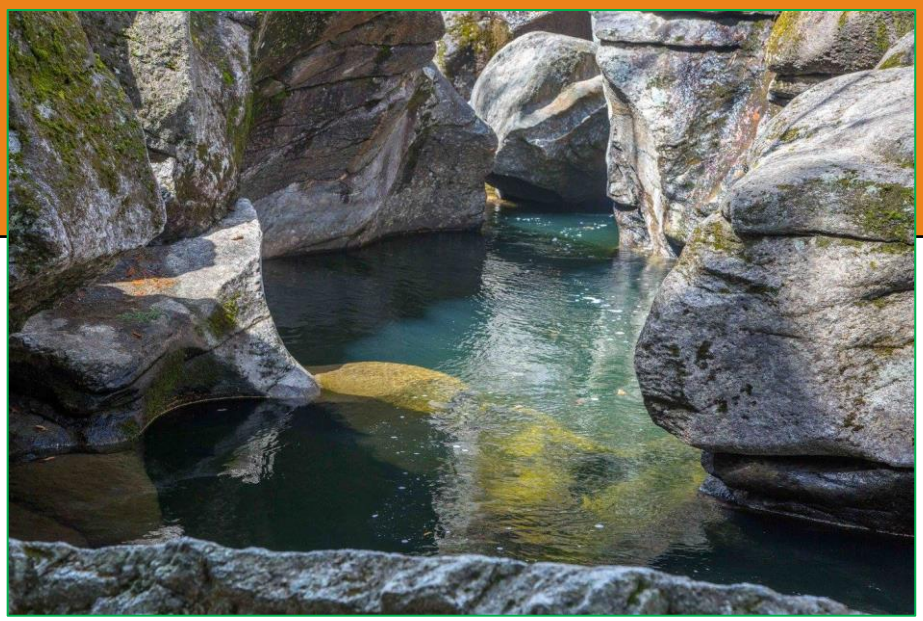
Groton

Hazard Mitigation Plan Update 2020



GROTON

This plan integrates the following:

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

February 28, 2020
Final

Prepared for the Town of Groton and NH Homeland Security & Emergency Management
By
The Groton Planning Team

With assistance from Mapping and Planning Solutions

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

-Dwight D. Eisenhower

HAZARD MITIGATION PLAN DEFINITIONS

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

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

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

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Cover Photo: Sculptured Rocks
Photo Credit: http://wakinguponturtleisland.blogspot.com

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Acknowledgements

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 prior Groton Hazard Mitigation Plan, approved on June 17, 2014.

Approval Notification Dates for 2020 Update

Approved Pending Adoption (APA):	February 6, 2020
Jurisdiction Adoption:	February 18, 2020
CWPP Approval:	March 3, 2020
Plan Approval Date (HSEM):	**February 28, 2020**
Receipt of FEMA Letter	March 16, 2020
Plan Distribution (MAPS):	March 16, 2020

TOWN OF GROTON HAZARD MITIGATION PLANNING TEAM (HMPT)

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

- Deb Johnson ..... Groton Planning Board
- Robert "Bubba" Ellis ..... Groton Road Agent
- John Rescigno ..... Groton Selectboard
- Kyle Andrews ..... Groton Selectboard
- Ron Madan ..... Groton Selectboard
- Sara Smith ..... Groton Administrative Assistant
- Elizabeth Bandkau ..... Groton Citizen
- Ruth Millet ..... Groton Town Clerk
- Tony Albert ..... Groton Selectboard
- Ann Joyce ..... Groton Citizen
- Gina Rescigno ..... Groton Citizen
- David Leone ..... Groton Citizen
- Lynn Kemma ..... Groton Citizen
- Slim Spafford ..... Groton Conservation Commission
- Mike Lemieux ..... Groton Citizen
- Bill Oakley ..... Groton EMD
- Patti Noyes Oakley ..... Groton Deputy EMD
- Marilyn Luto ..... Groton Citizen
- Mike Cryans ..... NH Executive Council
- Angel Ekstrom ..... Central NH PHN
- Jennifer Gilbert ..... NH OSI
- Kayla Henderson ..... NH HSEM
- Paul Hatch ..... NH HSEM
- June Garneau ..... MAPS
- Olin Garneau ..... MAPS

Many thanks for all the hard work and effort given by each and every one of you. This plan would not exist without your knowledge and experience. The Town of Groton also thanks the Federal Emergency Management Agency and NH Homeland Security & Emergency Management as the primary funding sources for this plan.

