material, date of installation, the recommended date for improvement, GPS location, and any problems associated with the location (i.e., flooding). In addition, this plan should be integrated with the City's GIS system to help establish a culvert replacement schedule. <b>Action Item #21 (also in Table 7.1)</b>
National Flood Insurance Program (NFIP) & Floodplain Ordinance (part of Zoning Ordinance)	The National Flood Insurance Program (NFIP) addresses both the need for flood insurance and the need to lessen the devastating consequences of flooding. The goals of the NFIP are to protect communities from potential flood damage through floodplain management and to provide people with flood insurance. A community's floodplain ordinance regulates all new and substantially improved structures located in the 100-year floodplain, as identified on the FEMA Flood Maps, which in Berlin are dated February 20, 2013.	Planning Board, Zoning Board, Select Board & Code Enforcement Officer	Good	<b>Improvements Needed:</b> The City developed a flood ordinance and became a National Flood Insurance Program (NFIP) member on June 15, 1982. The City's Flood Ordinance works well to successfully prohibit or force compliance to the ordinance for building and substantial improvements to structures within the FEMA flood zone. The Flood Ordinance was last amended in 2017. This strategy is deferred to continue compliance with the NFIP, obtain NFIP brochures to have available at City Hall, and provide public outreach regarding the benefits of membership in the NFIP, whether or not properties are in the FEMA floodplain. This strategy is also deferred to provide robust information on flood mitigation techniques that can be taken to protect individual homes and properties using the City's website or social media pages. Provide links to the NFIP, Ready.gov, and other pertinent websites. <b>Action Item #10 (also in Table 7.1)</b>

Current Program or Activity	Description	Managing Department	Effectiveness	Improvements Needed
Emergency Generators	During long-term utility outages, emergency generators power Critical Infrastructure and Key Resources (CIKR). When available, competitive grants for emergency generators are funded through HSEM's EMPG grant program (50/50); designated Primary Shelters and Emergency Operations Centers have a competitive advantage over other CIKR for funding.	Emergency Management Director, City Council, City Manager & SAU 3	Good	<b>Improvements Needed.:</b> The City has emergency backup power at many of the City's Critical Infrastructure & Key Resources (CIKR), as indicated in Tables 4.1-4.4. The City would benefit from permanent generators for City Hall and the Berlin Elementary School. Although the Berlin Middle High School can generate power to part of the building during a power outage, it too could benefit from an improved generator with a larger capacity. Three strategies are deferred to obtain funding and install generators at City Hall, Berlin Elementary School, and the Middle High School. <b>Action Items #30, #31 &amp; #32</b>
CodeRED	CodeRED is a reverse calling warning system that uses listed phone numbers. CodeRED does not include cell and unlisted numbers or email addresses. The Berlin School District uses the "One Call" reverse calling system for school activities and emergency notification.	Emergency Management Director	Good	<b>Improvements Needed:</b> CodeRED is an excellent warning system that only stores hardline resident phone numbers. The City has continuously provided information to residents about CodeRED. This strategy is deferred to continue providing public outreach to encourage all residents to contact CodeRED to add cell numbers, emails, unlisted numbers, and verify their information. Use the Emergency Management Services web page, a possible brochure at City Hall, or available social media platforms. <b>Action Item #13</b>
Emergency Operation Plan (2020)	An Emergency Operations Plan identifies the response procedures and capabilities of the City of Berlin in the event of a natural, technological, or human-caused hazard.	Emergency Management Director	Good	<b>Improvements Needed:</b> The Berlin Emergency Operations Plan (EOP) was last updated in 2020; the next update would be in 2025, 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 based on the state's 18-ESF format. This strategy is deferred to this plan to update the EOP. <b>Action Item #36 (also in Table 7.1)</b>
Master Plan (2022)	A Master Plan includes goals, objectives, and expectations for the City's future development.	Planning Board	Excellent	<b>Improvements Needed:</b> The Berlin Master Plan has been updated and approved. As recommended by the state, a complete Master Plan update will not be needed until 2032, which is outside the scope of this plan. This strategy is deferred to review the Berlin Hazard Mitigation Plan Update 2024 (this plan) whenever a review of the Master Plan is done to integrate action items and discussions on climate change and natural hazards into future updates. <b>Action Item #14 (also in Table 7.1)</b>



Current Program or Activity	Description	Managing Department	Effectiveness	Improvements Needed
Zoning Ordinances (2017) Subdivision Regulations (1998) Site Plan Review Regulations (1998)	Planning mechanisms such as subdivision, zoning, and site plan review regulations guide a community's present and future development by promoting its residents' public health, safety, convenience, and welfare.	Director of Strategic Initiatives & Zoning Officer	Good	<b>Improvements Needed:</b> The Berlin Zoning Ordinance (2017), Subdivision Regulations (1998), and Site Plan Review Regulations (1998) have not been reviewed and updated in many years. This strategy is deferred to review the City's regulations and the site plan review process upon approval of this plan to consider changes that could mitigate the occurrence and impact of natural hazards. <b>Action Item #22</b>
Burning Index	New Hampshire Forests & Lands (DNCR) has a burning index that measures the risk for wildfires and how likely fires are to start on a given day. It also evaluates the potential damages wildfires can create, the number of people needed to fight it, and the type of equipment that might be needed.	NH Hampshire Forests & Lands (DNCR) & Fire Department	Good	<b>Improvements Needed:</b> The Fire Department receives regular notification of the burning index via fax and email from NH Forests & Lands. This notification is made daily during the fire danger season. A Fire Danger Sign is in front of the Fire Station on Main Street. This strategy is deferred to explore options for an additional fire danger sign, perhaps near Jericho State Park. <b>Action #17</b>
Capital Improvement Program (CIP) & Capital Reserve Fund (CRF)	A Capital Improvement Plan (CIP) is a decision-making tool used to plan and schedule improvements over six years. A CIP provides a suggested timeline for budgeting and implementing needed capital improvements. Berlin's annual and segregated CIP funds include similarities to Capital Reserve Funds in other communities.	City Manager, Planning Board & Council	Inadequate	<b>Improvements Needed:</b> The Berlin Capital Improvement Program is reviewed and updated annually to ensure that the program's goals will be achieved; the current program includes similarities to Capital Reserve Funds (CRF) in other communities. However, this strategy is deferred to completely overhaul the current CIP, resulting in a new and better document to guide future budgeting and expenditures for the City. This strategy is also deferred to integrate elements of this hazard mitigation plan into the revised CIP to ensure the completion of identified projects. <b>Action Item #23</b>
Berlin Hazard Mitigation Plan (2016)	A hazard mitigation plan is designed to address natural, technological, and human-caused hazards and to understand the risks these pose for the community. A hazard mitigation plan aims to create action items that will make the community safer by lessening or eliminating the occurrence of impact from natural hazards.	Emergency Management Director	Excellent	<b>Improvements Needed:</b> The Berlin Hazard Mitigation Plan (2016) is being updated with this plan. This strategy is deferred to review this plan, the Berlin Hazard Mitigation Plan 2024, on an annual basis and to update the plan again in 2027. <b>Action Item #16</b>

Current Program or Activity	Description	Managing Department	Effectiveness	Improvements Needed
Mutual Aid Agreements (Fire, Police, DPW & 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.	Fire, Police, DPW & EMS	Good	<b>Improvements Needed:</b> The Berlin Fire Department has a mutual aid agreement with Gorham Fire & EMS and the Milan Fire Department and is a member of the North Country Fire Mutual Aid District. The Berlin Police Department has mutual aid agreements with surrounding towns and the NH State Police (Troop F). The Department of Public Works is not a member of the NH Public Works Mutual Aid Association but has a mutual aid agreement with Gorham. Berlin EMS performs EMS services and medical transportation and will call upon other EMS agencies to assist. All mutual aid systems in Berlin work well; however, this is deferred to become a New Hampshire Public Works Mutual Aid Association member. <b>Action Item #20</b>
Radio Communications	Radio communications are vital for emergency response to all types of hazards. Radios should be interoperable and up to date with current technology.	Emergency Management Director	Good	<b>Improvements Needed:</b> All emergency departments in Berlin (Police/Fire/EMS/DPW) have radio interoperability. Communications systems and radios are updated with state and federal requirements and work as intended. However, there are still areas of the City that have dead spots. This strategy is deferred to explore changing on the Cates Hill Tower and to look for other options to eliminate the dead spots. <b>Action Item #18</b>
Bridge Design Standards	The State of NH sets bridge design, repair, and upgrade standards.	Planning Board & Department of Public Works	Good	<b>Improvements Needed:</b> Berlin follows state standards for bridge design, repair, and maintenance, keeping these standards in line with Berlin's topography. This strategy is deferred to review the state bridge standards and make adjustments and recommendations for how these standards can be better applied in the City. <b>Action Item #24</b>
Local Road Design Standards	Local road design standards are specifications for the construction of new roads in a community.	City Council, Planning Board, Department of Public Works	Good	<b>Improvements Needed:</b> Local road standards have been established to provide specifications for building new roads. The City will not authorize the acceptance of new roads not built to written Class V standards. The road design standards have worked well in the past; however, this strategy is deferred to review the local road standards and make adjustments and recommendations for how these standards can be improved or better applied to the City's roads. <b>Action Item #25</b>
NH Forest and Lands & Fire Permits	NH Forest & Lands, a division of the NH Department of Natural & Cultural Resources (DNCR), regulates open burning and permits.	NH Forests & Lands (DNCR) & Local Fire Warden	Good	<b>No Improvements Needed:</b> The system in place with NH Forests & Lands (DNCR) and the local fire warden works well. The public knows fire permitting requirements and the ability to get permits online (\$5.50 fee required).

Current Program or Activity	Description	Managing Department	Effectiveness	Improvements Needed
Emergency Action Plan (Dams)	Dam Emergency Action Plans are designed to provide notification and evacuation procedures should a dam failure occur. Berlin has three high-hazard dams, Cross Power Dam, Smith Hydro Dam, and Dead River Dam 1.	Brookfield Power, Central Rivers Power, the Department of Natural Resources	Good	<b>No Improvements Needed:</b> All three high-hazard dams in Berlin have current Emergency Action Plans (EAPs) and inundation maps; the Berlin Fire Department retains copies of the EAPs for these dams. In addition, the Community Development Director receives documents and reports from the Federal Energy Regulatory Commission (FERC) as required. No improvements are currently needed to either the physical structures of the City's dams or the development of EAPs.
Emergency Trailers	Emergency Command and American Red Cross Trailers may provide mobile emergency communications, supplies, and other resources to a community or region.	Emergency Management Director	Good	<b>No Improvements Needed:</b> Berlin has access to an Emergency Command Trailer (from Twin State or other agencies) and has an American Red Cross Trailer located at the Berlin Fire Station. NH Forest & Lands (NHFL) maintains a command trailer and cache trailers. No improvements are needed at this time.
Life Safety & Fire Codes	Provides guidance for all buildings for life safety and fire codes	Fire Department	Excellent	<b>No Improvements Needed:</b> The National Fire Protection Association (NFPA) and the NH safety and fire codes guide the Berlin Fire Department in inspecting all commercial, public assembly, and rental properties (3 units or more). The Berlin Fire Department does its best to provide timely inspections based on available human resources.
State Health Department Public Health Plan	The Department of Health and Human Services (DHHS) has partnered with regional public health networks to establish Regional Public Health Emergency Annexes (RPHEAs) to help communities be prepared for public health emergencies such as Covid-19. The City of Berlin is supported by the North Country Regional Public Health Network, which has its own Regional Public Health Emergency Annex (RPHEA).	North Country Regional Public Health Network	Good	<b>No Improvements Needed:</b> The NH Department of Health & Human Services (DHHS) assists the City through its partner, the North Country Regional Public Health Network. The Berlin Health Officer attends public health meetings whenever possible.
School Emergency Operations Plan (SEOP)	A School Emergency Operations Plan guides response to emergencies at the school.	Police, Fire, Emergency Management Director & Superintendent of SAU3	Excellent	<b>No Improvements Needed:</b> SAU 3 and the Berlin School District complete updated School Emergency Operations Plans annually according to state requirements; the Berlin schools all have current plans. Drills and exercises are done annually and include the participation of the City's emergency responders. No improvements are needed as this preparedness strategy is part of SAU 3's annual responsibilities.

Current Program or Activity	Description	Managing Department	Effectiveness	Improvements Needed
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, impervious surface limitations, and the shoreland permit by notification process.	State of NH	Excellent	<b>No Improvements Needed:</b> The City of Berlin follows and exceeds the regulations detailed in the Shoreland Water Quality Protection Act. Compliance with the Act is encouraged.
Social Media Accounts	Social media accounts, such as Facebook, Twitter, and Instagram, can provide excellent information on emergency preparedness and hazard mitigation strategies that can be taken to protect homes and property. Community-run Listservs, subscription services, and local online newsletters can help city officials advance notifications, alerts, and public education.	Department Heads	Good	<b>No Improvements Needed:</b> Facebook pages are maintained by the City, the Fire Department, the Police Department, Berlin EMS, the Recreation Department, and the Library. These social media accounts work very well to keep the citizens of Berlin informed about things happening in their city.
Wellhead Protection Program	A wellhead protection area aims to prevent the contamination of groundwater used for drinking water. Berlin has identified a wellhead protection area. The area is the surface and subsurface area surrounding the public water supply where contaminants are likely to reach.	Water Department & Planning Board (for permits)	Good	<b>No Improvements Needed:</b> The Berlin Water Department has identified a wellhead protection area. As suggested by the state, the City should review the wellhead protection plan to maintain compliance with state regulations and better ensure the protection of the public water supply.
Building Code & Permits	The City has adopted International Building Codes (IBC) or International Residential Codes (IRC). It requires builders to follow the state-adopted codes for new construction to meet national standards for flood, wind, earthquake, fire, and snow load.	Code Enforcement Office	Excellent	<b>No Improvements Needed:</b> The City of Berlin 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 State of New Hampshire and Berlin have adopted.
Bridge Maintenance Program	There are currently no red-listed city or state-owned bridges in Berlin. The state inspects all bridges every other year and maintains them regularly. Inspection and clean-up of bridges occur annually.	Department of Public Works	Good	<b>No Improvements Needed:</b> The Department of Public Works has established a short- and long-term bridge maintenance and replacement schedule. Currently, there are no "red-listed" bridges in the City.

## Chapter 7: Last Mitigation Plan

### A. DATE OF LAST PLAN

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

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

#### COMPLETED

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

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

#### DELETED

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

#### DEFERRED

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

In *Table 7.1: Accomplishments since the Last Plan*, the team assessed what had been accomplished and determined what additional work may be needed. Columns in **red font** were extracted word-for-word from the 2016 Hazard Mitigation Plan. Five additional columns not shown here – *Hazard Addressed, Responsible Department, Funding or Support, Estimated Cost, and STAPLEE* – can be found in the 2016 Hazard Mitigation Plan.

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

Rank	New Mitigation Project	Time Frame	Completed, Deleted, or Deferred
0-1	<b>Action Item #2:</b> The Emergency Management Director will encourage all City officials and new hires who are integral to emergency response to take NIMS 700 and ICS 100 and 200. (Tables 6.1 & 7.1)	Short Term Ongoing for the life of the Plan	<b>Completed &amp; Deferred:</b> Most first responders have done NIMS & ICS training. Although this is preparedness, this strategy is deferred to this plan to continue providing NIMS (IS-700) & ICS (ICS 100 & ICS 200) training to new first responders and new city officials as they become elected and appointed. <b>Action Item #5 (also in Table 6.1)</b>
0-2	<b>Action Item #1:</b> Consider ways to improve standard 911 signage compliance so that emergency responders can better assist the public at the time of need; perhaps through public outreach. (Table 7.1)	Short Term Ongoing for the life of the Plan	<b>Completed &amp; Deferred:</b> The City has worked hard to educate the public on the importance of proper E-911 signage and, as a result, is about 90% compliant. This strategy is deferred to consider ways to reach 100% compliance so that emergency responders can better assist the public in their time of need. Use public outreach opportunities such as the Emergency Management Services web page or social media to promote better compliance. Explore and develop other means of increasing compliance. <b>Action Item #1 (also in Table 6.1)</b>

Rank	New Mitigation Project	Time Frame	Completed, Deleted, or Deferred
0-3	<b>Action Item #9:</b> Continue to develop, improve and update the GIS mapping of the floodplain (available from Granit) and the City's utilities and water systems as well as other hazards that affect the Community. (F7, WF1, EQ3, ER1, LS1, SW3, & MU2) (Tables 6.1 & 7.1)	Short Term Ongoing for the life of the Plan	<b>Partially Completed &amp; Deferred:</b> Although the City has established a Geographic Information System (GIS) in the water department, this system needs further development, improvements, and integration into other City departments to ensure its best use in understanding the impact of natural hazards. <b>Action Item #2 (also in Table 6.1)</b>
0-4	<b>Action Item #34:</b> Improve the drainage systems in the area of Moxie Alley between Pleasant and Main Street to mitigate flooding and to improve stormwater flow; study the possibility of a channeling project on the Dead River to eliminate the flooding and erosion that exists and causes damage to some Main Street buildings. (F5) (Table 7.1)	Long Term 4-5 years	<b>Deferred:</b> Action Item 34 from the previous plan regarding Moxie Alley was not done due to time, funding, and changing priorities. The Dead River flows to the Androscoggin River under residential and business buildings and Main Street; it includes at least a 25' by 12' aging box culvert. The existing culvert shows signs of collapse, and a part of Main Street is sinking. This strategy is deferred to obtain funding to hire a professional engineer to develop a solution for the Dead River drainage system and seek grant funding to pay for and fix the threat it poses to the residents and businesses in the area and Main Street itself. <b>Action Item #29</b>
0-5	<b>Action Item #10:</b> Routinely inspect the functionality of fire hydrants and continue the maintenance of all hydrants and other water resources in Berlin. (WF8)	Short Term Ongoing for the life of the Plan	<b>Completed &amp; Deferred:</b> Pressurized hydrants and drafting sites throughout Berlin provide water resources for firefighting. This strategy is deferred to maintain the community's pressurized hydrants and other water resources to help mitigate the effects of structure fires and wildfires. <b>Action Item #3 (also in Table 6.1)</b>
0-6	<b>Action Item #24:</b> Continue tree maintenance program to protect structures, utilities and roads from damage due to high winds, fallen trees and downed power lines. (SW4) (Table 6.1)	Short Term Ongoing for the life of the Plan	<b>Completed &amp; Deferred:</b> As trees become damaged and threaten structures on city roads, the Department of Public Works removes them. The NH Department of Transportation (NHDOT) and Eversource do this for state roads and utilities. This strategy is 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. <b>Action Item #4 (also in Table 6.1)</b>
0-7	<b>Action Item #8:</b> Continue public education on incompatible materials in the water and sewer system including items such as, but not limited to wipes, drugs, oils, fats/grease and other materials that could be flushed into toilets or dumped into floor drains. (Table 7.1)	Short Term Ongoing for the life of the Plan	<b>Partially Completed &amp; Deferred:</b> The City has sent pamphlets to educate residents on incompatible materials in the water and sewer systems as an inclusion to their sewer bills. This strategy is deferred to continue including pamphlets covering best practices and preventative measures for the water and sewer systems in future sewer bills. <b>Action Item #11</b>
0-8	<b>Action Item #7:</b> Provide public education on current warning systems via several means including but not limited to local radio, community meetings, Public Access TV, newspapers, the website and social media pages. (MU14) (Table 7.1)	Short Term Ongoing for the life of the Plan	<b>Deleted:</b> The primary warning system in the City of Berlin is the CodeRED reverse call system; public education on CodeRED is addressed in Action Item #13 in this plan. The City has continuously educated residents about CodeRED and other emergency preparedness issues through social media platforms and the Fire Department, Police Department, and Emergency Management Services web pages. Public Education is also addressed in Action Item #7 of this plan. Action Item #7 from the previous plan is deleted, as emergency preparedness and mitigation education are addressed in other action items.
0-9	<b>Action Item #4:</b> Extend hazardous materials training to include all new Firefighters, Police Officers and to EMTs and Public Works staff. (Table 7.1)	Short Term Ongoing for the life of the Plan	<b>Completed &amp; Deferred:</b> Berlin Firefighters are trained in the basic response to HazMat incidents and are adept at maintaining perimeters until specialized teams arrive. The Berlin Fire Chief has invited other departments to participate in HazMat training. This strategy is deferred to continue HazMat emergency training as part of each department's comprehensive training program. <b>Action Item #6 (also in Table 6.1)</b>