Acronyms associated with the above list:

EMD ..... Emergency Management Director
PHN ..... Public Health Network

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Executive Summary

The Groton Hazard Mitigation Plan Update 2020 was compiled to assist the Town of Groton in reducing and mitigating future losses from natural, technological or human-caused hazardous events. The plan was developed by participants of the Town of Groton 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 2014 Groton Hazard Mitigation Plan. In an effort to produce an accurate and current planning document, the planning team used the 2014 plan as a foundation, building upon that plan to provide more timely information.

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

NATURAL HAZARDS

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

TECHNOLOGICAL HAZARDS

1) Aging Infrastructure
2) Long Term Utility Outage
3) Dam Failure
4) Hazardous Materials

HUMAN-CAUSED HAZARDS

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

Some hazards that are listed in the 2018 New Hampshire State Hazard Mitigation Plan were not included in this plan as the team felt they were extremely unlikely to occur in Groton or not applicable. These hazards along with an explanation of why they are not included in 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 and Populations to Protect (FPP) and Potential Resources (PR). In addition, this plan addresses the town's involvement in the National Flood Insurance Program (NFIP).

Some communities, when faced with an array of hazards, are able to adequately cope with the impact of these hazards. For example, although severe winter weather is often a common hazard in New Hampshire and more often than not considered to be the most likely to occur, 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 this type of sudden storm is difficult to achieve: establishing warming and cooling centers, establishing notification systems, providing public outreach, tree trimming, opening shelters and perhaps burying overhead power lines are just a few of the action items that may be put in place.

In summary, finding mitigation action items for every hazard that affects a community is at times difficult. In addition, with today's economic constraints, cities and towns are less likely to have the financial ability to complete some mitigation action items, such as burying power lines. In preparing this plan, the Groton HMPT has considered a comprehensive list of mitigation action items that could diminish the impact of hazards but 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:

Groton Hazard Mitigation Plan Update 2020	the plan or this plan
Groton	the town or the community
Hazard Mitigation Planning Team	the team or HMPT
Hazard Mitigation Plan	HMP
Emergency Operations Plan	EOP
Mapping and Planning Solutions	MAPS
Mapping and Planning Solutions Planner	the planner
NH Homeland Security & Emergency Management	HSEM
Federal Emergency Management Agency	FEMA

For more acronyms, please refer to Appendix E: Acronyms

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

Vision Statement:
The Town of Groton 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 Groton Hazard Mitigation Plan Update 2020 was prepared in accordance with 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 Groton 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. This plan was funded by HSEM through grants from the Federal Emergency Management Agency (FEMA). 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 Disaster Mitigation Act of 2000 (DMA) is to:

"…establish a national disaster hazard mitigation program -

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

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

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

HSEM's goal is to have all New Hampshire communities complete a local hazard mitigation plan as a means 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 completion of this hazard mitigation plan.

The Groton Hazard Mitigation Plan Update 2020 is a planning tool to use to reduce future losses from natural, technological and human-caused hazards as required by the Disaster Mitigation Act of 2000. This plan does not constitute a section of the town's Master Plan. However mitigation action items from this plan may be incorporated into future Master Plan updates.

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

[1] Disaster Mitigation Act (DMA) of 2000, Section 101, b1 & b2
[2] Disaster Mitigation Act (DMA) of 2000, Section 322a

C. JURISDICTION

This plan addresses one jurisdiction – the Town of Groton, NH.

D. SCOPE OF THE PLAN & FEDERAL & STATE PARTICIPATION

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

In seeking approval as a Hazard Mitigation Plan and a Community Wildfire Protection Plan (CWPP), the planning effort included 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 Office of Strategic Initiatives (OSI) as well as routine notification of upcoming meetings to state and federal entities above. Designation as a CWPP may allow a community to gain access to federal funding for hazardous fuels reduction and other mitigation projects supported by the USDA-FS. By merging the two federal planning processes (hazard and wildfire), duplication is eliminated and the town has access to a larger pool of resources for pre-disaster planning.

The Healthy Forest Restoration Act (HFRA) of 2003 includes statutory incentives for the US Forest Service to give consideration to local communities as they develop and implement forest management and hazardous fuel reduction projects. For a community to take advantage of this opportunity, it must first prepare a CWPP. 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****: A CWPP must be collaboratively developed by local and state government representatives, 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.*[3]

Finally, as required under 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), its continued compliance with the program and as part of vulnerability assessment, the plan must address the NFIP insured structures that have been repetitively damaged due to floods.

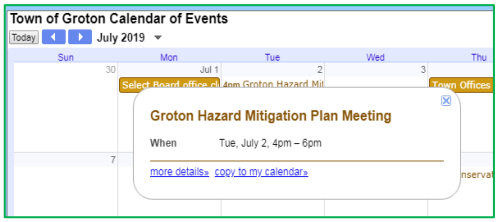
[3] Healthy Forest Restoration Act; HR 1904, 2003; Section 101-3-a.b.c; http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=108_cong_bills&docid=f:h1904enr.txt.pdf

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 (page 18). Community officials were urged to contact as many people as they could to participate in the planning process, including not only residents but also officials and residents from surrounding communities. The Town of Groton understands that natural hazards do not recognize political boundaries.

Groton is part of the Newfound Area School District, SAU 4. Students in grades K-5 attend Bridgewater Hebron Village School students in grades 6-8 attend Newfound Memorial Middle school and students in grades 9-12 attend Newfound Regional High School. Members of SAU 4 were invited to the hazard mitigation meetings, but no one attended any meetings.

The team also provided excellent public and stakeholder notification. Many interested citizens and stakeholders had the opportunity to become aware of the hazard mitigation planning taking place in Groton. A Press Release (see right) was posted at the Town House bulletin board and inside the building and at the Transfer Station. Meeting dates were also posted on the town's calendar (see below).



Mapping and Planning Solutions
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Whitefield, NH 03598

Press Release

FOR IMMEDIATE RELEASE
Updated: December, 2018

Contact: June Garneau
603-837-7122

TOWN OF GROTON COMMENCES HAZARD MITIGATION PLANNING

The Board of Selectmen for the Town of Groton recently met with June Garneau, of Mapping and Planning Solutions and other Team members from Groton, to begin work on the required five-year update to the **2014 Groton 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 Team will address issues such as flooding, hurricanes, drought, landslides and wildfires, and determine efforts the Town 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.