Rank	New Mitigation Project	Time Frame	Completed, Deleted, or Deferred
0-10	<b>Action Item #3:</b> Extend collapsed building training to include all new Firefighters and to Police Officers, EMTs and Public Works staff. <b>(Table 7.1)</b>	Short Term Ongoing for the life of the Plan	<b>Deleted:</b> Action Items #3, #5, and #6 from the previous plan were incomplete due to time, staff fluctuations, and priority changes. As mentioned in these three action items, collapsed buildings, water rescue, and heavy equipment training are generally part of emergency preparedness, not mitigation. Although it is preparedness, not mitigation, overall emergency preparedness training is addressed in Action Item #6 in this plan. Therefore, these three action items from the previous plan are deleted.
0-11	<b>Action Item #5:</b> Extend water rescue training to include all new Firefighters and to Police Officers and EMTs. <b>(Table 7.1)</b>	Short Term Ongoing for the life of the Plan	
0-12	<b>Action Item #6:</b> Extend heavy equipment rescue training to include all new Firefighters and to Police Officers, Public Works and EMTs. <b>(Table 7.1)</b>	Short Term Ongoing for the life of the Plan	
0-13	<b>Action Item #12:</b> Establish a webpage for educating the public on hazard mitigation and preparedness measures <b>(MU14)</b> by adding to the City's Emergency Management Services a webpage that will include such information as emergency contacts, shelter locations, evacuation routes <b>(SW7, WF11 &amp; T3)</b> , methods of emergency alerting, 911 compliance, water saving techniques <b>(D9)</b> , earthquake risk and mitigation activities that can be taken in residents' homes <b>(EQ7)</b> , steps homeowners can take to protect themselves and their properties when extreme temperatures occur <b>(ET1 &amp; ET4)</b> , safety measures that can be taken during hail <b>(HA3)</b> , high winds <b>(SW7)</b> and lightning storms <b>(L2)</b> , mitigation techniques for property protection and links to available sources; educate homeowners regarding the risks of building in hazard zones and encourage homeowners to install carbon monoxide monitors and alarms <b>(WW5)</b> .	Short Term Ongoing for the life of the Plan	<b>Partially Completed &amp; Deferred:</b> The Fire Department has a website with some emergency-related links, and an Emergency Management Services web page is accessible under "Departments". An emergency web page is a great way to provide outreach to residents on emergency preparedness and mitigation techniques property owners can use to reduce or eliminate the impact of natural hazards. This strategy is deferred to develop and provide more robust information and links on the Emergency Management Services webpage to educate the public on general and seasonal mitigation techniques. Consider moving the Emergency Management Services link to the City website's homepage. The City can also get information via social media platforms (see Table 2.1). <b>Action Item #7 (also in Table 6.1)</b>
1-1	<b>Action Item #28:</b> Install a permanent generator at Berlin High School (primary shelter and possible Alternative Care Site) to protect this critical facility and to insure its functions at the time of an emergency. <b>(MU13) (Table 6.1)</b>	Short Term 1 year or less	<b>Partially Completed &amp; Deferred:</b> A permanent Berlin Middle/High School generator has been installed, but it cannot power the entire facility. This strategy is deferred to consider the need for a larger generator to support the entire school during a long-term utility outage. <b>Action Item #30 (also in Table 6.1)</b>
1-2	<b>Action Item #17:</b> Develop a written stormwater operation and maintenance plan in order to insure more efficient stormwater management; create a manual for the stormwater collection system and integrate it with the City's GIS system; establish a culvert replacement schedule. <b>(F5) (Table 7.1)</b>	Short Term 1 year or less	<b>Partially Completed &amp; Deferred:</b> Although the Department of Public Works does a good 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 is deferred for continued drainage system maintenance and to develop a written Culvert & Stormwater Maintenance Plan. The Culvert & Storm Water Maintenance Plan should detail the size, material, date of installation, the recommended date for improvement, GPS location, and any problems associated with the location (i.e., flooding). In addition, this plan should be integrated with the City's GIS system to help establish a culvert replacement schedule. <b>Action Item #21 (also in Table 6.1)</b>

Rank	New Mitigation Project	Time Frame	Completed, Deleted, or Deferred
1-3	<b>Action Item #11:</b> Increase public outreach regarding the dangers of lightning by including links and other lightning information on the City's website and/or the Emergency Management Facebook page. <b>(L2)</b>	Short Term Ongoing for the life of the Plan	<b>Completed &amp; Deleted:</b> The City has and will continue to provide public education on the risks of lightning. However, Action Item #11 from the previous plan is now integrated into Action Item #7 in this plan. Therefore, this strategy from the previous plan is deleted.
1-4	<b>Action Item #19:</b> Establish a system of coded siren "blasts" that will better notify citizens of impending hazards; educate the public on the "blast" system. <b>(MU14) (Table 7.1)</b>	Short Term 1 year or less	<b>Deleted:</b> Although siren blasts were used in the past, the reverse calling system, CodeRED, has replaced the need for sirens. Action Item #13 in this plan recognizes the need to encourage residents to add cell and unlisted phone numbers and their emails. Because the siren is no longer used for emergencies, this strategy from the previous plan is deleted.
1-5	<b>Action Item #16:</b> Investigate legalities and methods used by other communities to create a database to track those individuals at high risk of death, such as the elderly, homeless, etc.; perhaps by developing a survey of the functional needs population and a method of maintaining the data. <b>(ET3 &amp; WW6) (Table 7.1)</b>	Short Term 1 year or less	<b>Deleted:</b> The City has not established a functional needs list due to concerns about the upkeep and maintenance of such a list. These concerns still exist today. Therefore, this strategy from the prior plan is deleted.
1-6	<b>Action Item #14:</b> Advise the public about the local flood hazard, flood insurance and flood protection measures (F10) by obtaining and keeping on hand a supply of NFIP brochures to have available in the City 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 and provide appropriate links to the NFIP and Ready.gov on the Emergency Management Services webpage.	Short Term 1 year or less	<b>Completed &amp; Deferred:</b> The City developed a flood ordinance and became a National Flood Insurance Program (NFIP) member on June 15, 1982. The City's Flood Ordinance works well to successfully prohibit or force compliance to the ordinance for building and substantial improvements to structures within the FEMA flood zone. The Flood Ordinance was last amended in 2017. This strategy is deferred to continue compliance with the NFIP, obtain NFIP brochures to have available at City Hall, and provide public outreach regarding the benefits of membership in the NFIP, whether or not properties are in the FEMA floodplain. This strategy is also deferred to provide robust information on flood mitigation techniques that can be taken to protect individual homes and properties using the City's website or social media pages. Provide links to the NFIP, Ready.gov, and other pertinent websites. <b>Action Item #10 (also in Table 6.1) (combined with Action Item #15 from the previous plan)</b>
1-7	<b>Action Item #15:</b> Through Public Outreach and the City's website, educate homeowners regarding the risks of building in flood zone and measures that can be taken to reduce the chance of flooding, such as securing debris, propane tanks, yard items or stored objects that may otherwise be swept away, damaged, or pose a hazard if picked up and washed away by floodwaters; add links and info to website. <b>(F23)</b>	Short Term 1 year or less	<b>Deleted:</b> Combined with Action Item #14 (previous plan) in Action Item #10 in this plan.
1-8	<b>Action Item #29:</b> Install a permanent generator at Brown Elementary School (potential shelter) to protect this critical facility and to insure its functions at the time of an emergency. <b>(MU13) (Table 6.1)</b>	Short Term 1 year or less	<b>Deleted:</b> This strategy from the previous plan was not completed; the Brown Elementary School has closed and will be repurposed by a private entity. Because the City no longer owns the facility, they would have no reason to install a generator; therefore, this strategy is deleted. <b>(also in Table 6.1)</b>
2-1	<b>Action Item #26:</b> Install power connections to receive a portable	Long Term 4-5 years	<b>Deferred:</b> Action Item #26 from the previous plan was not completed due to changing priorities and budgetary constraints. This strategy is

Rank	New Mitigation Project	Time Frame	Completed, Deleted, or Deferred
	generator at City Hall (CIKR/City Government) to protect this critical facility and to insure its functions at the time of an emergency. <b>(MU13) (Table 6.1)</b>		deferred to explore funding and possibilities to install a permanent generator at City Hall to ensure the Continuity of Government during a disaster. <b>Action Item #31 (also in Table 6.1)</b>
2-2	<b>Action Item #13:</b> Obtain and have available "Firewise" brochures to educate homeowners on methods to reduce fire risk around their homes <b>(WF10)</b> ; provide "Firewise" brochures to those residents seeking burn permits; advise residents of the importance of maintaining defensible space, the safe disposal of yard and household waste and the removal of dead or dry leaves, needles, twigs, and combustible materials from roofs, decks, eaves, porches and yards. <b>(WF12)</b>	Short Term 1 year or less	<b>Completed &amp; Deferred:</b> The City has done an excellent job reminding residents of the local fire danger, but more can be done. The strategy is deferred to promote structure fire and wildfire mitigation on the Emergency Management Services web page and other social media platforms and obtain and have available Firewise® brochures to educate homeowners on wildfire mitigation. Add a Firewise® link to the Emergency Management Services web page and provide Firewise® brochures to those residents seeking burn permits (if not obtained online, \$5.50 fee). <b>Action Item #12</b>
2-3	<b>Action Item #27:</b> Install a permanent generator at White Mountains Community College (potential shelter/feeding location and Alternative Care Site) to protect this critical facility and to insure its functions at the time of an emergency. <b>(MU13) (Table 6.1)</b>	Medium Term 1-3 years	<b>Completed &amp; Deleted:</b> Although this strategy from the previous plan suggested the installation of a permanent generator at the White Mountains Community College, it was determined that this was not the City's responsibility.
2-4	<b>Action Item #18:</b> Obtain funding to update and improve the salt and de-icing facility so that it can better serve the community during severe winter storm events. <b>(WW4) (Table 7.1)</b>	Medium Term 1-3 years	<b>Deferred:</b> Funding to update and improve the salt and de-icing facility was not completed as suggested in the previous plan due to funding and changing priorities. This strategy is deferred to seek and upgrade the salt and de-icing facility to ensure its use during severe winter storms. <b>Action Item #35</b>
2-5	<b>Action Item #31:</b> Install a permanent generator at Hillside Elementary (potential shelter) to protect this critical facility and to insure its functions at the time of an emergency. <b>(MU13) (Table 6.1)</b>	Medium Term 1-3 years	<b>Deferred:</b> A permanent generator at Berlin Elementary School was not installed due to funding and changing priorities. This strategy is deferred to obtain funding and install an emergency generator for Berlin Elementary to ensure the continued use of this facility as a school or a potential shelter. <b>Action Item #32 (also in Table 6.1)</b>
2-6	<b>Action Item #20:</b> Re-establish visual and data-trending capabilities at Godfrey Dam to better monitor and understand flooding potential. <b>(Table 7.1)</b>	Medium Term 1-3 years	<b>Deferred:</b> A visual monitoring system for the Godfrey Dam was not installed due to changing priorities and oversight. The dam is five miles into the woods and is particularly difficult to access in the winter. Leaves can clog the intake screen and create problems before the City knows them. This strategy is deferred to explore options to install visual monitoring capabilities at the Godfrey Dam to increase awareness and predict a potential floodwater situation. <b>Action Item #26</b>
2-7	<b>Action Item #21:</b> Obtain funding to establish CodeRED and provide public outreach to encourage all residents to contact CodeRED to add cell numbers, unlisted numbers and to verify information; use the website, a possible brochure or a sign up at City Hall. <b>(MU14) (Table 7.1)</b>	Medium Term 1-3 years	<b>Completed &amp; Deferred:</b> CodeRED is an excellent warning system that only stores hardline resident phone numbers. The City has continuously provided information to residents about CodeRED. This strategy is deferred to continue providing public outreach to encourage all residents to contact CodeRED to add cell numbers, emails, unlisted numbers, and verify their information. Use the Emergency Management Services web page, a possible brochure at City Hall, or available social media platforms. <b>Action Item #13 (also in Table 6.1)</b>
2-8	<b>Action Item #25:</b> Review and update the City's Zoning Ordinances; consider		<b>Deferred:</b> The Zoning Ordinance (2017), Subdivision Regulations (1998), and Site Plan Review Regulations (1998) have not been

Rank	New Mitigation Project	Time Frame	Completed, Deleted, or Deferred
	possible hazardous events and align Ordinance with the Master Plan. <b>(MU6) (Table 6.1)</b>	Medium Term 1-3 years	reviewed and updated in many years. Action Items #23 and 25 from the previous plan are deferred for a general review of all of Berlin's planning mechanisms after approval of this hazard mitigation plan to determine if any changes in the City's regulations could mitigate the effects of natural hazards. <b>Action Item #22 (also in Table 6.1)</b>
3-1	<b>Action Item #23:</b> Review and update the Subdivision Regulations to insure their effectiveness against natural hazards for future planning. <b>(WF2, MU3) (Table 6.1)</b>	Medium Term 1-3 years	<b>Deleted:</b> This action item is combined with Action Item #25 from the previous plan and can be seen in <b>Action Item #22</b> in this plan. <b>(also in Table 6.1)</b>
3-2	<b>Action Item #30:</b> Install a permanent generator at Berlin Middle School (potential shelter) to protect this critical facility and to insure its functions at the time of an emergency. <b>(MU13) (Table 6.1)</b>	Long Term 4-5 years	<b>Deleted:</b> Since the previous plan, middle school students attend the Berlin Middle High School, so a separate generator for a middle school is no longer needed. However, Action Item #30 in this hazard mitigation plan refers to the need for a more significant generator at the Middle/High School to support the entire school. Because a separate middle school no longer exists, this strategy is deleted. <b>(also in Table 6.1)</b>
3-3	<b>Action Item #32:</b> Update the Berlin Emergency Operations Plan to align with the current State Emergency Operations Plan. <b>(Table 6.1)</b>	Long Term 4-5 years	<b>Completed &amp; Deferred:</b> The Berlin Emergency Operations Plan (EOP) was last updated in 2020; the next update would be in 2025, 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 based on the state's 18-ESF format. This strategy is deferred to this plan to update the EOP. <b>Action Item #36 (also in Table 6.1)</b>
3-4	<b>Action Item #22:</b> Obtain funding to improve this Critical Facility with a new and improved Public Safety Building (Fire, Police & EMS). (CIKR) <b>(MU13). (Table 7.1)</b>	Medium Term 1-3 years	<b>Deferred:</b> The strategy from the previous plan to obtain funding for the new Public Safety Building was not done due to changing priorities and, more importantly, funding. This strategy is deferred to seek funding to improve the City's emergency response capabilities by building a new Public Safety Building to house the Fire, Police, EMS, and possibly the Public Works Department. <b>Action Item #37</b>
3-5	<b>Action Item #33:</b> Update the Berlin Master Plan and include a Natural Hazards section. <b>(MU6) (Table 6.1)</b>	Long Term 4-5 years	<b>Completed &amp; Deferred:</b> The Berlin Master Plan has been updated and approved (2022). As recommended by the state, a complete Master Plan update will not be needed until 2032, which is outside the scope of this plan. This strategy is deferred to review the Berlin Hazard Mitigation Plan Update 2024 (this plan) whenever a review of the Master Plan is done to integrate action items and discussions on climate change and natural hazards into future updates. <b>Action Item #14 (also in Table 6.1)</b>

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

#### Prevention

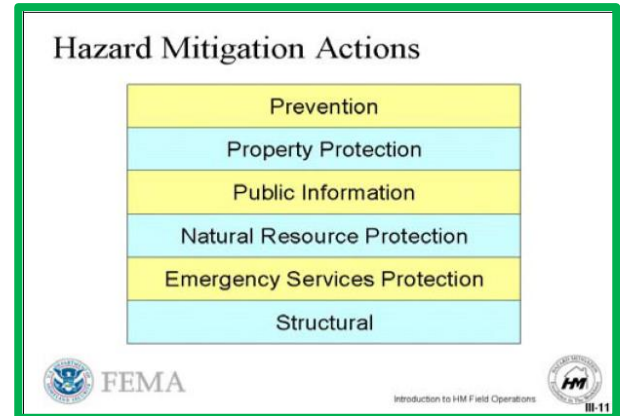
- Forest fire fuel reduction programs
- Special management regulations
- Fire Protection Codes NFPA 1
- Firewise® landscaping
- Culvert and hydrant maintenance
- Planning and zoning regulations
- Building Codes
- Density controls
- Driveway standards
- Slope development regulations
- Master Plan
- Capital 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 city officials
- Ongoing training for first responders



#### Property Protection

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

#### Natural Resource Protection

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

#### Structural Projects

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

## B. POTENTIAL MITIGATION STRATEGIES BY HAZARD

To further promote the concept of mitigation, the team was provided with a handout developed by Mapping and Planning Solutions and used to determine what additional mitigation action items might be appropriate for the City. The mitigation action items from that handout are listed below and on the following page. The planning team considered each item from this comprehensive list of possible mitigation action items to determine if any of these action items could be put in place for Berlin, 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 City officials* ..... *Emergency Service Protection*
- *High-risk Notification to Homeowners*..... *Property Protection*
- *Master Plan Update or Development* ..... *Prevention*
- *Capital Improvement Plan*..... *Prevention*

### Flood Mitigation Ideas

### Type of Project

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



## Natural Hazard Mitigation Ideas

## Type of Project

### Landslide & Erosion

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

### Lightning & Hail

- Building Construction ..... Property Protection

### High Wind Events

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

### Wildfire

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

### Extreme Temperatures

- Warming & Cooling Stations ..... Prevention

### Severe Winter Weather

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

### Subsidence

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

### Earthquake

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

### Drought

- Water Use Ordinances ..... Prevention

### C. STAPLEE METHODOLOGY

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

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

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

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

**Technical**..... Will the proposed action item work? Will it create more issues 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 City Council and other city officials in all aspects of managing and tracking potential emergency planning action items. For instance, the team knew that some of these action items were more appropriately identified as preparedness or readiness issues. As no other established planning 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 City understands that the action items for a town of 200 may not be the same as those for a city of 10,000. Also, the action items for a small city in the middle of predominantly hardwood forests are not the same as those for a town on the Jersey Shore. Therefore, the City of Berlin has accepted the **Mitigation Action Items** in Tables 8.1 and 9.1 as the complete list of action items for this city and only this city. Furthermore, the City of Berlin indicates that having considered a comprehensive list of possible mitigation action items (see sections A & B of this chapter) for this plan, there are no additional action items to add now.

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

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

Proposed Mitigation Action Items	Type of Activity	S	T	A	P	L	E	E	TTL
<b>Action Item #1:</b> Improve E911 signage compliance so emergency responders can better assist the public in their time of need. Use all available public outreach opportunities, including the City's website, the Emergency Management Services webpage, a possible brochure, available social media platforms, and local newsletters. (MU14) (Tables 6.1 & 7.1)	<u>Affected Location</u> -Citywide  <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
		<b>Political:</b> Some people may not want to put up compliant signage							
<b>Action Item #2:</b> Integrated GIS into other City departments, in addition to Water & Sewer, to develop a better understanding of the impact of natural hazards and to further utilize this important planning tool. (ER1, LS1, WF1, MU2) (Tables 6.1 & 7.1)	<u>Affected Location</u> -Citywide  <u>Type of Activity</u> -Prevention -Emergency Service Protection -Property Protection -Natural Resource Protection	3	3	1	3	3	3	3	19
		<b>Administrative:</b> There may be limited time to make the GIS program the most efficient for all city departments							

Proposed Mitigation Action Items	Type of Activity	S	T	A	P	L	E	E	TTL
<b>Action Item #3:</b> Inspect the functionality of all hydrants and maintain and repair all hydrants and other water resources in Berlin. Consider other areas with limited water resources and address these issues by installing new hydrants, fire ponds, or cisterns as needed. (WF8, MU12 & MU13) (Tables 6.1 & 7.1)	<u><b>Affected Location</b></u> -Citywide -Areas of the City without water resources  <u><b>Type of Activity</b></u> -Prevention -Emergency Service Protection -Property Protection -Natural Resource Protection	3	3	3	3	3	3	3	21
		No apparent difficulty with this action item							
<b>Action Item #4:</b> In addition to work done by and with local utility companies, monitor and maintain brush cutting, drainage system maintenance, and tree removal as part of a tree maintenance program. Create defensible space around power lines, oil and gas lines, and other infrastructure. Work to reduce wildfire risk by clearing dead vegetation and cutting high grass and other fuel loads in the community. (SW4, WF7, WF9 & F14) (Tables 6.1 & 7.1)	<u><b>Affected Location</b></u> -Citywide  <u><b>Type of Activity</b></u> -Prevention -Emergency Service Protection -Property Protection -Natural Resource Protection	3	3	3	2	3	3	3	20
		Political: Some people may resist cutting trees on their properties							
<b>Action Item #5:</b> The Emergency Management Director (EMD) to encourage all city officials who may be required to respond to an emergency and any new emergency responders to take NIMS 700 (S-700) & ICS (ISC100 & ISC200). Additionally, the EMD should encourage key personnel to learn about and become adept with WEB-EOC. (Emergency Preparedness) (Tables 6.1 & 7.1)	<u><b>Affected Location</b></u> -Citywide  <u><b>Type of Activity</b></u> -Prevention -Emergency Service Protection	3	3	3	3	3	3	3	21
		No apparent difficulty with this action item							
<b>Action Item #6:</b> The Fire Chief, the Police Chief, and the EMD to provide ongoing training for all emergency responders. Training will include the many aspects of emergency response, including EMS, wildfire suppression, HazMat, active shooter, and terrorism. Training is done locally or through the North Country Fire Mutual Aid and the State of New Hampshire at the NH Fire and Police Academies. (Emergency Preparedness) (Tables 6.1 & 7.1)	<u><b>Affected Location</b></u> -Training Facilities  <u><b>Type of Activity</b></u> -Prevention -Emergency Service Protection	3	3	2	2	3	3	3	19
		Administrative: Funding from the State for training is limited Political: Funding from the City could be improved for some departments, particularly the Fire Department							
<b>Action Item #7:</b> Provide robust information on the Emergency Management Services web page and social media platforms to educate the public on hazard mitigation and preparedness measures. Include preparedness information such as shelter locations, evacuation routes, methods of emergency alerting, and 911 compliance. Also include mitigation strategies such as techniques for earthquakes, tornadoes, severe winter weather, drought, lightning, and climate change. Provide information on the dangers of downed power lines, lightning, extreme temperatures, hail, and infectious diseases. Encourage homeowners to install carbon monoxide monitors and alarms and to monitor radon and other known and emerging contaminants in their homes. Offer reminders as needed for residents and business owners to clear snow from roofs during high accumulation snow years and the safe operation of gas grills and generators. Consider adding the Emergency Management Services link to the home page of the City's website. (MU14, SW7, WF11, D9, T3, EQ7, ET1, ET4, L2, HA3, WW5) (Tables 6.1 & 7.1)	<u><b>Affected Location</b></u> -Citywide  <u><b>Type of Activity</b></u> -Prevention -Public Education & Awareness -Property Protection	3	3	3	3	3	3	3	21
		No apparent difficulty with this action item							

Proposed Mitigation Action Items	Type of Activity	S	T	A	P	L	E	E	TTL
<b>Action Item #8:</b> Provide public outreach to Berlin's citizens regarding the Recreation Center's availability as a "cooling or warming center" during extended high temperatures and severe winter weather. (ET3 & WW6)	<u><b>Affected Location</b></u> -Recreation Center  <u><b>Type of Activity</b></u> -Prevention -Public Education & Awareness	3	3	3	3	3	3	3	21
		No apparent difficulty with this action item							
<b>Action Item #9:</b> To promote private mitigation efforts, provide public outreach to the citizens of Berlin 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 of wildfire. (MU16)	<u><b>Affected Location</b></u> -Private Roads  <u><b>Type of Activity</b></u> -Prevention -Public Education & Awareness -Emergency Service Protection -Property Protection -Natural Resource Protection	3	3	3	2	3	3	3	20
		Political: Some people may not like being told what to do on their roads							
<b>Action Item #10:</b> 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 City Hall. 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 City's Emergency Management webpage, a possible brochure, available social media platforms, and available local newsletters. Work with residents to ensure they comply with the City's floodplain ordinance. (F23) (Tables 6.1 & 7.1)	<u><b>Affected Location</b></u> -Areas prone to flooding  <u><b>Type of Activity</b></u> -Prevention -Public Education & Awareness -Property Protection	3	3	3	3	3	3	3	21
		No apparent difficulty with this action item							
<b>Action Item #11:</b> Provide pamphlets covering best practices and preventative measures for the water and sewer systems in future sewer bills. (MU13) (Table 7.1)	<u><b>Affected Location</b></u> -Citywide  <u><b>Type of Activity</b></u> -Prevention -Public Education & Awareness	3	3	3	3	3	3	3	21
		No apparent difficulty with this action item							
<b>Action Item #12:</b> Post important information on the City's Emergency Management 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 Emergency Management page of the City'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 yard waste, and the removal of dead or dry leaves, needles, twigs, and combustible materials from roofs, decks, eaves, porches, and yards. (WF12)	<u><b>Affected Location</b></u> -Citywide  <u><b>Type of Activity</b></u> -Prevention -Public Education & Awareness -Emergency Service Protection -Property Protection -Natural Resource Protection	3	3	3	3	3	3	3	21
		No apparent difficulty with this action item							

Proposed Mitigation Action Items	Type of Activity	S	T	A	P	L	E	E	TTL
<b>Action Item #13:</b> Provide public outreach to encourage all residents to contact CodeRED to add cell numbers, emails, unlisted numbers, and verify their information. Use the website, a possible brochure at City Hall, and social media platforms. <b>(Emergency Preparedness) (Table 7.1)</b>	<u><b>Affected Location</b></u> -Citywide  <u><b>Type of Activity</b></u> -Prevention -Public Education & Awareness -Emergency Service Protection	3	3	3	3	3	3	3	21
<b>Action Item #14:</b> Review this plan, the Berlin Hazard Mitigation Plan Update 2024, whenever an annual review of the Master Plan is done, and consider incorporating a discussion on climate change, a natural hazards section, and mitigation action items from this plan. <b>(MU6) (Tables 6.1 &amp; 7.1)</b>	<u><b>Affected Location</b></u> -Citywide  <u><b>Type of Activity</b></u> -Prevention -Property Protection -Natural Resource Protection	3	3	3	3	3	3	3	21
<b>Action Item #15:</b> Obtain approval of this hazard mitigation plan as a Community Wildfire Protection Plan (CWPP) to enable potential assistance from the state and federal governments for future wildfire mitigation projects. <b>(WF2)</b>	<u><b>Affected Location</b></u> -Citywide  <u><b>Type of Activity</b></u> -Prevention -Property Protection -Natural Resource Protection	3	3	3	3	3	3	3	21
<b>Action Item #16:</b> Provide an annual review of the Berlin Hazard Mitigation Plan Update 2024, including a review of the status of the Action Items listed in this plan to encourage completion. Obtain approval from the local elected body annually and provide a complete plan update in five years. <b>(MU11) (Table 6.1)</b>	<u><b>Affected Location</b></u> -Citywide  <u><b>Type of Activity</b></u> -Prevention	3	3	3	3	3	3	3	21
<b>Action Item #17:</b> Install a fire danger sign at or near the entrance to Jericho State Park to increase awareness of the risk of wildfires. <b>(WF11) (Table 6.1)</b>	<u><b>Affected Location</b></u> -Jericho State Park  <u><b>Type of Activity</b></u> -Prevention -Public Education & Awareness -Emergency Service Protection -Property Protection -Natural Resource Protection	3	3	3	3	3	3	3	21
<b>Action Item #18:</b> Explore making changes to the Cates Hill Tower and other options to eliminate communications dead spots in the City. <b>(Emergency Preparedness) (Table 6.1)</b>	<u><b>Affected Location</b></u> -Cates Hill Tower  <u><b>Type of Activity</b></u> -Prevention -Emergency Service Protection	3	3	3	3	3	3	3	21
<b>Action Item #19:</b> With the assistance of qualified personnel, inspect all city facilities to determine if an investment in lightning rods would be beneficial. Install lightning rods as recommended.	<u><b>Affected Location</b></u> Citywide  <u><b>Type of Activity</b></u> -Prevention -Emergency Service Protection -Property Protection	3	3	3	3	3	3	3	21



Proposed Mitigation Action Items	Type of Activity	S	T	A	P	L	E	E	TTL
<b>Action Item #20:</b> Requested funding from the City Council for the \$25 needed to join the NH Public Works Mutual Aid Association to ensure more access to public works resources during an emergency. <b>(Table 6.1)</b>	<u><b>Affected Location</b></u> -Citywide  <u><b>Type of Activity</b></u> -Prevention -Emergency Service Protection	3	3	3	1	3	3	3	19
		<i><b>Political:</b> Concern about obligations to others that could overwhelm the Department of Public Works</i>							
<b>Action Item #21:</b> Maintain culverts and ditches in the community and develop and maintain a written stormwater maintenance plan to ensure more efficient stormwater management. This plan or "inventory" should 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. <b>(F5) (Tables 6.1 &amp; 7.1)</b>	<u><b>Affected Location</b></u> -Culverts & Ditches  <u><b>Type of Activity</b></u> -Prevention -Emergency Service Protection -Property Protection -Natural Resource Protection	3	3	1	3	3	3	3	19
		<i><b>Administrative:</b> There may be limited staff time to do this project</i>							
<b>Action Item #22:</b> Review the City's planning mechanisms, including but not limited to the Subdivision & Zoning Regulations, the Site Plan Review Regulations, and the Floodplain Regulations, and discuss changes that may mitigate the occurrence of and damage from the natural hazards identified in this plan. Consider adding language to the subdivision regulations that require water resources in new developments, such as cisterns or fire ponds. <b>(MU6 &amp; WF2) (Tables 6.1 &amp; 7.1)</b>	<u><b>Affected Location</b></u> -Citywide  <u><b>Type of Activity</b></u> -Prevention -Property Protection -Natural Resource Protection	3	3	2	3	3	3	3	20
		<i><b>Administrative:</b> Staff time may be limited</i>							
<b>Action Item #23:</b> Overhaul the current CIP to create a new and better document to guide future budgeting and expenditures for the City. Integrate elements of this hazard mitigation plan into the revised CIP to ensure the completion of this plan's identified action items. <b>(MU6) (Table 6.1)</b>	<u><b>Affected Location</b></u> -Citywide  <u><b>Type of Activity</b></u> -Prevention	3	3	2	3	3	3	3	20
		<i><b>Administrative:</b> Staff time may be limited</i>							
<b>Action Item #24:</b> Review the state bridge standards and make adjustments and recommendations for how these standards can be better applied in the City. <b>(MU13) (Table 6.1)</b>	<u><b>Affected Location</b></u> -Citywide  <u><b>Type of Activity</b></u> -Prevention -Emergency Service Protection	3	3	3	3	3	3	3	21
		<i>No apparent difficulty with this action item</i>							
<b>Action Item #25:</b> Review the local road standards and make adjustments and recommendations to build more resilient infrastructure, adapt to climate change, and improve the City's roads. <b>(MU13) (Table 6.1)</b>	<u><b>Affected Location</b></u> -Citywide  <u><b>Type of Activity</b></u> -Prevention -Emergency Service Protection	3	3	3	3	3	3	3	21
		<i>No apparent difficulty with this action item</i>							
<b>Action Item #26:</b> To increase flood awareness, install visual monitoring capabilities at the Godfrey Dam. <b>(MU13) (Table 7.1)</b>	<u><b>Affected Location</b></u> -Godfrey Dam  <u><b>Type of Activity</b></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>							

Proposed Mitigation Action Items	Type of Activity	S	T	A	P	L	E	E	TTL
<b>Action Item #27:</b> Replace the metal culvert at Hutchins Street and Napier Village with a larger plastic culvert to improve stormwater flow, prevent flooding, and allow consistent access on this truck route. (F13)	<b>Affected Location</b> -Hutchins & Napier Village  <b>Type of Activity</b> -Prevention -Emergency Service Protection -Property Protection -Natural Resource Protection -Structural Project	2	3	3	3	3	2	2	18
		<b>Social:</b> There may be some local disruption to traffic <b>Economical:</b> Budget constraints <b>Environmental:</b> Will need DES approvals							
<b>Action Item #28:</b> Replace the metal culvert at Hutchins Street and the Biomass facility with a larger plastic culvert to improve stormwater flow, prevent flooding, and allow consistent access on this truck route. (F13)	<b>Affected Location</b> -Hutchins at Biomass Facility  <b>Type of Activity</b> -Prevention -Emergency Service Protection -Property Protection -Natural Resource Protection -Structural Project	2	3	3	3	3	2	2	18
		<b>Social:</b> There may be some local disruption to traffic <b>Economical:</b> Budget constraints <b>Environmental:</b> Will need DES approvals							
<b>Action Item #29:</b> Obtain funding to hire a professional engineer to develop a solution for the Dead River drainage system and seek grant funding to pay for and fix the threat it poses to the residents and businesses in the area and Main Street itself. (MU13 & F18) (Table 7.1)	<b>Affected Location</b> -Moxie Alley  <b>Type of Activity</b> -Prevention -Emergency Service Protection -Property Protection -Natural Resource Protection -Structural Project	1	1	2	3	2	2	1	12
		<b>Social:</b> Inconvenience to downtown merchants and residents <b>Technical:</b> Until an engineering study is done, it is unknown if the project will work <b>Administrative:</b> Will need to hire outside contractors <b>Legal:</b> There may be questions about legal authority <b>Economical:</b> Budget Constraints <b>Environmental:</b> DES and other approvals will be required							
<b>Action Item #30:</b> Obtain funding and install a permanent generator at the Berlin Middle/High School to ensure its use as the Primary Shelter during a long-term utility outage. (MU13) (Tables 6.1 & 7.1)	<b>Affected Location</b> -Berlin Middle/High School  <b>Type of Activity</b> -Prevention -Emergency Service Protection	3	3	2	1	2	1	3	15
		<b>Administrative:</b> Need an agreement between the City and SAU to get this accomplished <b>Political:</b> Some residents may not understand the need for a generator at the High School <b>Legal:</b> Will need the cooperation of SAU3 <b>Economical:</b> Budget Constraints							
<b>Action Item #31:</b> Obtain funding and install a permanent generator at the Berlin City Hall so that this critical facility can continue to function and maintain the continuation of government during a long-term utility outage. (MU13) (Tables 6.1 & 7.1)	<b>Affected Location</b> -Berlin City Hall  <b>Type of Activity</b> -Prevention -Emergency Service Protection	3	3	3	1	3	1	3	17
		<b>Political:</b> Some residents may not understand the need for a generator at City Hall <b>Economical:</b> Budget Constraints							

Proposed Mitigation Action Items	Type of Activity	S	T	A	P	L	E	E	TTL
<b>Action Item #32:</b> Obtain funding and install a permanent generator at the Berlin Elementary School to ensure its use as a possible shelter during a long-term utility outage. (MU13) (Tables 6.1 & 7.1)	<b>Affected Location</b> -Berlin Elementary  <b>Type of Activity</b> -Prevention -Emergency Service Protection	3	3	2	1	2	1	3	15
		<b>Administrative:</b> Need an agreement between the City and SAU to get this accomplished <b>Political:</b> Some residents may not understand the need for a generator at the Berlin Elementary School <b>Legal:</b> Will need the cooperation of SAU3 <b>Economical:</b> Budget Constraints							
<b>Action Item #33:</b> Obtain and install a dedicated 30,000-gallon cistern on Cates Hill to aid fire suppression. (WF6)	<b>Affected Location</b> -Cates Hill  <b>Type of Activity</b> -Prevention -Emergency Service Protection -Property Protection -Natural Resource Protection -Structural Project	3	3	3	3	3	3	3	21
		No apparent difficulty with this action item							
<b>Action Item #34:</b> Obtain a dedicated cistern or cisterns with an aggregate total of 30,000 gallons for Jericho Road for fire suppression. (WF6)	<b>Affected Location</b> -Jericho Road  <b>Type of Activity</b> -Prevention -Emergency Service Protection -Property Protection -Natural Resource Protection -Structural Project	3	3	3	3	3	3	3	21
		No apparent difficulty with this action item							
<b>Action Item #35:</b> Seek funding and upgrade the salt and de-icing facility to ensure its use during severe winter storms. (Emergency Preparedness) (Table 7.1)	<b>Affected Location</b> -Department of Public Works  <b>Type of Activity</b> -Prevention -Emergency Service Protection	3	1	3	1	3	1	1	13
		<b>Technical:</b> The location of a new facility has not been found <b>Political:</b> Some may not see the need to spend money on this project <b>Economical:</b> Budget constraints <b>Environmental:</b> DES and other approvals may be needed depending on the location							
<b>Action Item #36:</b> Update the Berlin Emergency Operations Plan to coincide with the new state 18-ESF format. Include an analysis of the impact of natural hazards on Critical Infrastructure & Key Resources that may be needed during an emergency. 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)	<b>Affected Location</b> -Citywide  <b>Type of Activity</b> -Prevention -Emergency Service Protection	3	3	2	3	3	3	3	20
		<b>Administrative:</b> Staff availability may be limited							
<b>Action Item #37:</b> Seek funding to improve the City's emergency response capabilities by building a new Public Safety Building to house the Fire, Police, EMS, and possibly the Public Works Department. (MU13) (Table 7.1)	<b>Affected Location</b> -To be determined  <b>Type of Activity</b> -Emergency Service Protection -Structural Project	3	1	3	1	3	1	1	13
		<b>Technical:</b> The location of a new facility has not been found <b>Political:</b> Some may not see the need to spend money on this project <b>Economical:</b> Budget constraints <b>Environmental:</b> DES and other approvals may be needed depending on the location							

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## 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 city officials within the financial capability of the City using only city 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 City does not have sole authority to act upon, those for which funding might be beyond the City's capability, and those generally taking 13-36 months to complete.

#### CATEGORY D

Category D includes those items that would take a significant funding effort, those that the City 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 City's hazard and wildfire responsiveness capability, funding availability will be a driving factor in determining what and when new mitigation action items are implemented.

## B. WHO, WHEN, HOW?

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

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

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

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

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

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

### TABLE 9.1: THE MITIGATION ACTION PLAN

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

#### Key to the Estimated Cost

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

#### Key to the Time Frame

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

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



**Mitigation Action Items are listed in order of priority.**

Final R/P	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
A-1	<p><b>Problem Statement:</b> The City has continuously used public outreach to remind residents of the need for proper E911 signage. However, the City is about 90% compliant with the proper E911 signage.</p> <p><b>Action Item #1:</b> Improve E911 signage compliance so emergency responders can better assist the public in their time of need. Use all available public outreach opportunities, including the City's website, the Emergency Management Services webpage, a possible brochure, available social media platforms, and local newsletters. <b>(MU14) (Tables 6.1 &amp; 7.1)</b></p>	All Hazards	Emergency Management Director, Fire & Police Departments	Local	Life of the Plan	Very Low Cost
A-2	<p><b>Problem Statement:</b> The City has established a Geographic Information System (GIS) and has integrated data from the Water &amp; Sewer Department. Berlin's GIS system needs to be further integrated with other City departments to gain an additional understanding of the impact of natural hazards.</p> <p><b>Action Item #2:</b> Integrated GIS into other City departments, in addition to Water &amp; Sewer, to develop a better understanding of the impact of natural hazards and to further utilize this important planning tool. <b>(MU2) (Tables 6.1 &amp; 7.1)</b></p>	All Hazards	Director of Strategic Initiatives & Other City Departments	Local	Life of the Plan	Low Cost
A-3	<p><b>Problem Statement:</b> The Water Department tests and maintains pressurized hydrants throughout Berlin. Hydrant maintenance needs to continue to ensure water availability while fighting wildfires or conflagrations.</p> <p><b>Action Item #3:</b> Inspect the functionality of all hydrants and maintain and repair all hydrants and other water resources in Berlin. Consider other areas with limited water resources and address these issues by installing new hydrants, fire ponds, or cisterns as needed. <b>(WF8, MU12 &amp; MU13) (Tables 6.1 &amp; 7.1)</b></p>	Wildfire & Conflagration	Berlin Water Department & Fire Department	Local	Life of the Plan	Very Low Cost
A-4	<p><b>Problem Statement:</b> As trees become damaged and threaten power lines and structures on city roads, the Department of Public Works (DPW) removes them. The NH Department of Transportation (NHDOT) and Eversource do this for state roads and utilities. There is a need to continue to work to keep this hazard to a minimum.</p> <p><b>Action Item #4:</b> In addition to work done by and with local utility companies, monitor and maintain brush cutting, drainage system maintenance, and tree removal as part of a tree maintenance program. Create defensible space around power lines, oil and gas lines, and other infrastructure. Work to reduce wildfire risk by clearing dead vegetation and cutting high grass and other fuel loads in the community. <b>(SW4, WF7, WF9 &amp; F14) (Tables 6.1 &amp; 7.1)</b></p>	High Wind Events, Wildfire, Severe Winter Weather-Ice Storms & Inland Flooding	Department of Public Works	Local & Grants	Life of the Plan	Very Low Cost

Final R/P	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
A-5	<p><b>Problem Statement:</b> Although first responders, including firefighters, have received NIMS &amp; ICS training, not all of Berlin's city officials have.</p> <p><b>Action Item #5:</b> The Emergency Management Director (EMD) to encourage all city officials who may be required to respond to an emergency and any new emergency responders to take NIMS 700 (S-700) &amp; ICS (ISC100 &amp; ISC200). Additionally, the EMD should encourage key personnel to learn about and become adept with WEB-EOC. <b>(Emergency Preparedness) (Tables 6.1 &amp; 7.1)</b></p>	All Hazards	Emergency Management Director	Local	Life of the Plan	Very Low Cost
A-6	<p><b>Problem Statement:</b> Training of all emergency responders is coordinated by the Fire Chief, Police Chief, and the EMD and includes the many aspects of emergency response. This training needs to continue.</p> <p><b>Action Item #6:</b> The Fire Chief, the Police Chief, and the EMD to provide ongoing training for all emergency responders. Training will include the many aspects of emergency response, including EMS, wildfire suppression, HazMat, active shooter, and terrorism. Training is done locally or through the North Country Fire Mutual Aid and the State of New Hampshire at the NH Fire and Police Academies. <b>(Emergency Preparedness) (Tables 6.1 &amp; 7.1)</b></p>	Wildfires, Conflagration, Hazardous Materials, Terrorism & Violence	Fire Chief/EMD & Police Chief	Local & Grants	Life of the Plan	Low Cost
A-7	<p><b>Problem Statement:</b> Although the City has established an Emergency Management Service page to provide public education on emergency preparedness and mitigation, these efforts should continue into the future.</p> <p><b>Action Item #7:</b> Provide robust information on the Emergency Management Services web page and social media platforms to educate the public on hazard mitigation and preparedness measures. Include preparedness information such as shelter locations, evacuation routes, methods of emergency alerting, and 911 compliance. Also include mitigation strategies such as techniques for earthquakes, tornadoes, severe winter weather, drought, lightning, and climate change. Provide information on the dangers of downed power lines, lightning, extreme temperatures, hail, and infectious diseases. Encourage homeowners to install carbon monoxide monitors and alarms and to monitor radon and other known and emerging contaminants in their homes. Offer reminders as needed for residents and business owners to clear snow from roofs during high accumulation snow years and the safe operation of gas grills and generators. Consider adding the Emergency Management Services link to the home page of the City's website. <b>(MU14, SW7, WF11, D9, T3, EQ7, ET1, ET4, L2, HA3, WW5) (Tables 6.1 &amp; 7.1)</b></p>	All Hazards including Severe Wind, Drought, Earthquake, Extreme Temperatures, Hail, Lightning, Severe Winter Weather, Tornado, Wildfire, Known & Emerging Contaminants & Infectious Disease	City Manager, Director of Strategic Initiatives & All Other Department Heads	Local	Life of the Plan	Very Low Cost

Final R/P	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
A-8	<p><b>Problem Statement:</b> <i>The Recreation Center has not been designated as the cooling and warming shelter. Inform the residents of the possibility of using the Recreation Center as a cooling shelter in times of extended high temperatures and as a warming center in times of extended cold temperatures through public outreach.</i></p> <p><b>Action Item #8:</b> Designate the Recreation Center as the cooling and warming center and provide public outreach to Berlin's citizens regarding the Recreation Center's availability as a "cooling or warming center" during extended high temperatures and severe winter weather. <b>(ET3 &amp; WW6)</b></p>	Extreme Temperatures & Severe Winter Weather	City Manager, Director of Strategic Initiatives & All Other Department Heads	Local	Life of the Plan	Very Low Cost
A-9	<p><b>Problem Statement:</b> <i>Residents may not be aware of the importance of maintaining their private roads to allow emergency responders access and prevent wildfires.</i></p> <p><b>Action Item #9:</b> To promote private mitigation efforts, provide public outreach to the citizens of Berlin 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 of wildfire. <b>(MU16)</b></p>	Wildfire & Conflagration	City Manager, Director of Strategic Initiatives & All Other Department Heads	Local	Life of the Plan	Very Low Cost
A-10	<p><b>Problem Statement:</b> <i>Residents and builders may not be aware of flood regulations and 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.</i></p> <p><b>Action Item #10:</b> Advise the public about the local flood hazard, flood insurance, and flood protection measures <b>(F10)</b> by obtaining and keeping on hand a supply of National Flood Insurance (NFIP) brochures to have available in the City Hall. Give NFIP materials to homeowners and builders when proposing new development or substantial improvements; encourage property owners to purchase flood insurance <b>(F22)</b>, 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 City's Emergency Management webpage, a possible brochure, available social media platforms, and available local newsletters. Work with residents to ensure they comply with the City's floodplain ordinance. <b>(F23) (Tables 6.1 &amp; 7.1)</b></p>	Inland Flooding	City Manager, Director of Strategic Initiatives & All Other Department Heads	Local	Life of the Plan	Very Low Cost