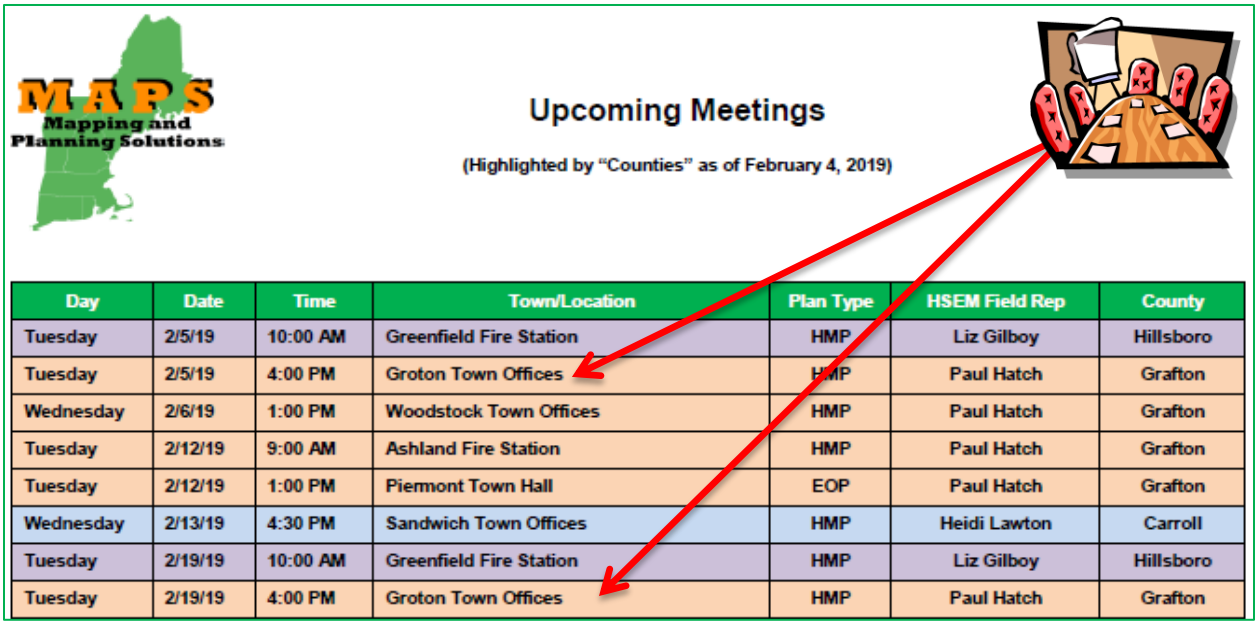
As mandated by the Disaster Mitigation Act of 2000, all municipalities are required to complete a local Hazard Mitigation Plan in order to qualify for Federal Emergency Management Administration funding should a natural disaster occur. The planning processes are made possible by grants from FEMA.

The Hazard Mitigation Planning Team is currently being formed; Groton citizens and any interested stakeholders are invited to participate. All interested parties should contact Sara Smith, the Groton Administrative Assistant, at 744-9190 if they wish to be included in the process.

The next meeting is scheduled for **Tuesday, February 5** from **4:00 PM to 6:00 PM** at the Groton Town House. The general public is encouraged to attend all meetings, regardless of whether they are a part of the Planning Team.

More information on the hazard mitigation planning process is available from June Garneau at Mapping and Planning Solutions, 603-837-7122.

Lastly, the planner sent a monthly calendar to NH EMDs, Police Chiefs, Fire Chiefs, Rangers and other state, federal and private officials, including stake-holders for the town (example shown below).



MAPS Mapping and Planning Solutions

Upcoming Meetings

(Highlighted by "Counties" as of February 4, 2019)

Day	Date	Time	Town/Location	Plan Type	HSEM Field Rep	County
Tuesday	2/5/19	10:00 AM	Greenfield Fire Station	HMP	Liz Gilboy	Hillsboro
Tuesday	2/5/19	4:00 PM	Groton Town Offices	HMP	Paul Hatch	Grafton
Wednesday	2/6/19	1:00 PM	Woodstock Town Offices	HMP	Paul Hatch	Grafton
Tuesday	2/12/19	9:00 AM	Ashland Fire Station	HMP	Paul Hatch	Grafton
Tuesday	2/12/19	1:00 PM	Piermont Town Hall	EOP	Paul Hatch	Grafton
Wednesday	2/13/19	4:30 PM	Sandwich Town Offices	HMP	Heidi Lawton	Carroll
Tuesday	2/19/19	10:00 AM	Greenfield Fire Station	HMP	Liz Gilboy	Hillsboro
Tuesday	2/19/19	4:00 PM	Groton Town Offices	HMP	Paul Hatch	Grafton

It was noted that team composition is expected to be lower in smaller communities because of the small population base and the fact that many people "wear more than one hat". It is often very difficult to attract individual citizens to participate in town government and those that do generally hold full-time jobs and work as volunteers in a variety of town positions. With small populations, the percent of interested citizens in a town's planning processes is extremely small. Due to the availability of jobs and other economic factors, the town has a relatively high elderly population and a dwindling amount of young people with interest in politics.