Final R/P	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
A-11	<p><b>Problem Statement:</b> <i>The City has sent pamphlets to educate residents on incompatible materials in the water and sewer systems as an inclusion to their sewer bills. This public education needs to continue.</i></p> <p><b>Action Item #11:</b> Provide pamphlets covering best practices and preventative measures for the water and sewer systems in future sewer bills. <b>(MU13) (Table 7.1)</b></p>	All Hazards	Sewer Department	Local	Life of the Plan	Very Low Cost
A-12	<p><b>Problem Statement:</b> <i>Although the City does a good job using its Emergency Management Service webpage to promote preparedness, residents may not know the steps they can take to reduce the fire risk at their homes.</i></p> <p><b>Action Item #12:</b> Post important information on the City's Emergency Management 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 <b>(WF10)</b> and provide a link to Firewise® on the Emergency Management page of the City'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 yard waste, and the removal of dead or dry leaves, needles, twigs, and combustible materials from roofs, decks, eaves, porches, and yards. <b>(WF12)</b></p>	Wildfire & Conflagration	City Manager, Director of Strategic Initiatives & Fire Department	Local	Life of the Plan	Very Low Cost
A-13	<p><b>Problem Statement:</b> <i>CodeRED is an excellent warning system that only stores residents' hardline phone numbers. Residents should be encouraged to provide additional information to the CodeRED system to ensure notification.</i></p> <p><b>Action Item #13:</b> Provide public outreach to encourage all residents to contact CodeRED to add cell numbers, emails, unlisted numbers, and verify their information. Use the website, a possible brochure at City Hall, and social media platforms. <b>(Emergency Preparedness) (Table 7.1)</b></p>	All Hazards	City Manager, Dispatch Supervisor, Emergency Management Director	Local	Life of the Plan	Very Low Cost
A-14	<p><b>Problem Statement:</b> <i>The Berlin Master Plan (2022), which is reviewed annually and will need an update in 2032 (based on the state's 10-year recommendation), does not have a Natural Hazards section or a discussion on climate change.</i></p> <p><b>Action Item #14:</b> Review this plan, the Berlin Hazard Mitigation Plan Update 2024, whenever an annual review of the Master Plan is done, and consider incorporating a discussion on climate change, a natural hazards section, and mitigation action items from this plan. <b>(MU6) (Tables 6.1 &amp; 7.1)</b></p>	All Hazards	Director of Strategic Initiatives & Planning Board	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	<p><b>Problem Statement:</b> This plan, the Berlin Hazard Mitigation Plan Update, 2024, will need to be approved again as a Community Wildfire Protection Plan (CWPP).</p> <p><b>Action Item #15:</b> Obtain approval of this hazard mitigation plan as a Community Wildfire Protection Plan (CWPP) to enable potential assistance from the state and federal governments for future wildfire mitigation projects. <b>(WF2)</b></p>	Wildfire & Conflagration	Mapping & Planning Solutions	Local	Short Term	Very Low Cost
B-2	<p><b>Problem Statement:</b> This Plan, the Berlin Hazard Mitigation Plan Update 2024, will require an annual review and a complete update in five years.</p> <p><b>Action Item #16:</b> Provide an annual review of the Berlin Hazard Mitigation Plan Update 2024, including a review of the status of the Action Items listed in this plan to encourage completion. Obtain approval from the local elected body annually and provide a complete plan update in five years. <b>(MU11) (Table 6.1)</b></p>	All Hazards	Emergency Management Director & City Council	Local	Short Term Long Term (full update)	Very Low Cost
B-3	<p><b>Problem Statement:</b> The Fire Department receives regular notification of the burning index via email from NH Forests &amp; Lands. This notification is made daily during the fire danger season. A fire danger sign is in front of the Fire Station on Main Street. However, an additional fire danger sign would be beneficial at or near Jericho Mountain State Park.</p> <p><b>Action Item #17:</b> Install a fire danger sign at or near the entrance to Jericho Mountain State Park to increase awareness of the risk of wildfires. <b>(WF11) (Table 6.1)</b></p>	Wildfire & Conflagration	Fire Department	Local & Grants	Short Term	Very Low Cost
B-4	<p><b>Problem Statement:</b> All emergency departments in Berlin (Police/Fire/EMS/DPW) have radio interoperability. Communications systems and radios are updated with state and federal requirements and work as intended. However, there are still areas of the City that have dead spots.</p> <p><b>Action Item #18:</b> Explore making changes to the Cates Hill Tower and other options to eliminate communications dead spots in the City. <b>(Emergency Preparedness) (Table 6.1)</b></p>	All Hazards	Emergency Management Director	Local & Grants	Short Term	Low Cost (\$7,000 annually for a lease if the City takes over Cates Hill Tower)
B-5	<p><b>Problem Statement:</b> Lightning has struck city buildings in the past and has caused damage to electronics and power outages.</p> <p><b>Action Item #19:</b> With the assistance of qualified personnel, inspect all city facilities to determine if an investment in lightning rods would be beneficial. Install lightning rods as recommended.</p>	Lightning	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	<p><b>Problem Statement:</b> <i>Although most mutual aid systems in Berlin are excellent, the City does not belong to the NH Public Works Mutual Aid Association.</i></p> <p><b>Action Item #20:</b> Requested funding from the City Council for the \$25 needed to join the NH Public Works Mutual Aid Association to ensure more access to public works resources during an emergency. <b>(Table 6.1)</b></p>	All Hazards	City Council & Department of Public Works	Local	Short Term	Very Low Cost
C-1	<p><b>Problem Statement:</b> <i>Although the Berlin Department of Public Works cleans and repairs drainage basins and culverts, a written stormwater maintenance plan should be developed to ensure continuity of actions and efficient stormwater management.</i></p> <p><b>Action Item #21:</b> Maintain culverts and ditches in the community and develop and maintain a written stormwater maintenance plan to ensure more efficient stormwater management. This plan or "inventory" should 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. <b>(F5) (Tables 6.1 &amp; 7.1)</b></p>	Inland Flooding	Department of Public Works	Local	Medium Term	Very Low Cost
C-2	<p><b>Problem Statement:</b> <i>The Berlin Subdivision and Zoning Regulations and the Site Plan Review need to be reviewed and updated. However, they should be reviewed and integrated with this hazard mitigation plan after approval.</i></p> <p><b>Action Item #22:</b> Review the City's planning mechanisms, including but not limited to the Subdivision &amp; Zoning Regulations and the Site Plan Review Regulations, and discuss changes that may mitigate the occurrence of and damage from the natural hazards identified in this plan. Consider adding language to the subdivision regulations that require water resources in new developments, such as cisterns or fire ponds. <b>(MU6 &amp; WF2) (Tables 6.1 &amp; 7.1)</b></p>	All Hazards	Director of Strategic Initiatives & Planning Board	Local	Medium Term	Very Low Cost
C-3	<p><b>Problem Statement:</b> <i>The Berlin Capital Improvement Program is reviewed and updated annually to ensure that the program's goals will be achieved; the current program includes similarities to Capital Reserve Funds (CRF) in other communities. However, this strategy is deferred to overhaul the CIP to make it a more effective tool for future budgeting.</i></p> <p><b>Action Item #23:</b> Overhaul the current CIP to create a new and better document to guide future budgeting and expenditures for the City. Integrate elements of this hazard mitigation plan into the revised CIP to ensure the completion of this plan's identified action items. <b>(MU6) (Table 6.1)</b></p>	All Hazards	City Manager, City Council, Director of Strategic Initiatives & Planning Board	Local	Medium Term	Very Low Cost



Final R/P	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
C-4	<p><b>Problem Statement:</b> Berlin follows state standards for bridge design, repair, and maintenance, keeping these standards in line with Berlin's topography. These standards should be reviewed and updated.</p> <p><b>Action Item #24:</b> Review the state bridge standards and make adjustments and recommendations for how these standards can be better applied in the City. (MU13) (Table 6.1)</p>	All Hazards	Department of Public Works	Local	Medium Term	Very Low Cost
C-5	<p><b>Problem Statement:</b> Local road standards have been established to provide specifications for building new roads. The road design standards have worked well in the past; however, road standards should be reviewed and adjusted to better apply to the City's roads and anticipated climate change.</p> <p><b>Action Item #25:</b> Review the local road standards and make adjustments and recommendations to build more resilient infrastructure, adapt to climate change, and improve the City's roads. (MU13) (Table 6.1)</p>	All Hazards	Department of Public Works	Local & Grants	Medium Term	Very Low Cost
C-6	<p><b>Problem Statement:</b> A visual monitoring system for the Godfrey Dam was not installed due to changing priorities and oversight. The dam is five miles into the woods and is particularly difficult to access in the winter. Leaves can clog the intake screen and create problems before the City knows.</p> <p><b>Action Item #26:</b> To increase flood awareness, install all visual monitoring capabilities at the Godfrey Dam. (MU13) (Table 7.1)</p>	Inland Flooding	Water Commission	Local & Grants	Medium Term	Medium Cost
C-7	<p><b>Problem Statement:</b> Flooding can occur at Hutchins Street and Napert Village.</p> <p><b>Action Item #27:</b> Replace the metal culvert at Hutchins Street and Napert Village with a larger plastic culvert to improve stormwater flow, prevent flooding, and allow consistent access on this truck route. (F13)</p>	Inland Flooding	Department of Public Works	Local & Grants	Medium Term	Medium Cost
C-8	<p><b>Problem Statement:</b> Flooding can occur at Hutchins Street at the Biomass facility.</p> <p><b>Action Item #28:</b> Replace the metal culvert at Hutchins Street and the Biomass facility with a larger plastic culvert to improve stormwater flow, prevent flooding, and allow consistent access on this truck route. (F13)</p>	Inland Flooding	Department of Public Works	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
D-1	<p><b>Problem Statement:</b> The Dead River flows to the Androscoggin River under residential and business buildings and Main and Pleasant Streets in an area known as Moxie Alley. The existing culvert shows signs of collapse, and a part of Main Street is sinking. In addition, the river is up against the foundations of some buildings, causing damage and undermining structural integrity.</p> <p><b>Action Item #29:</b> Obtain funding to hire a professional engineer to develop a solution for the Dead River drainage system and seek grant funding to pay for and fix the threat it poses to the residents and businesses in the area and Main Street itself. <b>(MU13 &amp; F18) (Table 7.1)</b></p>	Inland Flooding & Aging Infrastructure	Department of Public Works	Local & Grants	Long Term	High Cost
D-2	<p><b>Problem Statement:</b> Although Berlin has emergency backup power at many of the City's Critical Infrastructure &amp; Key Resources (CIKR), some CIKRs, including the Berlin Middle/High School, do not have permanent backup emergency power. The current generator only covers part of the building, the designated Primary Shelter.</p> <p><b>Action Item #30:</b> Obtain funding and install a permanent generator at the Berlin Middle/High School to ensure its use as the Primary Shelter during a long-term utility outage. <b>(MU13) (Tables 6.1 &amp; 7.1)</b></p>	All Hazards	SAU 3 & Emergency Management Director	Local & Grants	Long Term	Medium Cost
D-3	<p><b>Problem Statement:</b> The Berlin City Hall, designated Emergency Operations Center, has no permanent generator.</p> <p><b>Action Item #31:</b> Obtain funding and install a permanent generator at the Berlin City Hall so that this critical facility can continue to function and maintain the continuation of government during a long-term utility outage. <b>(MU13) (Tables 6.1 &amp; 7.1)</b></p>	All Hazards	City Manager, City Council & Emergency Management Director	Local & Grants	Long Term	Medium Cost
D-4	<p><b>Problem Statement:</b> Although Berlin has emergency backup power at many of the City's Critical Infrastructure &amp; Key Resources (CIKR), some CIKRs do not have permanent backup emergency power, including the Berlin Elementary School.</p> <p><b>Action Item #32:</b> Obtain funding and install a permanent generator at the Berlin Elementary School to ensure its use as a possible shelter during a long-term utility outage. <b>(MU13) (Tables 6.1 &amp; 7.1)</b></p>	All Hazards	SAU 3 & Emergency Management Director	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-5	<p><b>Problem Statement:</b> <i>Water resources for fire suppression on Cates Hill are inadequate.</i></p> <p><b>Action Item #33:</b> Obtain and install a dedicated 30,000-gallon cistern on Cates Hill to aid in fire suppression. <b>(WF6)</b></p>	Wildfire & Conflagration	Water Commission & Fire Department	Local & Grants	Long Term	Medium Cost
D-6	<p><b>Problem Statement:</b> <i>Water resources for fire suppression in the area of Jericho Mountain State Park and Jericho Road are inadequate.</i></p> <p><b>Action Item #34:</b> Obtain a dedicated cistern or cisterns with an aggregate total of 30,000 gallons for Jericho Road for fire suppression. <b>(WF6)</b></p>	Wildfire & Conflagration	Water Commission & Fire Department	Local & Grants	Long Term	Medium Cost
D-7	<p><b>Problem Statement:</b> <i>Funding to update and improve the salt and de-icing facility was not completed as suggested in the previous plan due to funding and changing priorities.</i></p> <p><b>Action Item #35:</b> Seek and upgrade the salt and de-icing facility to ensure its use during severe winter storms. <b>(Emergency Preparedness) (Table 7.1)</b></p>	Severe Winter Weather	Department of Public Works	Local	Long Term	Medium Cost
D-8	<p><b>Problem Statement:</b> <i>The Berlin Emergency Operations Plan (EOP) was last updated in 2020 and will need to be updated again in 2025.</i></p> <p><b>Action Item #36:</b> Update the Berlin Emergency Operations Plan to coincide with the new state 18-ESF format. Include an analysis of the impact of natural hazards on Critical Infrastructure &amp; Key Resources that may be needed during an emergency. Like the current EOP, the new EOP will include an EOC Call Alert List, a detailed Resource Inventory List, and Player Packets. <b>(MU6) (Tables 6.1 &amp; 7.1)</b></p>	All Hazards	Emergency Management Director	Local & Grants	Long Term	Low Cost
D-9	<p><b>Problem Statement:</b> <i>The strategy from the previous plan to obtain funding for the new Public Safety Building was not done due to changing priorities and, more importantly, funding. A new Public Safety Building is still needed to meet the requirements of modern EMS, Police, and Fire equipment.</i></p> <p><b>Action Item #37:</b> Seek funding to improve the City's emergency response capabilities by building a new Public Safety Building to house the Fire, Police, EMS, and possibly the Public Works Department. <b>(MU13) (Table 7.1)</b></p>	All Hazards	City Manager & Emergency Management Director	Local & Grants	Long Term	High Cost

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

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

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

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

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

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

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

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

This plan will only enhance mitigation if balanced with all other city plans. Berlin completed its last hazard mitigation plan in 2016 and has completed many projects from that plan. Some examples of these projects can be found in Table 7.1, including providing ongoing fire, flood, sewer, and lightning education, training city employees on NIMS and ICS, hydrant maintenance, and updating essential city documents. As a result, the City was able to integrate these actions into other city activities, budgets, plans, and mechanisms.

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

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

### BERLIN MASTER PLAN

Traditionally, Master Plans are updated every 5 to 10 years. A complete update of Berlin's Master Plan was completed in 2022 and is due for a recommended update in 2032. This last update of the Master Plan included a Natural Hazards section, a discussion on climate change, and integrated elements of the 2016 HMP. Future reviews and updates of the Master Plan will consider integrating concepts, ideas, and action items from this Hazard Mitigation Plan (**Action Item #14**).

### BERLIN EMERGENCY OPERATIONS PLAN 2020 (EOP)

The EOP is designed to allow the City 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 Berlin EOP was completed in 2020. An update for the Emergency Operations Plan is expected to be completed after completing this plan in 2025. The new EOP may incorporate elements from this hazard mitigation plan (**Action Item #36**).

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

The Berlin Capital Improvement Program is reviewed and updated annually to ensure that the program's goals will be achieved; the current program includes similarities to Capital Reserve Funds (CRF) in other communities. Action Item #23 calls for a complete overhaul of the current CIP, which should result in a better document for future budgeting and expenditures. This action item also calls for integrating elements of this hazard mitigation plan into the revised CIP to ensure the completion of identified projects. The CRFs and the CIP are adjusted annually in coordination with the City Council and other city department heads and committees at budget time. During the annual budget planning process, specific mitigation actions identified in this plan that require city fiscal support will be reviewed for incorporation into the budget. **Refer to those Action Items that require local money or match money (multiple Action Items) or address the CIP and CRF.**

### THE BERLIN ORDINANCES & SUBDIVISION REGULATIONS

As time goes by and the needs of the City change, the City'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 #22**).

The local governments will modify other plans and actions to incorporate hazard or wildfire issues. The City Council ensures this process will be followed in the future.

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

This plan was completed in a series of open meetings beginning July 8, 2021. The plan was presented to the City for review, submitted to HSEM/FEMA for Conditional Approval (*APA, Approved Pending Adoption*), formally adopted by the City Council, and resubmitted to HSEM/FEMA for Final Approval. Once Final Approval from HSEM/FEMA was met, copies of the plan were distributed to the City, 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.

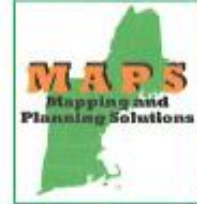


## Chapter 11: Signed Community Documents and Approval Letters

### A. PLANNING SCOPE OF WORK & AGREEMENT

#### PLANNING SCOPE OF WORK & AGREEMENT

#### BERLIN HAZARD MITIGATION PLAN UPDATE



#### PARTIES TO THE AGREEMENT

Mapping and Planning Solutions  
Town of Berlin, NH

Current Plan Expiration: 8/9/2021  
PDM19 Grant Expiration: 5/29/2023

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

#### **Agreement**

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

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

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

#### **Scope of Work**

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

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

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

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

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



## Terms

- **Fees & Payment Schedule:** The contract price is limited to \$9,999.75; 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 .....	\$5,400.00
2. Second payment upon plan submittal to HSEM for APA (Approve Pending Adoption) .....	\$4,400.00
3. Final payment upon project completion and receipt of final hard-copy of the plan .....	<u>\$199.75</u>
<b>Total Fees .....</b>	<b>\$9,999.75</b>

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

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

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

- **Required Matching Funds:** This project's total cost under PDM19 is \$13,333.00, with a federal share of \$9,999.75 and a matching amount of \$3,333.25 (75%/25% split). Matching funds are the responsibility of the Town of Berlin, not MAPS. The town will be responsible for providing and documenting all resources used to meet the FEMA required match. However, Mapping and Planning Solutions will assist the town with attendance tracking by asking meeting attendees to sign in at all meetings and to log any time spent outside of the meetings working on this project. MAPS will provide the town with final attendance records in spreadsheet form at the project's end for the town to use in its match fulfillment.

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

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

- **Ownership of Material:** The town shall own all maps, reports, documents and other materials produced during the project period; each party may keep file copies of any generated work. MAPS shall have the right to use work products collected during the planning process; however, MAPS shall not use any data in such a way as to reveal personal or public information about individuals or groups, which could reasonably be considered confidential.
- **Termination:** This agreement may be terminated if both parties agree in writing. In the event of termination, MAPS shall forward all information prepared to date to the town. MAPS shall be entitled to recover its costs for any work that was completed.
- **Limit of Liability:** MAPS agrees to perform all work diligently and efficiently according to the terms of this agreement. MAPS' responsibilities under this agreement depend upon the cooperation of the Town of Berlin. MAPS and its employees, if any, shall not be liable for opinions rendered, advice, or errors resulting from the quality of data that is supplied. Adoption of the plan by the town and final approval of the plan by HSEM and FEMA relieve Mapping and Planning Solutions of content liability. MAPS carries general liability insurance.

Town of Berlin, NH & Mapping and Planning Solutions  
Hazard Mitigation Plan Update, PDM19, HMP-Level4, Scope/Agreement  
Page 4

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

**For Mapping & Planning Solutions**

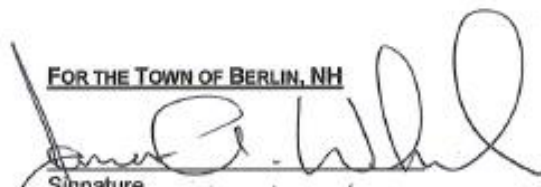
June Garneau  
Mapping and Planning Solutions  
105 Union Street  
Whitefield, NH 03598  
jgarneau@mappingandplanning.com  
(603) 837-7122; (603) 991-9664 (cell)

**For the town**

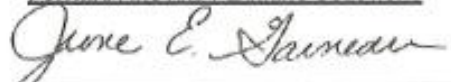
James Watkins  
Fire Chief & EMD  
Berlin Fire Department  
263 Main Street  
Berlin, NH 03570  
(603) 752-3135  
jwatkins@berlinnh.gov

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

**FOR THE TOWN OF BERLIN, NH**

  
Signature  
James A. Wheeler  
Printed Name/Title City Manager  
7/19/21  
Date

**FOR MAPPING AND PLANNING SOLUTIONS**

  
Signature  
June Garneau, Owner  
December 28, 2020

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

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

## HMP Approvable Pending Adoption (APA) Notice: Ber...



Neiderbach, Josiah &lt;josiah.

To jwatkins@berlinnh.gov;

pwarren@berlinnh.gov

Cc Bogdan, Kerry; +7 others



Tue 4:28 PM

You replied to this message on 1/10/2024 8:57 AM.



Berlin NH APA Review.docx 93 KB ▾

Reference: Adoption Required to Finish Local Mitigation Plan Process

Dear Officials:

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

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

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

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

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

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

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

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

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

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

Sincerely,

Jay

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

**C. FORMAL APPROVAL LETTER FROM FEMA**

PAGE LEFT INTENTIONALLY BLANK FOR  
INSERTION OF FINAL APPROVAL LETTER

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



***D. SIGNED CERTIFICATE OF ADOPTION***

**CERTIFICATE OF ADOPTION**

**BERLIN, NH**

**CITY COUNCIL**

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

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

WHEREAS, public and committee meetings were held between July 8, 2021, and May 12, 2022, regarding the development and review of the Hazard Mitigation Plan Update 2024 and

WHEREAS, the plan specifically addresses hazard mitigation strategies and plan maintenance procedures for the City of Berlin; and

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

WHEREAS, adoption of this plan will make the City of Berlin eligible for funding to alleviate the impacts of future hazards; now, therefore, be it

RESOLVED by the City Council:

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

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

3. Future revisions and plan maintenance required by 44 CFR 201.6 and FEMA are hereby adopted as a part of this resolution for five (5) years from the date of this resolution;
4. An annual report on the progress of the plan's action items shall be presented to the City Council by the Emergency Management Director.

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

**City Manager**  
**(on behalf of the City Council)**

**Emergency Management Director**

\_\_\_\_\_  
Signature

Phillip L. Warren Jr.  
City Manager

\_\_\_\_\_  
Signature

James P. Watkins  
Fire Chief & EMD

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

\_\_\_\_\_  
Notary

\_\_\_\_\_  
Expiration

\_\_\_\_\_  
Date

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

**E. CWPP APPROVAL LETTER FROM DNCR**

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

Several public meetings were held between July 8, 2022, and May 12, 2022, regarding the development and review of the Berlin Hazard Mitigation Plan Update 2024. The Berlin Hazard Mitigation Plan Update 2024 contains potential future projects to mitigate hazard and wildfire damage in the City of Berlin.

The Fire Chief, City Manager, and Emergency Management Director desire that this plan be accepted by the Department of Natural and Cultural Resources (DNCR) as a Community Wildfire Protection Plan, having adhered to the requirements of said plan.

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

**For the City of Berlin**

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

\_\_\_\_\_  
City Manager  
(on behalf of the City Council)

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

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

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

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

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

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

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

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

***Signatures are scanned facsimile; 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 City's governing body and the designated Emergency Management Director shall execute this page annually.

Berlin, NH  
Hazard Mitigation Plan Update

REVIEWED AND APPROVED

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

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

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

Emergency Management Director

CONCURRENCE OF APPROVAL

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

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

Chairman of the City Council

Changes and notes regarding the 2024 Hazard Mitigation Plan Update

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

### Additional Notes – Year One:

[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 City's governing body and the designated Emergency Management Director shall execute this page annually.

Berlin, NH  
Hazard Mitigation Plan Update

REVIEWED AND APPROVED

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

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

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

Emergency Management Director

CONCURRENCE OF APPROVAL

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

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

Chairman of the City Council

Changes and notes regarding the 2024 Hazard Mitigation Plan Update

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*Please use the reverse side for additional notes* 

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YEAR 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 City’s governing body and the designated Emergency Management Director shall execute this page annually.

Berlin, NH  
Hazard Mitigation Plan Update

REVIEWED AND APPROVED

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

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

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

Emergency Management Director

CONCURRENCE OF APPROVAL

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

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

Chairman of the City Council

Changes and notes regarding the 2024 Hazard Mitigation Plan Update

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*Please use the reverse side for additional notes* 

**Additional Notes – Year Three:**

[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 City's governing body and the designated Emergency Management Director shall execute this page annually.

Berlin, NH  
Hazard Mitigation Plan Update

REVIEWED AND APPROVED

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

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

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

Emergency Management Director

CONCURRENCE OF APPROVAL

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

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

Chairman of the City Council

Changes and notes regarding the 2024 Hazard Mitigation Plan Update

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*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 Hazard Mitigation Planning Review Guide**, FEMA, October 2011
- **Local Hazard Mitigation Planning Handbook**, FEMA, March 2013
- **Mitigation Ideas, A Resource for Reducing Risk to Natural Hazards**, FEMA, January 2013
- **Hazard Mitigation Unified Guidance**, FEMA, July 12, 2013
- **Hazard Mitigation Assistance Guidance**, FEMA, February 27, 2015
- **Hazards Mitigation Plans**
  - Berlin Hazard Mitigation Plan, 2016
  - Holderness Hazard Mitigation Plan, 2022
  - Enfield Hazard Mitigation Plan, 2022
  - Bethlehem Hazard Mitigation Plan, 2021
- **NH State Multi-Hazard Mitigation Plan**, 2018
  - [https://prd.blogs.nh.gov/dos/hsem/wp-content/uploads/2015/11/State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018\\_FINAL.pdf](https://prd.blogs.nh.gov/dos/hsem/wp-content/uploads/2015/11/State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018_FINAL.pdf)
- **NH Division of Forests and Lands Quarterly Update**
  - <http://www.nhdfi.org/fire-control-and-law-enforcement/fire-statistics.aspx>
- **Disaster Mitigation Act (DMA) of 2000**, Section 101, b1 & b2 and Section 322a
  - <http://www.fema.gov/library/viewRecord.do?id=1935>
- **Economic & Labor Market Information Bureau**, NH Employment Security, October 2022; Community Response for Berlin, Received, 5/10/2022, Census 2000 and Revenue Information derived from this site;
  - <http://www.nhes.nh.gov/elmi/products/cp/profiles-htm/Berlin.htm>

### **Photos**

- Photos are taken by MAPS unless otherwise noted.

### **Map Snips**

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

**Wildfire Links**

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

**Additional Websites**

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

## APPENDIX B: HAZARD MITIGATION ASSISTANCE (HMA)

The Federal Emergency Management Agency's (FEMA's) HMA programs promote funding for mitigation measures that reduce or eliminate long-term risk to people and property from future disasters. These programs allow communities across the nation to enhance mitigation and take steps that will foster greater resilience and reduce disaster suffering<sup>39</sup>:

### HAZARD MITIGATION GRANT PROGRAM (HMGP)

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

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

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

### FLOOD MITIGATION ASSISTANCE (FMA)

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

## HMA Eligible Activities

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

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

<sup>39</sup> [https://www.fema.gov/sites/default/files/documents/fema\\_hma-trifold\\_2021.pdf](https://www.fema.gov/sites/default/files/documents/fema_hma-trifold_2021.pdf); sections of this appendix are taken directly from this Hazard Mitigation Assistance flier, although not all sections are quoted

## BUILDING RESILIENT INFRASTRUCTURE AND COMMUNITIES (BRIC)

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

## PRE-DISASTER MITIGATION (PDM)

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

## ROLES OF APPLICANTS AND SUBAPPLICANTS

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

## ADDITIONAL RESOURCES

For general questions about the HMA programs, please contact your State Hazard Mitigation Officer or FEMA Region. Other resources are available; see the Hazard Mitigation Assistance flier, FEMA, or go to [www.fema.gov/hazard-mitigation-assistance](https://www.fema.gov/hazard-mitigation-assistance).<sup>40</sup>

### Who is eligible to apply?

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

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

### Cost-share requirements

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

\* Percent of federal/non-federal cost share

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

<sup>40</sup> [https://www.fema.gov/sites/default/files/documents/fema\\_hma-trifold\\_2021.pdf](https://www.fema.gov/sites/default/files/documents/fema_hma-trifold_2021.pdf)

## 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

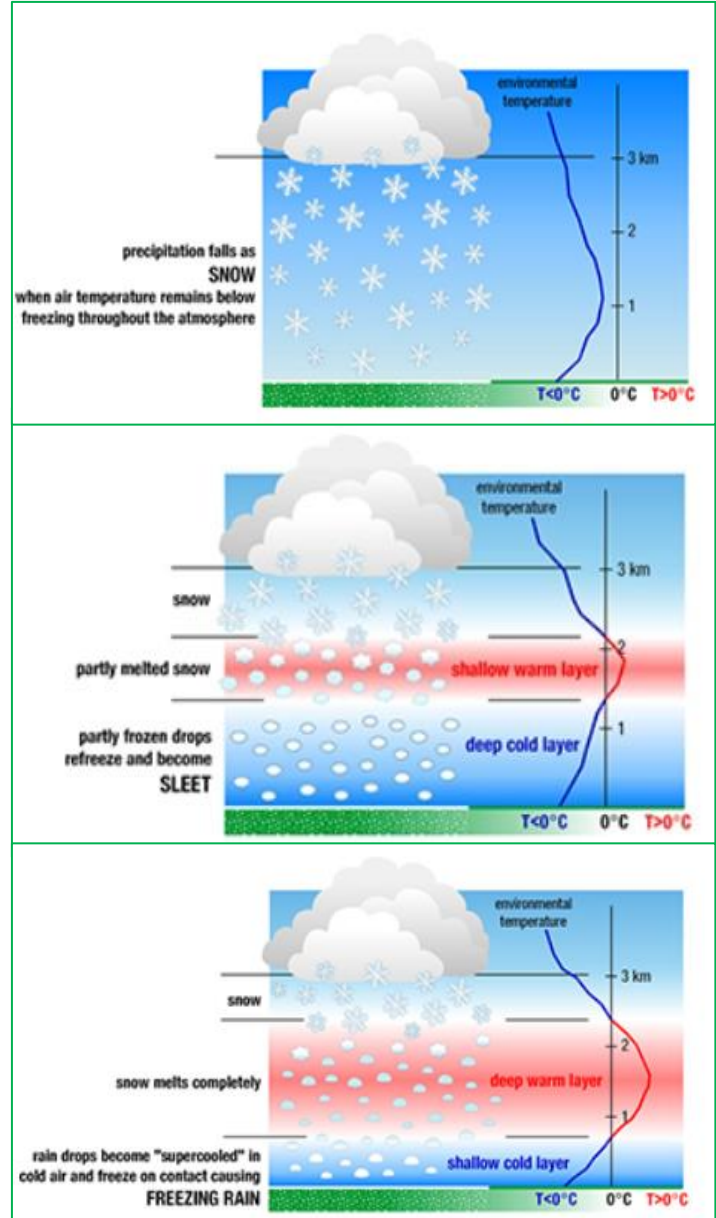
A winter storm can range from moderate snow to blizzard conditions. Blizzard conditions are considered blinding wind-driven snow over 35 mph that lasts several days. A severe winter storm deposits four or more inches of snow for 12 hours or six inches for 24 hours.

#### Sleet

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

#### Freezing Rain & Ice Storms

Snowflakes melt as they fall through a warm band of air and then fall through a shallow band of cold air close to the ground to become “supercooled”. These supercooled raindrops instantly freeze upon contact with the ground and anything else below 32 degrees Fahrenheit. This freezing accumulates ice on roads, trees, utility lines, and other objects, resulting in an “ice storm”. “Ice coating at least one-fourth inch in thickness is heavy enough to damage trees, overhead wires, and similar objects.”<sup>41</sup>



Types of Severe Winter Weather  
NOAA – National Severe Storms Laboratory

<sup>41</sup> NOAA, National Severe Storms Laboratory, <https://www.nssl.noaa.gov/education/svrwx101/winter/types/>



The Sperry-Piltz Ice Accumulation Index (SPIA) (below) is designed to help utility companies better prepare for predicated ice storms.<sup>42</sup>

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

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

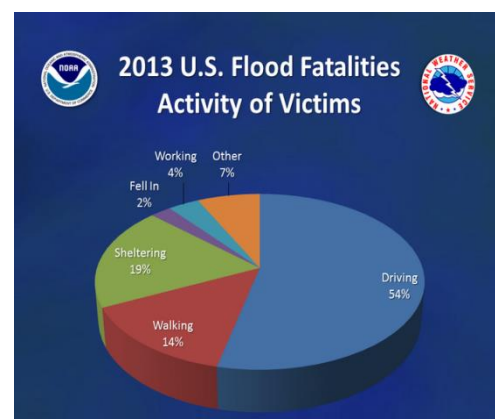
(Categories of damage are based upon combinations of precipitation totals, temperatures and wind speeds/directions.)

## \*INLAND FLOODING

### General Flooding Conditions

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

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



<sup>42</sup> The Weather Channel, <http://www.weather.com/news/weather-winter/rating-ice-storms-damage-sperry-piltz-20131202>

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

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

A "Dam" means any artificial barrier, including appurtenant works, which impounds or diverts water, has a height of 4 feet or more, or a storage capacity of two acres or more, or is located at the outlet of a great pond<sup>43</sup>. A dam failure occurs when water overtops the dam or there is a structural failure of the dam, which causes there to be a breach and an unintentional release of water. Dams are classified in the following manner<sup>44</sup>:

Classification	Description	Inspection Intervals
<b>Non-Menace</b>	A dam is not a menace because it is in a location and size that failure or misoperation of the dam would not result in probable loss of life or property. The dam must be less than six feet in height if the storage capacity is greater than 50 acre-feet or less than 25 feet in height if it has a storage capacity of 15-50 acre-feet.	Every six years
<b>Low Hazard</b>	A dam that has a low hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in no possible loss of life, low economic loss to structures or property, structural damage to a town or city road or private road accessing property other than the dam owner's that could render the road impassable or otherwise interrupt public safety services, the release of liquid industrial, agricultural, or commercial wastes, septage, or contained sediment if the storage capacity is less two-acre-feet and is located more than 250 feet from a water body or watercourse, and/or reversible environmental losses to environmentally-sensitive sites.	Every six years
<b>Significant Hazard</b>	A dam that has a significant hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in no probable loss of lives; however, there would be a major economic loss to structures or property, structural damage to a Class I or Class II road that could render the road impassable or otherwise interrupt public safety services, major environmental pro-public health losses including one or more of the following: damages to a public water system (RSA 485:1-a, XV) which will take longer than 48 hours to repair, the release of liquid industrial, agricultural, or commercial wastes, septage, sewage, or contaminated sediments if the storage capacity is two acre-feet or more; or damage to an environmentally-sensitive site that does not meet the definition of reversible environmental losses.	Every four years
<b>High Hazard</b>	A dam that has a high hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in probable loss of human life as well as a result of water levels and velocities causing the structural failure of a foundation of a habitable residential structure or commercial or industrial structure which is occupied under normal conditions; water levels rising above the first floor elevation of a habitable residential structure or a commercial or industrial structure, which is occupied under normal conditions when the rise due to a dam failure is greater than one foot; structural damage to an interstate highway, which could render the roadway impassable or otherwise interrupt public safety services; the release of a quantity and concentration of material, which qualify as "hazardous waste" as defined by RSA 147-A:2 VII; or any other circumstance that would more likely than not cause one or more deaths.	Every two years

<sup>43</sup> NH DES [http://des.nh.gov/organization/divisions/water/dwgb/wrpp/documents/primer\\_chapter11.pdf](http://des.nh.gov/organization/divisions/water/dwgb/wrpp/documents/primer_chapter11.pdf)

<sup>44</sup> <http://des.nh.gov/organization/commissioner/pip/factsheets/db/documents/db-15.pdf>

### Flooding (local, road erosion)

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

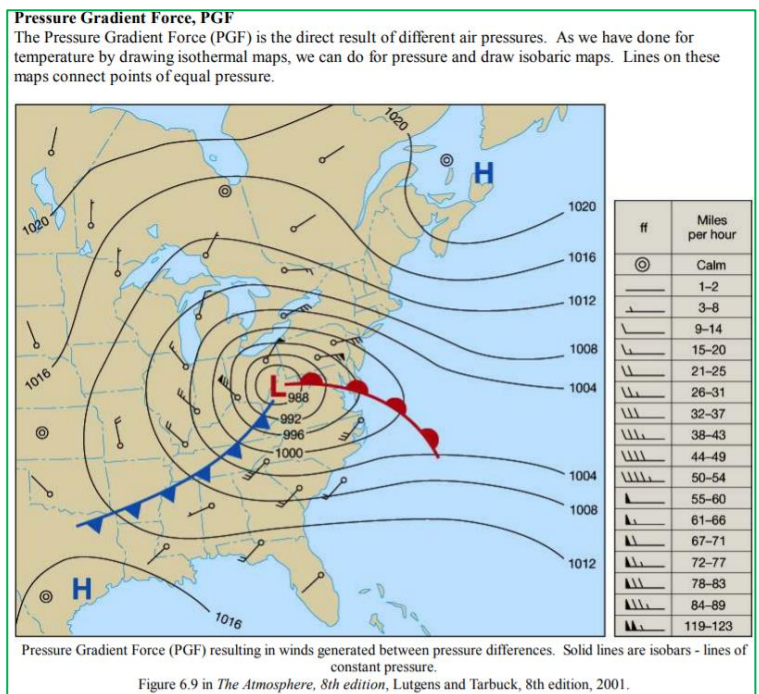
### Flooding (Riverine)

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

### \*HIGH WIND EVENTS

#### Windstorm

NOAA (National Oceanic & Atmospheric Administration) stated that wind is “*The horizontal motion of the air past a given point.*” Winds begin with differences in air pressures. Air pressures higher in one place than another set up a force pushing from the high pressure toward the low pressure. The more significant the difference in pressures, the stronger the force. The distance between high and low pressure also determines how fast the moving air is accelerated. Meteorologists refer to the force that starts the wind flowing as the “pressure gradient force.” High and low pressures are relative. No set number divides high and low pressure. Wind is used to describe the prevailing direction from which the wind is blowing with speed given usually in miles per hour or knots.” Also, NOAA’s issuance of a Wind Advisory occurs when sustained winds reach 25 to 39 mph and gusts to 57 mph.<sup>45 46</sup>



<sup>45</sup> NOAA; <http://www.nws.noaa.gov/glossary/index.php?letter=w>

<sup>46</sup> Pressure Gradient Force Chart “snipped” from [Air Pressure and Wind](https://www.weather.gov/media/zhu/ZHU_Training_Page/winds/pressure_winds/pressure_winds.pdf); [https://www.weather.gov/media/zhu/ZHU\\_Training\\_Page/winds/pressure\\_winds/pressure\\_winds.pdf](https://www.weather.gov/media/zhu/ZHU_Training_Page/winds/pressure_winds/pressure_winds.pdf)

## Tornado

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

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

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

*“Dr. T. Theodore Fujita developed the Fujita Tornado Damage Scale (F-Scale) to provide estimates of tornado strength based on damage surveys. Since it's practically impossible to make direct measurements of tornado winds, an estimate of the winds based on damage is the best way to classify a tornado. The new Enhanced Fujita Scale (EF-Scale) addresses some of the limitations identified by meteorologists and engineers since introducing the Fujita Scale in 1971. The new scale identifies 28 different free-standing structures most affected by tornadoes considering construction quality and maintenance. The range of tornado intensities remains as before, zero to five, with 'EF-0' being the weakest, associated with very little damage and 'EF-5' representing complete destruction, which was the case in Greensburg, Kansas on May 4th, 2007, the first tornado classified as 'EF-5'. The EF scale was adopted on February 1, 2007.”<sup>47</sup>* The chart (right), adapted from wunderground.com, compares the Fujita Scale to the Enhanced Fujita Scale.

EF SCALE	OLD F-SCALE	TYPICAL DAMAGE
<b>EF-0</b> (65-85mph)	<b>F0</b> (65-73 mph)	<b>Light damage.</b> Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
<b>EF-1</b> (86-110 mph)	<b>F1</b> (74-112 mph)	<b>Moderate damage.</b> Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
<b>EF-2</b> (111-135 mph)	<b>F2</b> (113-157 mph)	<b>Considerable damage.</b> Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light object missiles generated; cars lifted off the ground.
<b>EF-3</b> (136-165 mph)	<b>F3</b> (158-206 mph)	<b>Severe damage.</b> Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
<b>EF-4</b> (166-200 mph)	<b>F4</b> (207-260 mph)	<b>Devastating damage.</b> Well-constructed houses and whole frame houses were completely leveled; cars were thrown, and small missiles were generated.
<b>EF-5</b> (>200 mph)	<b>F5</b> (261-318 mph)	<b>Incredible damage.</b> Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (109 yards); high-rise buildings have significant structural deformation; incredible phenomena will occur.
EF No rating	<b>F6-F12</b> (319 mph to speed of sound)	<b>Inconceivable damage.</b> Should a tornado with a maximum wind speed in excess of EF5 occur, the extent and types of damage may not be conceivable. A number of missiles, such as iceboxes, water heaters, storage tanks, automobiles, etc., will create secondary damage to structures.

<sup>47</sup> Enhance Fujita Scale, [http://www.wunderground.com/resources/severe/fujita\\_scale.asp](http://www.wunderground.com/resources/severe/fujita_scale.asp)

## Downburst

According to NOAA, a downburst is a strong downdraft that causes damaging winds on or near the ground. Not to be confused with a downburst, the term "microburst" describes the size of the downburst. Comparing a microburst and the larger macroburst shows that both can cause extreme winds.