Groton had excellent participation in the development of this plan. Meeting attendance included the Emergency Management Director (EMD), the Deputy EMD and the Road Agent. The Administrative Assistant, members of the Selectboard, a member of the Planning Board and a member of the Conservation Commission also took part in meetings. Lastly, seven interested citizens took the opportunity to attend several meetings. Comments made by all team members including the citizens of the community who attended, were integrated into the narrative discussion and were incorporated into the essence of the document.

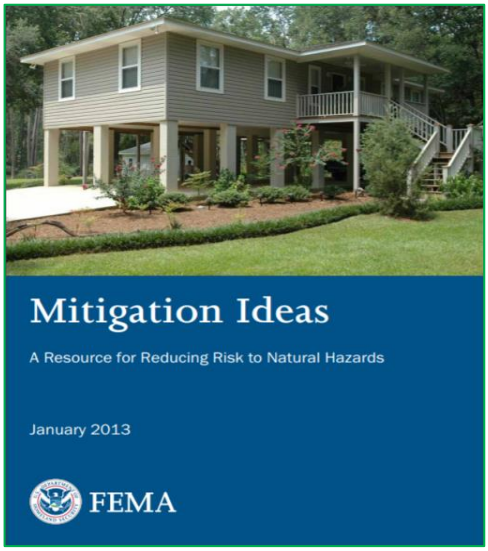
> §201.6(b) requires that there be an open public involvement process in the formation of a plan. This process shall provide an opportunity for the public to comment on the plan during its formation as well as an opportunity for any neighboring communities, businesses, and others to review any existing plans, studies, reports, and technical information and incorporation of those in 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 Groton Hazard Mitigation Plan of 2014 for updates, development changes and accomplishments. In addition, as noted in the Bibliography and in footnotes located throughout the plan many other documents were used to create this mitigation plan. Some, but not all, of those plans and documents are listed as follows:

The Groton Hazard Mitigation Plan of 2014 .....Compare & Contrast
Groton Master Plan (2017) .....Community Information
Groton Annual Report (2018).....Fire Report & Development
Other Hazard Mitigation Plans (Franconia, Ashland, Bath).....Formats & Mitigation Ideas
The Groton Subdivision Regulations (2014).....New Development Regulations
The Groton Zoning Ordinance (2015).....Zoning Regulations
Flood Plain Development Ordinance (Part of Zoning).....Floodplain Regulations
Census 2010 Data .....Population Data
The NH DRA Summary of Inventory of Valuation MS-1 2018 for Groton .....Structure Evaluation
The Economic & Labor Market Information Bureau Community Profile.....Population Trends
The American Community Survey (ACS 2013-2017).....Population Trends
Mitigation Ideas, FEMA, January 2013.....Mitigation Strategies
The Department of Cultural & Natural Resources (DNCR) .....DNCR Fire Report
The NH Office of Strategic Initiatives (OSI) .....Flood Losses
The NH Department of Revenue property tax valuation.....Property Information

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



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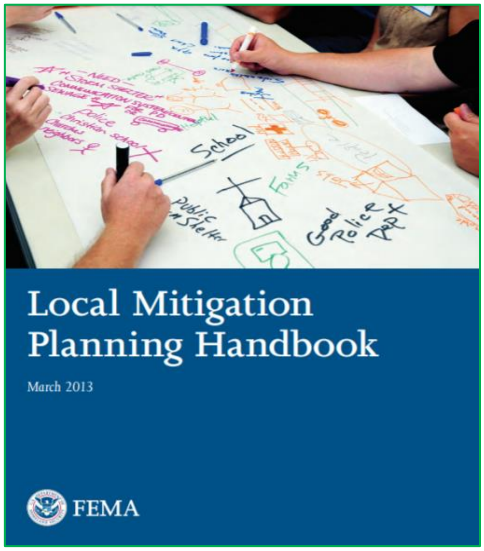

https://www.fema.gov/media-library/assets/documents/31598

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.