A microburst is a downburst with winds extending 2 ½ miles or less, lasting 5 to 15 minutes, and causing damaging winds as high as 168 MPH. A macroburst is a downburst with winds extending more than 2 ½ miles and lasting 5 to 30 minutes. Damaging winds, causing widespread, tornado-like damage, could be as high as 134 MPH.<sup>48</sup>

Below is the Beaufort Wind Scale, showing expected damage based on the wind (knots), developed in 1805 by Sir Francis Beaufort of England and posted on NOAA's Storm Prediction Center website.<sup>49</sup>

Force	Wind (Knots)	WMO Classification	The appearance of Wind Effects	
			On the Water	On Land
0	Less than 1	Calm	Sea surface smooth and mirror-like	Calm, smoke rises vertically
1	1-3	Light Air	Scaly ripples, no foam crests	Smoke drift indicates wind direction; still wind vanes
2	4-6	Light Breeze	Small wavelets, crests glassy, no breaking	Wind felt on face, leaves rustle, vanes begin to move
3	7-10	Gentle Breeze	Large wavelets, crests begin to break, scattered whitecaps	Leaves and small twigs constantly moving, light flags extended
4	11-16	Moderate Breeze	Small waves 1-4 ft. becoming longer, numerous whitecaps	Dust, leaves, and loose paper lifted; small tree branches move
5	17-21	Fresh Breeze	Moderate waves 4-8 ft. taking longer form, many whitecaps, some spray	Small trees in leaf begin to sway
6	22-27	Strong Breeze	Larger waves 8-13 ft., whitecaps common, more spray	Larger tree branches moving, whistling in wires
7	28-33	Near Gale	Sea heaps up, waves 13-20 ft., white foam streaks off breakers	Whole trees moving, resistance felt walking against the wind
8	34-40	Gale	Moderately high (13-20 ft.) waves of greater length, edges of crests begin to break into spindrift, foam blown in streaks	Whole trees in motion, resistance felt walking against the wind
9	41-47	Strong Gale	High waves (20 ft.), the sea begins to roll, dense streaks of foam, the spray may reduce visibility	Slight structural damage occurs, slate blows off roofs
10	48-55	Storm	Very high waves (20-30 ft.) with overhanging crests, sea white with densely blown foam, heavy rolling, lowered visibility	Seldom experienced on land, trees broken or uprooted, "considerable structural damage."
11	56-63	Violent Storm	Exceptionally high (30-45 ft.) waves, foam patches cover the sea, visibility more reduced	
12	64+	Hurricane	Air-filled with foam, waves over 45 ft., sea completely white with driving spray, visibility greatly reduced	

<sup>48</sup> NOAA - <http://www.srh.noaa.gov/jetstream/tstorms/wind.html>

<sup>49</sup> NOAA, Storm Prediction Center, <http://www.spc.noaa.gov/faq/tornado/beaufort.html>

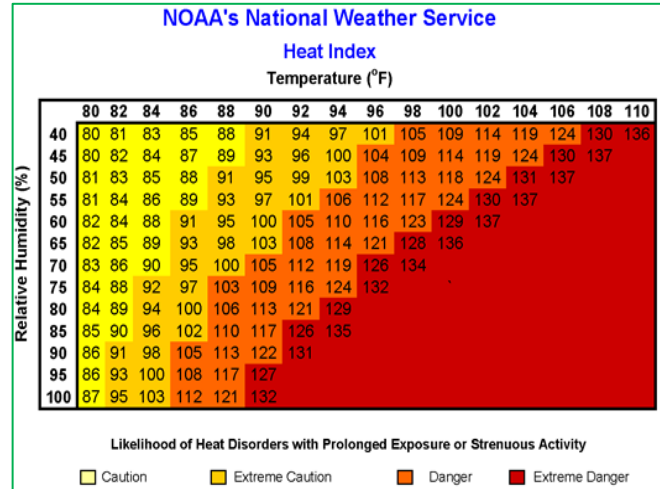


## \*EXTREME TEMPERATURES

### Extreme Heat

A heatwave is a “prolonged period of excessive heat, often combined with excessive humidity.” Heat kills by pushing the human body beyond its limits. In extreme heat and high humidity, evaporation is slowed, and the body must work extra hard to maintain a normal temperature.

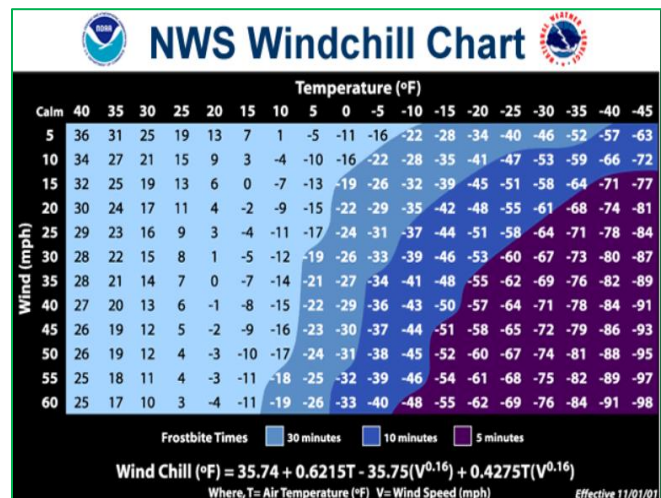
Most heat disorders occur when a victim is overexposed to heat or has over-exercised for their age and physical condition. Older adults, young children, and those who are sick or overweight are more likely to succumb to extreme heat.



Conditions that can induce heat-related illnesses include stagnant atmospheric conditions and poor air quality. Consequently, people living in urban areas may be at greater risk from a prolonged heat wave than those in rural areas. Also, asphalt and concrete store heat longer and gradually release heat at night, producing higher nighttime temperatures known as the "urban heat island effect."<sup>50</sup> The chart above explains the likelihood of heat disorders that may result from high heat.<sup>51</sup>

### Extreme Cold

What constitutes extreme cold and its effects can vary across different areas of the country. In regions relatively unaccustomed to winter weather, near-freezing temperatures are considered “extreme cold.” Whenever temperatures drop decidedly below average and wind speed increases, heat can leave your body more rapidly; these weather-related conditions may lead to serious health problems. Extreme cold is dangerous; it can bring on health emergencies in susceptible people without shelter, those stranded, or live in poorly insulated homes or without heat.<sup>52</sup> The National Weather Service Chart (to the right) shows windchill due to wind and temperature.<sup>53</sup>



<sup>50</sup> NOAA, Index/Heat Disorders; <http://www.srh.noaa.gov/ssd/html/heatwv.htm>

<sup>51</sup> NOAA; <http://www.nws.noaa.gov/os/heat/index.shtml>

<sup>52</sup> CDC; <http://www.bt.cdc.gov/disasters/winter/guide.asp>

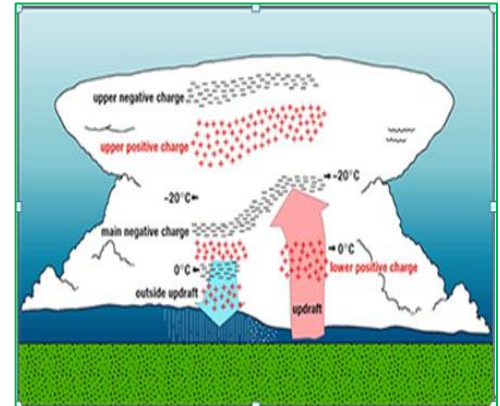
<sup>53</sup> National Weather Service; <http://www.nws.noaa.gov/om/windchill/>

**\*LIGHTNING & HAIL**

**Lightning**

The NOAA National Severe Storms Laboratory (NSSL) stated, “Lightning is a giant spark of electricity in the atmosphere between clouds, the air, or the ground. In the early stages of development, air acts as an insulator between the positive and negative charges in the cloud and between the cloud and the ground. When the opposite charges build up enough, this insulating capacity of the air breaks down, and there is a rapid discharge of electricity that we know as lightning. The flash of lightning temporarily equalizes the charged regions in the atmosphere until the opposite charges build up again.”<sup>54</sup>

Thunder, a result of lightning, is created when the “lightning channel heats the air to around 18,000 degrees Fahrenheit...”<sup>55</sup> thus causing the rapid expansion of the air and the sounds we hear as thunder. Although thunder heard during a storm cannot hurt you, the lightning associated with the thunder can strike people and strike homes, outbuildings, grass, and trees, sparking disaster. In addition, wildfires and structure loss are at high risk during severe lightning events.



*“A conceptual model shows the electrical charge distribution inside deep convection (thunderstorms), developed by NSSL and university scientists. In the main updraft (in and above the red arrow), there are four main charge regions. In the convective region but outside the out draft (in and above the blue arrow), there are more than four charge regions.” - NOAA*

Although thunderstorms and their associated lightning can occur any time of year, in New England, they are most likely to occur in the summer and late afternoon or early evening; they may even occur during a winter snowstorm. Trees, tall buildings, and mountains are often lightning targets because their tops are closer to the cloud; however, lightning is unpredictable and does not always strike the tallest thing in the area.

Thunderstorms and lightning occur most commonly in moist, warm climates. Data from the National Lightning Detection Network shows that an average of 20,000,000 cloud-to-ground flashes occur annually over the continental US. Around the world, lightning strikes the ground about 100 times each second, or 8 million times a day.

In general, lightning decreases across the US mainland toward the northwest. Over the entire year, the highest frequency of cloud-to-ground lightning is in Florida between Tampa and Orlando. This phenomenon is due to the presence, on many days during the year, of significant moisture content in the atmosphere at low levels (below 5,000 feet) and high surface temperatures that produce strong sea breezes along the Florida 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.”<sup>56</sup>

<sup>54</sup> NOAA National Severe Storms Laboratory, <https://www.nssl.noaa.gov/education/svrwx101/lightning>

<sup>55</sup> Ibid

<sup>56</sup> Ibid



## Hailstorm

### Lightning Activity Level (LAL) Grid

The lightning activity level is a common parameter in fire weather forecasts nationwide. LAL is a measure of the amount of lightning activity using values 1 to 6 where:

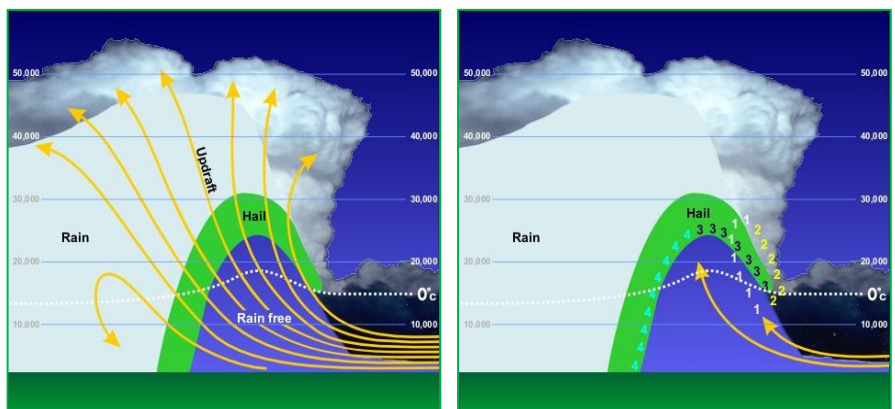
LAL	Cloud & Storm Development	Lightning Strikes 15 Minutes
1	No thunderstorms	-
2	Cumulus clouds are common, but only a few reach the towering cumulus stage. A single thunderstorm must be confirmed in the observation area. The clouds produce mainly virga, but light rain will occasionally reach the ground. Lightning is very infrequent.	1-8
3	Towering cumulus covers less than two-tenths of the sky. Thunderstorms are few, but two to three must occur within the observation area. Light to moderate rain will reach the ground, and lightning is infrequent.	9-15
4	Towering cumulus covers two to three-tenths of the sky. Thunderstorms are scattered, and more than three must occur within the observation area. Moderate rain is common, and lightning is frequent.	16-25
5	Towering cumulus and thunderstorms are numerous. They cover more than three-tenths and occasionally obscure the sky. Rain is moderate to heavy, and lightning is frequent and intense.	>25
6	Similar to LAL 3, except thunderstorms are dry.	

<http://www.prh.noaa.gov/hnl/pages/LAL.php>

Hailstones are balls of ice that grow as they are held up by winds, known as updrafts, that blow upwards in thunderstorms. The updrafts carry droplets of supercooled water, water at a below-freezing temperature that is not yet ice. The supercooled water droplets freeze into ice balls and grow to become hailstones. The faster the updraft, the bigger the stones can grow. Most hailstones are smaller in diameter than a dime, but stones weighing more than a pound have been recorded. "The largest hailstone recovered in the US fell in Vivian, SD on June 23, 2010, with a diameter of 8 inches and a circumference of 18.62 inches. It weighed 1 lb. 15 oz."<sup>57</sup>

Dime/Penny	0.75
Nickel	0.88
Quarter	1.00
Half Dollar	1.25
Ping Pong	1.50
Golf Ball	1.75
Hen Egg	2.00
Tennis Ball	2.50
Baseball	2.75
Tea Cup	3.00
Grapefruit	4.00
Softball	4.50

How hailstones grow is complicated, but the results are irregular balls of ice that can be as large as baseballs. The chart above shows the relative size differences and a common way to "measure" the size of hail based on diameter.<sup>58</sup> The charts to the right show how hail is formed.<sup>59</sup>



<sup>57</sup> NOAA National Severe Storms Laboratory; <https://www.nssl.noaa.gov/education/svrwx101/hail/>

<sup>58</sup> <http://www.pinterest.com/pin/126171227030590678/>

<sup>59</sup> <http://oceanservice.noaa.gov/education/yos/resource/JetStream/tstorms/hail.htm#hail>

### \*WILDFIRES

The National Wildfire Coordinating Group (NWCG) states that wildfires are designated into seven categories, as seen in the top chart to the right.<sup>60</sup> For statistical analysis, the US Forest Service recognizes the cause of fires according to the bottom chart to the right:<sup>61</sup>

According to the International Wildland-Urban Interface Code (IWUIC), the definition of wildfire is “an uncontrolled fire spreading through vegetative fuels exposing and possibly consuming structures”. In addition, the IWUIC defines the Wildland Urban Interface (WUI) area as *“that geographical area where structures and other human development meets or intermingles with wildland or vegetative fuels.”*<sup>62</sup>

There are two major potential losses with wildfire: the forest and the threat to the built-up human environment. In many cases, the only time it is feasible for a community to control a wildfire is when it threatens the built-up human environment.

### \*TROPICAL & POST-TROPICAL CYCLONES

#### **Cyclones (Hurricanes)**

A hurricane is a tropical cyclone with 74 miles per hour or more winds and blows in a large spiral around a relatively calm center. The storm's eye is usually 20-30 miles wide, and the storm may extend over 400 miles. High winds are a primary cause of hurricane-inflicted loss of life and property damage.

“The Saffir-Simpson Hurricane Wind Scale” (on the following page<sup>63</sup>) is a 1 to 5 rating based on a hurricane's sustained wind speed. This scale estimates potential property damage. Hurricanes reaching Category 3 and higher are considered major hurricanes because of their potential for significant loss of life and damage. Category 1 and 2 storms are still dangerous and require preventative measures. In the western North Pacific, the term “super typhoon” is used for tropical cyclones with sustained winds exceeding 150 mph.”<sup>64</sup>

Flooding is often caused by the coastal storm surge of the ocean and torrential rains, both of which may accompany a hurricane; these floods can result in the loss of lives and property.

#### **Post-Tropical Cyclones**

A tropical depression becomes a tropical storm with maximum sustained winds between 39-73 mph. Although tropical storms have less than 74 miles per hour winds, they can do significant damage like hurricanes. The damage most felt by tropical storms is from the torrential rains, which cause rivers and streams to flood and overflow their banks.

Class	Aces Burned
Class A	0 to .25 acres
Class B	.26 to 9 acres
Class C	10 to 99 acres
Class D	100 to 299 acres
Class E	300 to 999 acres
Class F	1,000 to 4,999 acres
Class G	5,000 acres or more
Code	Statistical Cause
1	Lightning
2	Equipment Use
3	Smoking
4	Campfire
5	Debris Burning
6	Railroad
7	Arson
8	Children
9	Miscellaneous

<sup>60</sup> <http://www.nwcg.gov/pms/pubs/glossary/s.htm>

<sup>61</sup> [https://www.fs.fed.us/cgi-bin/Directives/get\\_dirs/fsh?5109.14](https://www.fs.fed.us/cgi-bin/Directives/get_dirs/fsh?5109.14)

<sup>62</sup> International Wildland-Urban Interface Code, 2012, International Code Council, Inc.

<sup>63</sup> National Hurricane Center; <http://www.nhc.noaa.gov/aboutsshws.php>

<sup>64</sup> National Hurricane Center, NOAA; <http://www.nhc.noaa.gov/aboutsshws.php>

Rainfall from tropical storms has been reported at up to 6 inches per hour; 43 inches of rain in 24 hours was reported in Alvin, TX, due to Tropical Storm Claudette.<sup>65</sup>

Category	Sustained Winds	Types of Damage Due to Hurricane Winds
1	74-95 mph 64-82 kt. 119-153 km/h	<b>Very dangerous winds will produce some damage:</b> Well-constructed frame homes could have damage to the roof, shingles, vinyl siding, and gutters. Large branches of trees will snap, and shallowly rooted trees may be toppled. Extensive damage to power lines and poles will likely result in power outages that could last several days.
2	96-110 mph 83-95 kt. 154-177 km/h	<b>Extremely dangerous winds will cause extensive damage:</b> Well-constructed frame homes could sustain significant roof and siding damage. In addition, many shallowly rooted trees will be snapped or uprooted, blocking numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3 (major)	111-129 mph 96-112 kt. 178-208 km/h	<b>Devastating damage will occur:</b> Well-built frame homes may incur significant damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4 (major)	130-156 mph 113-136 kt. 209-251 km/h	<b>Catastrophic damage will occur:</b> Well-built frame homes can sustain severe damage by losing most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted, and power poles will be downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5 (major)	157 mph or higher 137 kt. or higher 252 km/h or higher	<b>Catastrophic damage will occur:</b> A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

## \*EARTHQUAKES

An earthquake is a rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric, and phone lines, and often cause landslides, flash floods, fires, and avalanches. More significant earthquakes usually begin with slight tremors but rapidly take the form of one or more violent shocks and end in vibrations of gradually diminishing force called aftershocks. An earthquake's underground point of origin is called its focus; the point on the surface directly above the focus is the epicenter. Using two scales widely determines the magnitude and intensity of an earthquake. The two scales are the Richter scale (which measures strength or magnitude) and the Mercalli Scale (which measures intensity or severity). The chart to the right shows the two scales relative to one another. The Richter scale measures earthquakes starting at one as the lowest, with each successive unit being about ten times stronger and more severe than the previous one.<sup>66</sup>

It is well documented that fault lines run throughout New Hampshire, but high-magnitude earthquakes have not been common in NH history. Four earthquakes occurred in New Hampshire between 1924 and 1989, having a magnitude of 4.2 or more. Two occurred in Ossipee, one west of Laconia and one near the Quebec border.

Modified Mercalli Scale		Richter Magnitude Scale
I	Detected only by sensitive instruments	1.5
II	Felt by few persons at rest, especially on upper floors; delicately suspended objects may swing	2
III	Felt noticeably indoors, but not always recognized as earthquake; standing autos rock slightly, vibration like passing truck	2.5
IV	Felt indoors by many, outdoors by few, at night some may awaken; dishes, windows, doors disturbed; autos rock noticeably	3
V	Felt by most people; some breakage of dishes, windows, and plaster; disturbance of tall objects	3.5
VI	Felt by all, many frightened and run outdoors; falling plaster and chimneys, damage small	4
VII	Everybody runs outdoors; damage to buildings varies depending on quality of construction; noticed by drivers of autos	4.5
VIII	Panel walls thrown out of frames; fall of walls, monuments, chimneys; sand and mud ejected; drivers of autos disturbed	5
IX	Buildings shifted off foundations, cracked, thrown out of plumb; ground cracked; underground pipes broken	5.5
X	Most masonry and frame structures destroyed; ground cracked, rails bent, landslides	6
XI	Few structures remain standing; bridges destroyed, fissures in ground, pipes broken, landslides, rails bent	6.5
XII	Damage total; waves seen on ground surface, lines of sight and level distorted, objects thrown up in air	7

<sup>65</sup> [http://www.wpc.ncep.noaa.gov/research/mcs\\_web\\_test\\_test\\_files/Page1637.htm](http://www.wpc.ncep.noaa.gov/research/mcs_web_test_test_files/Page1637.htm)

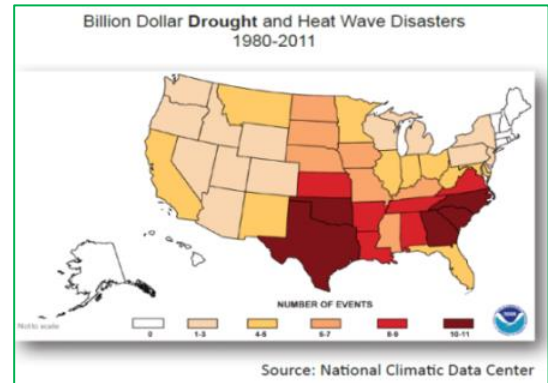
<sup>66</sup> Modified Mercalli Scale/Richter Scale Chart; MO DNR, [http://www.dnr.mo.gov/geology/geosrv/geores/richt\\_mercalli\\_relation.htm](http://www.dnr.mo.gov/geology/geosrv/geores/richt_mercalli_relation.htm)

**\*DROUGHT**

A drought is a long period of abnormally low precipitation that adversely affects the growing season or living conditions of plants and animals. The effect of drought is indicated through measurements of soil moisture, groundwater levels, and streamflow. Droughts are rare in New Hampshire, are generally less damaging and disruptive than floods, and are more difficult to define.

However, not all of these indicators will be minimal during a drought. For example, frequent minor rainstorms can replenish the soil moisture without raising groundwater levels or increasing streamflow. Low stream flow also correlates with low groundwater levels because groundwater discharge to streams and rivers maintains streamflow during extended dry periods. Low streamflow and low groundwater levels commonly cause diminished water supply.

The US Drought Monitor provides an intensity scale, as shown below, to indicate the “Category” of drought at any given time. During the peak months of the 2016 drought in New Hampshire, the southern part of the state was in Category D3 or Extreme Drought.