Overarching Goals

The following are the five overarching goals of this plan:

- *Minimize loss and disruption of human life, property, the environment and the economy due to natural, technological and human-caused hazards through a coordinated and collaborative effort between federal, state and local authorities to implement appropriate hazard mitigation measures.*
- *Enhance protection of the general population, citizens and guests of the community before, during and after a hazard event through public education about disaster preparedness and resilience and expanded awareness of the threats and hazards which face the community.*
- *Promote continued comprehensive hazard mitigation planning at local levels to identify, introduce and implement cost effective hazard mitigation measures.*
- *Address the challenges posed by climate change as they pertain to increasing the risk and impacts of the hazards identified within this plan.*
- *Strengthen Continuity of Operations and Continuity of Government across at the local level to ensure continuation of essential services*

Natural Hazard Objectives

- *Reduce long-term flood risks through assessment, identification and strategic mitigation of at risk/vulnerable infrastructure (dams, stream crossings, roadways, coastal levees, etc.).*
- *Minimize illnesses and deaths related to events that present a threat to human and animal health.*
- *Assist communities with plan development, outreach and public education in order to reduce the impact from 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 to mitigate the effect on citizens.*
- *Build upon state and local capabilities to identify and respond to emerging contaminates.*
- *Effectively collaborate between federal, state and local agencies as well as private partners, Non-Governmental Organizations (NGOs) and Volunteer Organizations Active in Disaster (VOADs).*

- *Enhance public education of technological hazards to assist in the prevention and mitigation of hazard impacts on the population.*
- *Ensure HAZMAT teams are properly equipped and trained to respond, contain and mitigate incidents involving technological hazards.*
- *Reduce the possibility of long-term utility outages by planning, training and exercising on utility failure events.*
- *Lessen the effects of technological hazards on communications infrastructure by building more resilient voice and data systems.*

HUMAN-CAUSED HAZARD OBJECTIVES

- *Ensure that grant related funding processes allow for expedient and effective actions to take place at the community and state-level.*
- *Identify Critical Infrastructure & Key Resources (CIKR) risks or vulnerabilities and protect or harden infrastructure against hazards.*
- *Improve the ability to respond and mitigate Cyber Events through increased training, exercising, improved equipment and utilizing the latest technologies.*
- *Foster collaboration between federal, state and local agencies on training, exercising and preparing for mass casualty incidents and terrorism.*
- *Ensure that state and community assets (i.e. hospitals, state agencies, non-profits, universities, nursing homes, prisons, etc.) are prepared for all phases of emergency management including training and exercising on reunification.*

Did You Know?

Money spent on reducing the risk of natural hazards is a wise investment. FEMA administers three grant programs that provide funding for eligible mitigation planning and projects: the Hazard Mitigation Grant Program (HMGP), the Flood Mitigation Assistance (FMA) Program, and the Pre-Disaster Mitigation (PDM) Program.

FEMA E-Brief, April 12, 2017

H. Hazard Mitigation Planning Process & Methodology

The planning process consisted of twelve specific steps; some steps were accomplished independently while other areas were interdependent. Many factors affected the ultimate sequence of the planning process such as the number of meetings, community preparation, attendance and other community needs. The planning process resulted in significant cross-talk regarding all types of natural, technical and human-caused hazards by team members.

All steps were included but not necessarily in the numerical sequence listed. The list of steps is 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 and Potential Hazards

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 community's participation in National Flood Insurance Program (NFIP)
Chapter 3, Section D

Step 06: Prepare an introduction to the community, discuss emergency service capabilities and development trends and review statistical information about the town
Chapter 2, Sections A, B and C and Table 2.1, Town Statistics

Step 07: Review current plans, policies & mutual aid & brainstorm to identify improvements
Table 6.1 – Current Plans, Policies and Mutual Aid

Step 08: Examine the mitigation actions 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 and action plan
Table 9.1 – The Mitigation Action Plan

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

Step 12: Adopt and monitor the plan

I. Hazard Mitigation Building Blocks & Tables

Using a "building block" approach, the base, or foundation, for the mitigation plan update was the prior plan. Each table that was completed had its starting point with the last hazard mitigation plan completed by the community.

Ultimately, the "building blocks" led to the final goal, the development of prioritized mitigation "action items" that when put into an action plan, would lessen or diminish the impact of natural hazards on the town.

Hazard Mitigation Process
"The Building Blocks"

Hazard Identification & Risk Assessment (HIRA)
What are the hazards and which are most likely to impact Groton?
Table 3.1

Critical Infrastructure & Key Resources
Are any in harm's way?
Tables 4.1-4.4

Current Plans, Policies & Mutual Aid
Do any need improvement?
Table 6.1

Historic Wildfires & the Wildland Urban Interface
What are the wildfire risks throughout Groton?
Table 3.2

Past & Potentially Hazardous Locations
In What areas of Groton is the town hardest hit?
Table 3.2

Accomplishments since the Last Plan
Were strategies Completed or should they be Deleted or Deferred to this plan?
Table 7.1

Mitigation Action Items
What can we do to lessen, diminish or eliminate the risk of hazards?
What problems are we trying to solve?
Table 9.1 – The End Goal

J. Narrative Description of the Process

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

The planning process included a complete review of the 2014 Groton Hazard Mitigation Plan. Using the 2014 plan as a base, each element of the old plan was examined and revised to reflect changes that had taken place in development and in the priorities of the community. In addition, referring to the 2014 plan, strategies from the past were reassessed and improved upon for the future.

The following narrative explains how the 2014 Groton Hazard Mitigation Plan was used during each step of the planning process to make revisions that resulted in this plan.

Meeting 1, December 4, 2018

The first full meeting of the Groton Hazard Mitigation Team was held on Tuesday, December 4, 2018. Meeting attendance included Deb Johnson (Planning Board Chair), Robert Ellis (Road Agent), John Rescigno (Selectboard), Kyle Andrews (Selectboard), Ron Madan (Selectboard), Sara Smith (Administrative Assistant), Paul Hatch (NH Homeland Security & Emergency Management), Olin Garneau (Mapping and Planning Solutions) and June Garneau (Mapping and Planning Solutions).

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

Work then began on *Table 2.1, Town Statistics*. Most of the work on this table was complete at this meeting with the exception of a few items that June would either determine through GIS or get at a later date. There was some discussion about the seasonal population change in Groton with summer and winter homes, however it was determined that Groton does not have a major influx of seasonal tourists. There was also much discussion about evacuation routes in Groton.

Hazards Mitigation Potential Team Members

Federal
USDA Forest Service

State
Department of Transportation (DOT)
Department of Natural & Cultural Resources (DNCR)
Office of Strategic Initiatives (OSI)

Local
Selectboard Members (Past/Present)
Town Manager/Administrator
Town Planner
Police Chief
Fire Chief
Emergency Management Director
Emergency Medical Services
Fire Warden
Health Services
Education/School
Recreation Directors
Public Works Director
Road Agent
Water Management
Public Utilities
Waste Management
Dam Operators
Major Employers

Local - Special Interest
Land Owners
Home Owners
Forest Management
Timber Management
Tourism & Sportsman's Groups
Developers & Builders