Category	Description	Possible Impacts	Ranges				
			Palmer Drought Severity Index (PDSI)	CPC Soil Moisture Model (Percentiles)	USGS Weekly Streamflow (Percentiles)	Standardized Precipitation Index (SPI)	Objective Drought Indicator Blends (Percentiles)
D0	Abnormally Dry	<ul style="list-style-type: none"> <li>Going into drought: <ul style="list-style-type: none"> <li>short-term dryness slowing planting, growth of crops or pastures</li> </ul> </li> <li>Coming out of drought: <ul style="list-style-type: none"> <li>some lingering water deficits</li> <li>pastures or crops not fully recovered</li> </ul> </li> </ul>	-1.0 to -1.9	21 to 30	21 to 30	-0.5 to -0.7	21 to 30
D1	Moderate Drought	<ul style="list-style-type: none"> <li>Some damage to crops, pastures</li> <li>Streams, reservoirs, or wells low, some water shortages developing or imminent</li> <li>Voluntary water-use restrictions requested</li> </ul>	-2.0 to -2.9	11 to 20	11 to 20	-0.8 to -1.2	11 to 20
D2	Severe Drought	<ul style="list-style-type: none"> <li>Crop or pasture losses likely</li> <li>Water shortages common</li> <li>Water restrictions imposed</li> </ul>	-3.0 to -3.9	6 to 10	6 to 10	-1.3 to -1.5	6 to 10
D3	Extreme Drought	<ul style="list-style-type: none"> <li>Major crop/pasture losses</li> <li>Widespread water shortages or restrictions</li> </ul>	-4.0 to -4.9	3 to 5	3 to 5	-1.6 to -1.9	3 to 5
D4	Exceptional Drought	<ul style="list-style-type: none"> <li>Exceptional and widespread crop/pasture losses</li> <li>Shortages of water in reservoirs, streams, and wells creating water emergencies</li> </ul>	-5.0 or less	0 to 2	0 to 2	-2.0 or less	0 to 2

<https://droughtmonitor.unl.edu/AboutUSDM/AbouttheData/DroughtClassification.aspx>

### **\*LANDSLIDE & EROSION**

Erosion is the wearing away of lands, such as riverbank loss, beach, shoreline, or dune material. It is measured as the rate of change in the position or displacement of a riverbank or shoreline over a period of time. Short-term erosion typically results from periodic natural events, such as flooding, hurricanes, storm surges, and windstorms, but may be intensified by human activities. Long-term erosion results from multi-year impacts such as repetitive flooding, wave action, sea-level rise, sediment loss, subsidence, and climate change. Death and injury are not typically associated with erosion; however, erosion can destroy buildings and infrastructure.<sup>67</sup>

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

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

There are also multiple types of landslides:

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

Like flooding, landslides are unique in how they affect different geographic, topographic, and geologic areas. Therefore, consideration of many measurements is required to determine the severity of the landslide event.<sup>68</sup>

### **\*INFECTIOUS DISEASES**

#### ***Bacterial & Viral Infections***

Many organisms live inside our bodies and on our skin. Although these organisms are generally harmless and sometimes helpful, they can cause illnesses. Infectious diseases can be transmitted from one person to another by bites from animals or insects (zoonotic), from the environment, or by consuming food or water that has been contaminated. In addition, infectious diseases may be caused by bacteria, viruses, fungi, and parasites.<sup>69</sup>

Some of the more common infectious diseases include Lyme disease, HIV/AIDS, Tuberculosis, Rabies, West Nile Virus, Eastern Equine Encephalitis (EEE), Ebola, Avian Flu, Enterovirus D-68, Influenza, Hepatitis A, Zika Virus, Meningitis, Legionella, Sexually Transmitted Diseases (STD), Hepatitis C, Salmonella, SARS, and Staph.<sup>70</sup>

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<sup>67</sup> Mitigation Ideas, A Resource for Reducing Risk to Natural Hazards, FEMA, January 2013

<sup>68</sup> State of New Hampshire Multi-Hazard Mitigation Plan Update 2018 & <https://oas.org/dsd/publications/Unit/oea66e/ch10.htm>

<sup>69</sup> <https://www.mayoclinic.org/diseases-conditions/infectious-diseases/symptoms-causes/syc-20351173>

<sup>70</sup> <https://www.dhhs.nh.gov/dphs/cdcs/index.htm>



*“Throughout history, millions of people have died of diseases such as bubonic plague or the Black Death, which is caused by Yersinia pestis bacteria, and smallpox, which is caused by the variola virus. In recent times, viral infections have been responsible for two major pandemics: the 1918-1919 “Spanish Flu” epidemic that killed 20-40 million people, and the ongoing HIV/AIDS epidemic that killed an estimated 1.5 million people worldwide in 2013 alone.*

*Bacterial and viral infections can cause similar symptoms such as coughing and sneezing, fever, inflammation, vomiting, diarrhea, fatigue, and cramping – all of which are ways the immune system tries to rid the body of infectious organisms. But bacterial and viral infections are dissimilar in many other important respects, most of them due to the organisms’ structural differences and the way they respond to medications.”<sup>71</sup>*

In early 2020, a novel coronavirus emerged in China, spreading worldwide to become the worst pandemic since the 1918 Spanish Flu. Known as Covid-19, this novel coronavirus has infected 675,001,862 people and caused the deaths of 6,870,133 individuals worldwide as of February 26, 2023. As of this date, confirmed cases in the US were reported to be 103,373,358, with 1,119,560 reported deaths.<sup>72</sup> Most US residents were advised to “stay at home” by State Governors; businesses closed to flatten the rising curve of confirmed cases through mitigation. As of June 2021, mitigation, testing, and vaccination efforts appeared to be working in much of the United States. However, the Delta and Omicron variants appeared in the US in December 2021, causing critical concerns about the possibility of overwhelming the country’s hospital systems.

The pandemic is an evolving worldwide crisis, affecting millions of workers in the United States and presenting massive economic results. Although most people confirmed with Covid-19 eventually recover, the virus has impacted the elderly and compromised individuals, particularly those in confined living quarters such as nursing homes and prisons.

The extent of infectious diseases is generally described by the level and occurrence of a particular disease as follows<sup>73</sup>:

Endemic .....	Disease with a constant presence or usual prevalence in a population within a geographic area
Sporadic .....	Disease that occurs infrequently and irregularly
Hyperendemic .....	Disease that is persistent and has high levels of occurrence
Epidemic.....	Disease that shows an increase, often sudden, in the number of cases of a disease above what is normally expected in that population in that area
Outbreak.....	Disease that has the same definition as an epidemic but is often used for a more limited geographic area
Cluster .....	Refers to an aggregation of cases grouped in place and time that are suspected to be greater than the number expected, even though the expected number may not be known.
Pandemic .....	An epidemic that has spread over several countries or continents, usually affecting a large number of people

<sup>71</sup> <https://www.webmd.com/a-to-z-guides/bacterial-and-viral-infections#1>

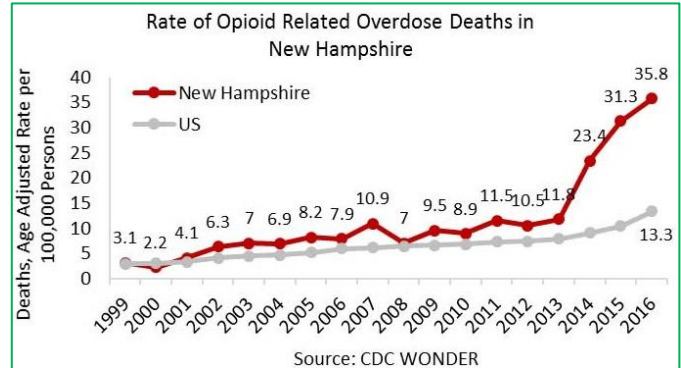
<sup>72</sup> <https://coronavirus.jhu.edu/map.html>

<sup>73</sup> <https://www.cdc.gov/ophs/csels/dsepd/ss1978/lesson1/section11.html>

## Opioid Crisis

A revised report by the National Institute of Drug Abuse states, “Every day, more than 130 people in the United States die after overdosing on opioids. The misuse of and addiction to opioids—including prescription pain relievers, heroin, and synthetic opioids such as fentanyl - is a serious national crisis that affects public health as well as social and economic welfare. The Centers for Disease Control and Prevention estimates that the total “economic burden” of prescription opioid misuse alone in the United States is \$78.5 billion a year, including the costs of healthcare, lost productivity, addiction treatment, and criminal justice involvement.”

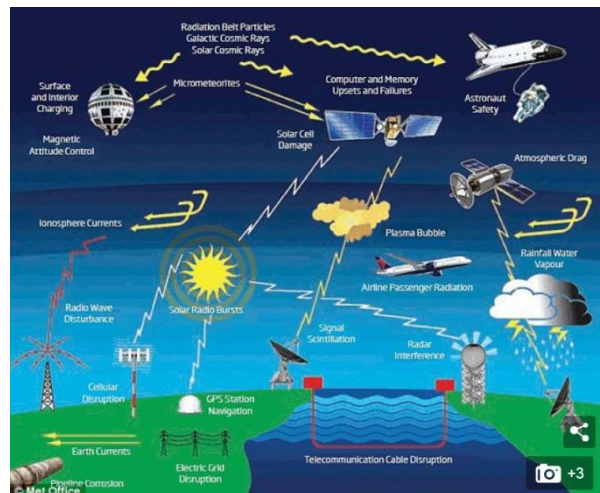
According to the National Institute on Drug Abuse, “New Hampshire has the second highest rate of opioid-related overdose deaths – a rate of 35.8 deaths per 100,000 persons – nearly 3 times higher than the national rate of 13.2 deaths per 100,000. From 1999 through 2016, opioid-related deaths in New Hampshire tripled. This increase was mainly driven by the number of deaths related to synthetic opioids (predominately fentanyl), which increased more than tenfold, from 30 to 363 deaths, during this time.”<sup>74</sup> The chart to the right shows the increase in opioid-related overdose deaths in New Hampshire compared to the US overall.<sup>75</sup>



## \*SOLAR STORM & SPACE WEATHER

When sudden amounts of stored magnetic energy and ions are discharged from the Sun’s surface, solar flares, high-speed solar wind streams, solar energetic particles, and coronal mass ejections (CMEs) are possible. This magnetic energy sometimes finds its way to Earth by following the Sun’s magnetic field. Then, upon collision with the Earth’s magnetic field, these charged particles enter the Earth’s upper atmosphere, causing Auroras.

Charged magnetic particles can produce their own magnetic field, disrupting navigation, communication systems, and GPS satellites. In addition, they can potentially produce Geomagnetic Induced Currents (GICs), affecting the power grid and pipelines. In addition, an electromagnetic surge from a solar storm can produce an Electromagnetic Pulse (EMP). An EMP could cause significant damage to infrastructures such as nuclear power plants, banking systems, the electrical grid, sewage treatment facilities, cell phones, landlines, and even vehicles. The image above shows the potential impacts of solar storms and space weather.<sup>76</sup>



<sup>74</sup> <https://www.drugabuse.gov/drugs-abuse/opioids/opioid-summaries-by-state/new-hampshire-opioid-summary>

<sup>75</sup> Ibid

<sup>76</sup> <https://www.dailymail.co.uk/sciencetech/article-3764842/A-solar-storm-destroy-planet-unless-create-massive-magnetic-shield-protect-Earth-warns-expert.html>



## Solar Storm & Space Weather Extent<sup>77</sup>

Geomagnetic Storms				
Scale	Description	Effect	Physical Measure	Average Frequency (1 cycle = 11 years)
G 5	Extreme	<b>Power systems:</b> Widespread voltage control problems and protective system problems can occur; some grid systems may experience complete collapse or blackouts. Transformers may experience damage. <b>Spacecraft operations:</b> May experience extensive surface charging, problems with orientation, uplink/downlink, and tracking satellites. <b>Other systems:</b> Pipeline currents can reach hundreds of amps, HF (high frequency) radio propagation may be impossible in many areas for one to two days, satellite navigation may be degraded for days, low-frequency radio navigation can be out for hours, and aurora has been seen as low as Florida and southern Texas (typically 40° geomagnetic lat.).	Kp. = 9	4 per cycle (4 days per cycle)
G 4	Severe	<b>Power systems:</b> Possible widespread voltage control problems and some protective systems will mistakenly trip out key assets from the grid. <b>Spacecraft operations:</b> May experience surface charging and tracking problems; corrections may be needed for orientation problems. <b>Other systems:</b> Induced pipeline currents affect preventive measures, HF radio propagation is sporadic, satellite navigation is degraded for hours, low-frequency radio navigation is disrupted, and aurora has been seen as low as Alabama and northern California (typically 45° geomagnetic lat.).	Kp. = 8, including a 9-	100 per cycle (60 days per cycle)
G 3	Strong	<b>Power systems:</b> Voltage corrections may be required; false alarms are triggered on some protection devices. <b>Spacecraft operations:</b> Surface charging may occur on satellite components, drag may increase on low-Earth-orbit satellites, and corrections may be needed for orientation problems. <b>Other systems:</b> Intermittent satellite navigation and low-frequency radio navigation problems may occur, HF radio may be intermittent, and aurora has been seen as low as Illinois and Oregon (typically 50° geomagnetic lat.).	Kp. = 7	200 per cycle (130 days per cycle)
G 2	Moderate	<b>Power systems:</b> High-latitude power systems may experience voltage alarms; long-duration storms may cause transformer damage. <b>Spacecraft operations:</b> Corrective actions to orientation may be required by ground control; possible changes in drag affect orbit predictions. <b>Other systems:</b> HF radio propagation can fade at higher latitudes, and aurora has been seen as low as New York and Idaho (typically 55° geomagnetic lat.).	Kp. = 6	600 per cycle (360 days per cycle)
G 1	Minor	<b>Power systems:</b> Weak power grid fluctuations can occur. <b>Spacecraft operations:</b> Minor impact on satellite operations possible. <b>Other systems:</b> Migratory animals are affected at this and higher levels; aurora is commonly visible at high latitudes (northern Michigan and Maine).	Kp. = 5	1700 per cycle (900 days per cycle)

Solar Radiation Storms				
Scale	Description	Effect	Physical Measure (Flux level of $\geq 10$ MeV particles)	Average Frequency (1 cycle = 11 years)
S 5	Extreme	<b>Biological:</b> Unavoidable high radiation hazard to astronauts on EVA (extra-vehicular activity); passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk. <b>Satellite operations:</b> Satellites may be rendered useless, memory impacts can cause loss of control, may cause serious noise in image data, star-trackers may be unable to locate sources, permanent damage to solar panels is possible. <b>Other systems:</b> Complete blackout of HF (high frequency) communications possible through the polar regions and position errors make navigation operations extremely difficult.	$10^5$	Fewer than 1 per cycle
S 4	Severe	<b>Biological:</b> Unavoidable radiation hazard to astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk. <b>Satellite operations:</b> May experience memory device problems and noise on imaging systems; star-tracker problems may cause orientation problems, and solar panel efficiency can be degraded. <b>Other systems:</b> Blackout of HF radio communications through the polar regions and increased navigation errors over several days are likely.	$10^4$	3 per cycle

<sup>77</sup> Extent charts taken from <https://www.weather.gov/akq/SpaceWeather>

Solar Radiation Storms				
S 3	Strong	<b>Biological:</b> Radiation hazard avoidance is recommended for astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk. <b>Satellite operations:</b> Single-event upsets, noise in imaging systems, and a slight reduction of efficiency in solar panels are likely. <b>Other systems:</b> Degraded HF radio propagation through the polar regions and navigation position errors likely.	$10^3$	10 per cycle
S 2	Moderate	<b>Biological:</b> Passengers and crew in high-flying aircraft at high latitudes may be exposed to elevated radiation risk. <b>Satellite operations:</b> Infrequent single-event upsets are possible. <b>Other systems:</b> minor effects on HF propagation through the polar regions and navigation at polar cap locations possibly affected.	$10^2$	25 per cycle
S 1	Minor	<b>Biological:</b> None. <b>Satellite operations:</b> None. <b>Other systems:</b> Minor impacts on HF radio in the polar regions.	10	50 per cycle

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

## AVALANCHES

According to the National Snow & Ice Data Center, an avalanche is a rapid flow of snow down a hill or mountainside. Although avalanches can occur on any slope given the right conditions, certain times of the year and specific locations are naturally more dangerous than others. Most avalanches tend to happen during wintertime, particularly from December to April. However, avalanche fatalities have been recorded for every month of the year.”<sup>78</sup>



“All that is necessary for an avalanche is a mass of snow and a slope for it to slide down...A large avalanche in North America might release 230,000 cubic meters (300,000 cubic yards) of snow. That is the equivalent of 20 football fields filled 3 meters (10 feet) deep with snow. However, such large avalanches are often naturally released, when the snowpack becomes unstable and layers of snow fail. Skiers and recreationists usually trigger smaller, but often more deadly avalanches.”

North American Public Avalanche Danger Scale				
Avalanche danger is determined by the likelihood, size and distribution of avalanches.				
Danger Level		Travel Advice	Likelihood of Avalanches	Avalanche Size and Distribution
5 Extreme		Avoid all avalanche terrain.	Natural and human-triggered avalanches certain.	Large to very large avalanches in many areas.
4 High		Very dangerous avalanche conditions. Travel in avalanche terrain <u>not</u> recommended.	Natural avalanches likely; human-triggered avalanches very likely.	Large avalanches in many areas; or very large avalanches in specific areas.
3 Considerable		Dangerous avalanche conditions. Careful snowpack evaluation, cautious route-finding and conservative decision-making essential.	Natural avalanches possible; human-triggered avalanches likely.	Small avalanches in many areas; or large avalanches in specific areas; or very large avalanches in isolated areas.
2 Moderate		Heightened avalanche conditions on specific terrain features. Evaluate snow and terrain carefully; identify features of concern.	Natural avalanches unlikely; human-triggered avalanches possible.	Small avalanches in specific areas; or large avalanches in isolated areas.
1 Low		Generally safe avalanche conditions. Watch for unstable snow on isolated terrain features.	Natural and human-triggered avalanches unlikely.	Small avalanches in isolated areas or extreme terrain.
Safe backcountry travel requires training and experience. You control your own risk by choosing where, when and how you travel.				

An avalanche has three main parts (see the image above). The first and most unstable is the “starting zone”, where the snow can “fracture” and slide. “Typical starting zones are higher up on slopes. However, given the right conditions, snow can fracture at any point on the slope.”<sup>79</sup>

The second part is the “avalanche track”, or the downhill path the avalanche follows. The avalanche is evident where large swaths of trees are missing or large pileups of rock, snow, trees, and debris are at the bottom of an incline.

The third part of an avalanche is the “runout zone”. The runout zone is where the avalanche has stopped and left the most extensive and highest pile of snow and debris.

“Several factors may affect the likelihood of an avalanche, including weather, temperature, slope steepness, slope orientation (whether the slope is facing north or south), wind direction, terrain, vegetation, and general snowpack conditions. Different combinations of these factors can create low, moderate, or extreme avalanche conditions. In addition, some of these conditions, such as temperature and snowpack, can change on a daily or hourly basis.”<sup>80</sup>

<sup>78</sup> Copyright Richard Armstrong, NSIDC, <http://nsidc.org/cryosphere/snow/science/avalanches.html>

<sup>79</sup> NSIDC, <http://nsidc.org/cryosphere/snow/science/avalanches.html>; image credit: Betsy Armstrong

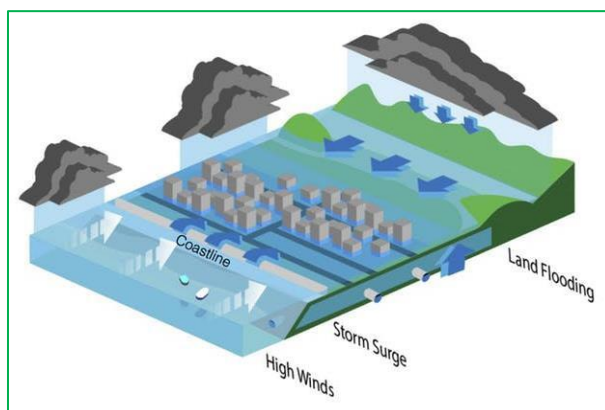
<sup>80</sup> Copyright Richard Armstrong, NSIDC, <http://nsidc.org/cryosphere/snow/science/avalanches.html>

When an avalanche is possible, an “avalanche advisory” is issued. This preliminary notification warns hikers, skiers, snowmobilers, and responders that conditions may be favorable for the development of avalanches. The chart above shows avalanche danger determined by likelihood, size, and distribution.<sup>81</sup>

### **COASTAL FLOODING**

Coastal areas are particularly susceptible to flooding, erosion, storm surge, and sea-level rise due to tropical and post-tropical cyclones, heavy rain events, gale-force winds, and other natural phenomena. The flooding that results is “determined by a combination of several factors such as storm intensity, forward speed, storm area size, coastline characteristics, angle of approach to the coast, tide height.”<sup>82</sup>

The severity of the flooding can vary depending on “both the speed of onset (how quickly the floodwaters rise) and the flood duration. Nor’easters can impact the region for several days and produce storm surge with or without the addition of inland runoff from heavy precipitation.”<sup>83</sup> As shown in the image below, storm surge and inland flooding can affect the severity of flooding along the shore.<sup>84</sup>



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<sup>81</sup> [http://www.avalanche.org/danger\\_card.php](http://www.avalanche.org/danger_card.php)

<sup>82</sup> NH Multi-hazard Mitigation Plan-2018, page 55

<sup>83</sup> Ibid

<sup>84</sup> Ibid, page 53, “Understanding compound flooding from land and ocean sources”, Theodore Scontras, University of Maine)

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## 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-4693	Inland Flooding, High Winds, Snowstorms	December 22-25, 2022	Belknap, Grafton, Coos & Carroll	<b>Major Disaster Declaration, DR-4693:</b> A severe winter storm occurred December 22-25, 2022. Heavy, wet snow caused trees and power lines to fall; some roadways were closed. The declaration was declared in four of the state's ten counties.
DR-4624	Inland Flooding	July 29-July 30, 2021	Cheshire & Sullivan	<b>Major Disaster Declaration, DR-4624:</b> The Federal Emergency Management Agency announced a major disaster declaration and notification of individual and public assistance on October 4, 2021, for two NH Counties.
DR-4622	Inland Flooding	July 17-19, 2021	Cheshire	<b>Major Disaster Declaration, DR-4622:</b> The Federal Emergency Management Agency announced a major disaster declaration during a period of severe storms and flooding from July 17-19, 2021, in one New Hampshire County.
DR-4516	Infectious Disease	January 20, 2020 ongoing	All Ten NH Counties	<b>Major Disaster Declaration, DR-4516:</b> The Federal Emergency Management Agency ("FEMA") within the US Department of Homeland Security is giving public notice of its intent to assist the State of New Hampshire, local and tribal governments, and certain private nonprofit organizations under the major disaster declaration issued by the President on April 3, 2020, as a result of the Coronavirus Disease 2019 (Covid-19).
EM-3445	Infectious Disease	January 20, 2020 ongoing	All Ten NH Counties	<b>Emergency Declaration EM-3445:</b> A ten-county declaration to provide individual assistance and public assistance as a result of the impact of Covid-19
DR-4457	Severe Storm & Flooding	July 11-12, 2019	Grafton	<b>Major Disaster Declaration, DR-4457:</b> The Federal Emergency Management Agency announced a major disaster declaration for a period of severe storms and flooding from July 11-12, 2019, in one New Hampshire County.
DR-4371	Severe Winter Storms	March 13-14, 2018	Carroll, Strafford & Rockingham	<b>Major Disaster Declaration, DR 4371:</b> The Federal Emergency Management Agency announced a major disaster declaration on June 8, 2018, for a period of a severe winter storm from March 13-14, 2018.
DR-4370	Severe Storm & Flooding	March 2-8, 2018	Rockingham	<b>Major Disaster Declaration, DR 4370:</b> The Federal Emergency Management Agency announced a major disaster declaration on June 8, 2018, for a period of severe storms and flooding from March 2-8, 2018.
DR-4355	Severe Storms, Flooding	October 29-November 1, 2017	Sullivan, Grafton, Coos, Carroll, Belknap & Merrimack	<b>Major Disaster Declaration, DR-4355:</b> The Federal Emergency Management Agency (FEMA) announced that federal disaster assistance was available to supplement state and local recovery efforts in areas affected by severe storms and flooding from October 29-November 1, 2017, in five New Hampshire Counties.



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

Number	Hazard	Date of Event	Counties	Description
<b>DR-4026</b>	Tropical Storm Irene	August 26-September 6, 2011	Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, & Sullivan	<b>Major Disaster Declaration DR-4026:</b> Tropical Storm Irene Aug 26th- Sept 6, 2011, in Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, & Sullivan Counties.
<b>EM-3333</b>	Tropical Storm Irene	August 26-September 6, 2011	All Ten NH Counties	<b>Emergency Declaration EM-3333:</b> An emergency Declaration was declared for Tropical Storm Irene in all ten counties.
<b>DR-4006</b>	Severe Storm & Flooding	May 26-30, 2011	Coos & Grafton Counties	<b>Major Disaster Declaration DR-4006:</b> May flooding event occurred May 26th-30th, 2011, in Coos & Grafton Counties (Memorial Day Weekend Storm).
<b>DR-1913</b>	Severe Storms & Flooding	March 14-31, 2010	Hillsborough & Rockingham	<b>Major Disaster Declaration DR-1913:</b> Flooding in two NH counties occurred, including Hillsborough and Rockingham counties.
<b>DR-1892</b>	Severe Winter Storm, Rain & Flooding	February 23 - March 3, 2010	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan	<b>Major Disaster Declaration: DR-1892:</b> Flood and wind damage to most of southern NH, including six counties; 330,000 homes without power; more than \$2 million obligated by June 2010.
<b>DR-1812</b>	Severe Winter Storm & Ice Storm	December 11-23, 2008	All Ten NH Counties	<b>Major Disaster Declaration DR-1812:</b> Damaging ice storms to the entire state, including all ten NH counties; fallen trees and large-scale power outages; five months after December's ice storm battered the region, nearly \$15 million in federal aid had been obligated.
<b>EM-3297</b>	Severe Winter Storm	December 11, 2008	All Ten NH Counties	<b>Emergency Declaration EM-3297:</b> Severe winter storm beginning on December 11, 2008.
<b>DR-1799</b>	Severe Storms & Flooding	September 6-7, 2008	Hillsborough	<b>Major Disaster Declaration: DR-1799:</b> Severe storms and flooding began on September 6, 2008.
<b>DR-1787</b>	Severe Storms & Flooding	July 24-August 14, 2008	Belknap, Carroll & Grafton & Coos	<b>Major Disaster Declaration DR-1787:</b> Severe storms, a tornado, and flooding occurred on July 24, 2008.
<b>DR-1782</b>	Severe Storms, Tornado, & Flooding	July 24, 2008	Belknap, Carroll, Merrimack, Strafford & Rockingham	<b>Major Disaster Declaration DR-1782:</b> Tornado damage to several NH counties.
<b>DR-1695</b>	Nor'easter, Severe Storms & Flooding	April 15-23, 2007	All Ten NH Counties	<b>Major Disaster Declaration DR-1695:</b> Flood damages; FEMA & SBA obligated more than \$27.9 million in disaster aid following the April nor'easter. (Tax Day Storm)

Number	Hazard	Date of Event	Counties	Description
DR-1643	Severe Storms & Flooding	May 12-23, 2006	Belknap, Carroll, Grafton, Hillsborough, Merrimack, Rockingham & Strafford	<b>Major Disaster Declaration DR-1643:</b> Flooding in most of southern NH; May 12-23, 2006 (aka Mother's Day Storm).
DR-1610	Severe Storms & Flooding	October 7-18, 2005	Belknap, Cheshire, Grafton, Hillsborough, Merrimack & Sullivan	<b>Major Disaster Declaration DR-1610:</b> State and federal disaster assistance reached more than \$3 million to help residents and business owners in New Hampshire recover from losses from severe storms and flooding in October 2005.
EM-3258	Hurricane Katrina Evacuation	August 29-October 1, 2005	All Ten NH Counties	<b>Emergency Declaration EM-3258:</b> Assistance to evacuees from the area struck by Hurricane Katrina and to provide emergency assistance to those areas beginning on August 29, 2005, and continuing. The President's action made federal funding available to the state's ten counties.
EM-3211	Snow	March 11-12, 2005	Carroll, Cheshire, Hillsborough, Rockingham & Sullivan	<b>Emergency Declaration EM-3211:</b> March snowstorm; more than \$2 million has been approved to help pay for costs of the snow removal; Total aid for the March storm is <b>\$2,112,182.01</b> (Carroll: \$73,964.57; Cheshire: \$118,902.51; Hillsborough: \$710,836; Rockingham: \$445,888.99; Sullivan: \$65,088.53; State of NH: \$697,501.41)
EM-3208	Snow	February 10-11, 2005	Carroll, Cheshire, Coos, Grafton & Sullivan	<b>Emergency Declaration EM-3208:</b> FEMA had obligated more than \$1 million by March 2005 to help pay for costs of the heavy snow and high winds; Total aid for the February storm is <b>\$1,121,727.20</b> (Carroll: \$91,832.72; Cheshire: \$11,0021.18; Coos: \$11,6508.10; Grafton: \$213,539.52; Sullivan: \$68,288.90; State of NH: \$521,536.78)
EM 3208-002	Snow	January, February, March 2005	Belknap, Carroll, Cheshire, Grafton, Hillsborough, Rockingham, Merrimack, Strafford & Sullivan	<b>Emergency Declaration EM 3208-002:</b> The Federal Emergency Management Agency (FEMA) has obligated more than \$6.5 million to reimburse state and local governments in New Hampshire for costs incurred in three snowstorms that hit the state earlier this year, according to disaster recovery officials. Total aid for all three storms is \$6,892,023.87 (January: \$3,658,114.66; February: \$1,121,727.20; March: \$2,113,182)
EM-3207	Snow	January 22-23, 2005	Belknap, Carroll, Cheshire, Grafton, Hillsborough, Rockingham, Merrimack, Strafford & Sullivan	<b>Emergency Declaration EM-3207:</b> More than \$3.5 million has been approved to help pay for the costs of the heavy snow and high winds; Total aid for the January storm is <b>\$3,658,114.66</b> (Belknap: \$125,668.09; Carroll: \$52,864.23; Cheshire: \$134,830.95; Grafton: \$137,118.71; Hillsborough: \$848,606.68; Merrimack: \$315,936.55; Rockingham: \$679,628.10; Strafford: \$207,198.96; Sullivan: \$48,835.80; State of NH: \$1,107,426.59)
EM-3193	Snow	December 6-7, 2003	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack & Sullivan	<b>Emergency Declaration EM-3193:</b> The declaration covers jurisdictions with record and near-record snowfall that occurred throughout December 6-7, 2003
DR-1489	Severe Storms & Flooding	July 21-August 18, 2003	Cheshire & Sullivan	<b>Major Disaster Declaration DR-1489:</b> Floods stemming from persistent rainfall and severe storms caused damage to public property from July 21 through August 18, 2003.

Number	Hazard	Date of Event	Counties	Description
EM-3177	Snowstorm	February 17-18, 2003	Cheshire, Hillsborough, Merrimack, Rockingham & Strafford	<b>Emergency Declaration EM-3177:</b> Declaration covers jurisdictions with record and near-record snowfall from the snowstorm that occurred February 17-18, 2003
EM-3166	Snowstorm	March 5-7, 2001	Cheshire, Coos, Grafton, Hillsborough, Merrimack, Rockingham & Strafford	<b>Emergency Declaration EM-3166:</b> Declaration covers jurisdictions with record and near-record snowfall from the late winter storm that occurred in March 2001
DR-1305	Tropical Storm Floyd	September 16-18, 1999	Belknap, Cheshire & Grafton	<b>Major Disaster Declaration DR-1305:</b> The declaration covers damage to public property from the storm that spawned heavy rains, high winds, and flooding throughout September 16-18.
DR-1231	Severe Storms & Flooding	June 12-July 2, 1998	Belknap, Carroll, Grafton, Hillsborough, Merrimack & Rockingham	<b>Major Disaster Declaration DR-1231:</b>
DR-1199	Ice Storm	January 7-25, 1998	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, Strafford & Sullivan	<b>Major Disaster Declaration DR-1199:</b>
DR-1144	Severe Storms/Flooding	October 20-23, 1996	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan	<b>Major Disaster Declaration DR-1144:</b>
DR-1077	Storms/Floods	October 20-November 15, 1995	Carroll, Cheshire, Coos, Grafton, Merrimack & Sullivan	<b>Major Disaster Declaration DR-1077:</b>
EM-3101	High Winds & Record Snowfall	March 13-17, 1994	All Ten NH Counties	<b>Emergency Declaration EM-3101:</b>
DR-923	Severe Coastal Storm	October 30-31, 1991	Rockingham	<b>Major Disaster Declaration DR-923:</b>
DR-917	Hurricane Bob, Severe Storm	August 18-20, 1991	Carroll, Hillsborough, Rockingham & Strafford	<b>Major Disaster Declaration DR-917:</b>

Number	Hazard	Date of Event	Counties	Description
DR-876	Flooding, Severe Storm	August 7-11, 1990	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, & Sullivan	Major Disaster Declaration DR-876:
DR-789	Severe Storms & Flooding	March 30-April 11, 1987	Carroll, Cheshire, Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan	Major Disaster Declaration DR-789
DR-771	Severe Storms & Flooding	July 29-August 10, 1986	Cheshire, Hillsborough & Sullivan	Major Disaster Declaration DR-771:
EM-3073	Flooding	March 15, 1979	Coos	Emergency Declaration EM-3073:
DR-549	High Winds, Tidal Surge, Coastal Flooding & Snow	February 16, 1978	All Ten NH Counties	Major Disaster Declaration DR-549: Blizzard of 1978
DR-411	Heavy Rains, Flooding	January 21, 1974	Belknap, Carroll, Cheshire & Grafton	Major Disaster Declaration DR-411:
DR-399	Severe Storms & Flooding	July 11, 1973	All Ten NH Counties	Major Disaster Declaration DR-399:
DR-327	Coastal Storms	March 18, 1972	Rockingham	Major Disaster Declaration DR-327:
DR-11	Forest Fire	July 2, 1953	Carroll	Major Disaster Declaration DR-11:

**Source:**

Disaster Declarations for New Hampshire

[http://www.fema.gov/disasters/grid/state-tribal-government/33?field\\_disaster\\_type\\_term\\_tid\\_1=All](http://www.fema.gov/disasters/grid/state-tribal-government/33?field_disaster_type_term_tid_1=All)

## APPENDIX E: HAZARD MITIGATION PLANNING – LIST OF ACRONYMS

AAR .....	After Action Report	HSEM .....	Homeland Security Emergency Management
ACS .....	Acute Care Site	HSPD .....	Homeland Security Presidential Directive
ARC .....	American Red Cross	IAP .....	Incident Action Plan
ARES .....	Amateur Radio Emergency Service	IC.....	Incident Commander
BFE .....	Base Flood Elevation	ICC .....	Incident Command Center
BOCA.....	Building Officials and Code Administrators	ICS .....	Incident Command System
CBRNE .....	Chemical, Biological, Radiological,	JIC.....	Joint Information Center
CDC .....	Centers for Disease Control and Prevention	LEOP.....	Local Emergency Operations Plan
CDP .....	Center for Domestic Preparedness	MAPS .....	Mapping and Planning Solutions
CERT .....	Community Emergency Response Team	MCI.....	Mass Casualty Incident
CFR .....	Code of Federal Regulations	MEF.....	Mission Essential Function
CIKR .....	Critical Infrastructure & Key Resources	MOU .....	Memorandum of Understanding
CIP.....	Capital Improvements Program	NAWAS .....	National Warning System
COG .....	Continuity of Government	NEF .....	National Essential Function
COGCON.....	Continuity of Government Readiness Conditions	NERF.....	Non-Emergency Response Facility
COOP .....	Continuity of Operations	NFIP .....	National Flood Insurance Program
CPCC.....	Continuity Policy Coordination Committee	NGVD .....	National Geodetic Vertical Datum of 1929
CWPP .....	Community Wildfire Protection Plan	NIMS .....	National Incident Management System
DBHRT .....	Disaster Behavioral Health Response Team	NOAA .....	National Oceanic and Atmospheric Association
DEMD .....	Deputy Emergency Management Director	NRP.....	National Response Plan
DES .....	Department of Environment Services	NSPD .....	National Security Presidential Directive
DFO .....	Disaster Field Office	NTAS.....	National Terrorism Advisory System Nuclear and Explosive
DHHS .....	Department of Health and Human Services	NWS.....	National Weather Service
DHS .....	Department of Homeland Security	PA .....	Public Assistance
DMCR .....	Disaster Management Central Resource	PDA.....	Preliminary Damage Assessment
DBEA .....	Department of Business & Economic Affairs	PDD.....	Presidential Decision Directive
DNCR .....	Department of Natural & Cultural Resources	PIO .....	Public Information Officer
DOD.....	Department of Defense	PMEF .....	Primary Mission Essential Function
DOE .....	Department of Energy	POD .....	Point of Distribution
DOJ .....	Department of Justice	PPE .....	Personal Protective Equipment
DOT .....	Department of Transportation	PR .....	Potential Resources
DPW .....	Department of Public Works	PSA .....	Public Service Announcement
DRC.....	Disaster Recovery Center	RERP .....	Radiological Emergency Response Plan
EAS .....	Emergency Alert System	RNAT.....	Rapid Needs Assessment Team
EMD.....	Emergency Management Director	SERT.....	State Emergency Response Team
EMS.....	Emergency Medical Services	SITREP .....	Situation Report (Also SitRep)
EO .....	Executive Order	SNS.....	Strategic National Stockpile
EOC.....	Emergency Operations Center	SOG .....	Standard Operating Guidelines
EPA .....	U.S. Environmental Protection Agency	SOP.....	Standard Operating Procedures
EPZ.....	Emergency Planning Zone	SPNHF .....	Society for the Protection of NH Forests
ERF .....	Emergency Response Facility	UC .....	Unified Command
ERG.....	Emergency Relocation Group	USDA-FS .....	US Department of Agriculture – Forest Service
ESF.....	Emergency Support Functions	USGS .....	United States Geological Society
FEMA.....	Federal Emergency Management Agency	VOAD .....	Volunteer Organization Active in Disasters
FIRM.....	Flood Insurance Rate Map	WMD .....	Weapon(s) of Mass Destruction
FPP.....	Facilities & Populations to Protect	WMNF .....	White Mountain National Forest
GIS .....	Geographic Information System	WUI .....	Wildland Urban Interface
HazMat .....	Hazardous Material(s)		
HFRA .....	Healthy Forest Restoration Act		
HMGP .....	Hazard Mitigation Grant Program		
HSAS.....	Homeland Security Advisory System		



## APPENDIX F: POTENTIAL MITIGATION IDEAS<sup>85</sup>

### Drought

- D1 ..... Assess Vulnerability to Drought Risk
- D2 ..... Monitoring Drought Conditions
- D3 ..... Monitor Water Supply
- D4 ..... Plan for Drought
- D5 ..... Require Water Conservation during Drought Conditions
- D6 ..... Prevent Overgrazing
- D7 ..... Retrofit Water Supply Systems
- D8 ..... Enhance Landscaping & Design Measures
- D9 ..... Educate Residents on Water Saving Techniques
- D10 ..... Educate Farmers on Soil & Water Conservation Practices
- D11 ..... Purchase Crop Insurance

### Earthquake

- EQ1 .... Adopt & Enforce Building Codes
- EQ2 .... Incorporate Earthquake Mitigation into Local Planning
- EQ3 .... Map & Assess Community Vulnerability to Seismic Hazards
- EQ4 .... Conduct Inspections of Building Safety
- EQ5 .... Protect Critical Facilities & Infrastructure
- EQ6 .... Implement Structural Mitigation Techniques
- EQ7 .... Increase Earthquake Risk Awareness
- EQ8 .... Conduct Outreach to Builders, Architects, Engineers, and Inspectors
- EQ9 .... Provide Information on Structural & Non-Structural Retrofitting

### Erosion

- ER1 .... Map & Assess Vulnerability to Erosion
- ER2 .... Manage Development in Erosion Hazard Areas
- ER3 .... Promote or Require Site & Building Design Standards to Minimize Erosion Risk
- ER4 .... Remove Existing Buildings & Infrastructure from Erosion Hazard Areas
- ER5 .... Stabilize Erosion Hazard Areas
- ER6 .... Increase Awareness of Erosion Hazards

### Extreme Temperatures

- ET1 ..... Reduce Urban Heat Island Effect
- ET2 ..... Increase Awareness of Extreme Temperature Risk & Safety
- ET3 ..... Assist Vulnerable Populations
- ET4 ..... Educate Property Owners about Freezing Pipes

### Hailstorm

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

### Landslide

- LS1 ..... Map & Assess Vulnerability to Landslides
- LS2 ..... Manage Development in Landslide Hazard Areas
- LS3 ..... Prevent Impacts to Roadways
- LS4 ..... Remove Existing Buildings & Infrastructure from Landslide

### Lightning

- L1 ..... Protect Critical Facilities
- L2 ..... Conduct Lightning Awareness Programs

### Flood

- F1 ..... Incorporate Flood Mitigation in Local Planning
- F2 ..... Form Partnerships to Support Floodplain Management
- F3 ..... Limit or Restrict Development in Floodplain Areas
- F4 ..... Adopt & Enforce Building Codes and Development Standards
- F5 ..... Improve Stormwater Management Planning
- F6 ..... Adopt Policies to Reduce Stormwater Runoff
- F7 ..... Improve Flood Risk Assessment
- F8 ..... Join or Improve Compliance with NFIP
- F9 ..... Manage the Floodplain beyond Minimum Requirements
- F10 ..... Participate in the CRS
- F11 ..... Establish Local Funding Mechanism for Flood Mitigation
- F12 ..... Remove Existing Structures from Flood Hazard Areas
- F13 ..... Improve Stormwater Drainage System Capacity
- F14 ..... Conduct Regular Maintenance for Drainage Systems & Flood Control Structures
- F15 ..... Elevate or Retrofit Structures & Utilities
- F16 ..... Floodproof Residential & Non-Residential Structures
- F17 ..... Protect Infrastructure
- F18 ..... Protect Critical Facilities
- F19 ..... Construct Flood Control Measures
- F20 ..... Protect & Restore Natural Flood Mitigation Features
- F21 ..... Preserve Floodplains as Open Space
- F22 ..... Increase Awareness of Flood Risk & Safety
- F23 ..... Educate Property Owners about Flood Mitigation Techniques

### Severe Wind

- SW1 ... Adopt & Enforce Building Codes
- SW2 ... Promote or Require Site & Building Design Standards to Minimize Wind Damage
- SW3 ... Assess Vulnerability to Severe Wind
- SW4 ... Protect Power Lines & Infrastructure
- SW5 ... Retrofit Residential Buildings
- SW6 ... Retrofit Public Buildings & Critical Facilities
- SW7 ... Increase Severe Wind Awareness

### Severe Winter Weather

- WW1 .. Adopt & Enforce Building Codes
- WW2 .. Protect Buildings & Infrastructure
- WW3 .. Protect Power Lines
- WW4 .. Reduce Impacts to Roadways
- WW5 .. Conduct Winter Weather Risk Awareness Activities
- WW6 .. Assist Vulnerable Populations

### Tornado

- T1 ..... Encourage Construction of Safe Rooms
- T2 ..... Require Wind-Resistant Building Techniques
- T2 ..... Conduct Tornado Awareness Activities

<sup>85</sup> Mitigation Ideas, A Resource for Reducing Risk to Natural Hazards, FEMA, January 2013

### Wildfire

WF1 ..... Map & Assess Vulnerability to Wildfire  
WF2 ..... Incorporate Wildfire Mitigation in the Comprehensive Plan  
WF3 ..... Reduce Risk through Land Use Planning  
WF4 ..... Develop a Wildland Urban Interface Code  
WF5 ..... Require or Encourage Fire-Resistant Construction Techniques  
WF6 ..... Retrofit At-Risk Structure with Ignition-Resistant Materials  
WF7 ..... Create Defensible Space around Structures & Infrastructure  
WF8 ..... Conduct Maintenance to Reduce Risk  
WF9 ..... Implement a Fuels Management Program  
WF10 ..... Participate in the Firewise® Program  
WF11 ..... Increase Wildfire Awareness  
WF12 ..... Educate Property Owners about Wildfire Mitigation Techniques

### Multi-Hazards

MU1 ..... Assess Community Risk  
MU2 ..... Map Community Risk  
MU3 ..... Prevent Development in Hazard Areas  
MU4 ..... Adopt Regulations in Hazard Areas  
MU5 ..... Limit Density in Hazard Areas  
MU6 ..... Integrate Mitigation into Local Planning  
MU7 ..... Strengthen Land Use Regulations  
MU8 ..... Adopt & Enforce Building Codes  
MU9 ..... Create Local Mechanisms for Hazard Mitigation  
MU10 ..... Incentivize Hazard Mitigation  
MU11 ..... Monitor Mitigation Plan Implementation  
MU12 ..... Protect Structures  
MU13 ..... Protect Infrastructure & Critical Facilities  
MU14 ..... Increase Hazard Education & Risk Awareness  
MU15 ..... Improve Household Disaster Preparedness  
MU16 ..... Promote Private Mitigation Efforts

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***Berlin Fire Station***

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