Experts
GIS Specialists

Next on the agenda were hazard identification and the completion of *Table 3.1, Hazard Identification & Risk Assessment (HIRA)*. Using the town's last HMP and the State of New Hampshire Multi-Hazard Mitigation Plan Update 2018, the team was able to assess which hazards could affect the community. After the hazards had been identified, the team then assessed the risk severity and probability by ranking each hazard on a scale of 1-5 (5 being very high or catastrophic) based on the following:

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

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

Having completed Table 3.1, the team started working on descriptions of each hazard and how they could, or do impact the community. In order to gain more knowledge of the impact of these hazards, June asked the team to describe each hazard as it relates to Groton. 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 loss of life?*
- *Are the elderly and functional needs populations particularly at risk?*
- *What has been done in the past to cope with the hazards?*
- *Was outside help requested?*
- *Are the hazards further affected by an extended power failure?*
- *What mitigation actions can we take to eliminate the hazard or diminish its impact?*

Meeting 1 – December 4, 2018

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

2) The Process
a) Funding
b) Review of 12 Step Process & The Team (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 (handout)

4) Today's Topics
a) Table 2.1, Town Information
b) Table 3.1, Hazard Identification & Analysis
c) Hazard Descriptions
d) Table 4.1-4.4, Critical Infrastructure & Key Resources (time allowing)
e) Table 3.2, Historic Hazard Identification (time allowing)

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

6) Future Meetings
a) _____

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

With time running out before the hazard descriptions were completed, June advised the team that the remaining hazard descriptions would be completed at next meeting. June thanked the team for their work and assigned "homework" to team members, including requesting that the Road Agent prepare a list of road/culvert projects that would need to be completed within the next five years. June also asked the team to think about Critical

Infrastructure & Key Resources (CIKR) and past events that have affected the town. The next meeting was scheduled for Tuesday, September 5, 2019.

MEETING 2, SEPTEMBER 5, 2019

Meeting attendance included Robert Ellis, John Rescigno, Ron Madan, Sara Smith, Kayla Henderson (NH Homeland Security & Emergency Management), Olin Garneau and June Garneau.

The meeting began with a review of the work that was done at the previous meeting. June reviewed *Table 2.1, Town Statistics* to ensure that the town data was accurate, no changes were made. June then reviewed *Table 3.1, Hazard Identification & Risk Assessment (HIRA)* to be certain the team felt the hazards were in the correct order for the town, only minor adjustments were made.

Next on the agenda was the completion of the hazard descriptions that were started at the previous meeting. While doing the hazard descriptions, development trends were also discussed.

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

Meeting 2 – September 5, 2019

1) Last Meeting
- a) Reviewed planning process, purpose, funding & collaboration.
- b) Reviewed of community involvement and stakeholders
- c) Worked on Table 2.1, Town Information
- d) Worked Table 3.1, Hazard Identification & Analysis
- e) Worked on Hazard Descriptions (Did not finish)

2) Today's Topics
- a) Review….
  - i) Table 2.1, Town Statistics
  - ii) Table 3.1, Hazard Identification & Analysis
- b) Finish Hazard Descriptions
  - i) Development
  - ii) Roads
  - iii) Public Notice
- c) Work on….
  - i) Table 3.2, Historic Hazard Identification
  - ii) Table 4.1-4.4, Critical Infrastructure & Key Resources
  - 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) _____

While working on Table 3.2, June 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 the area that is most prone to the risk of wildfires. In Groton, it was noted that the WUI would cover the entire town of Groton; therefore, the entire town was thought to be in the WUI. Mitigation strategies were discussed to protect structures and to educate the town's citizens about the risk of wildfire.

Next, the team worked on *Tables 4.1–4.4, Critical Infrastructure & Key Resources (CIKR)*. The Emergency Response Facilities, the Non-Emergency Response Facilities, the Facilities & Populations to Protect and the Potential Resources from the 2014 plan were examined and a few minor adjustments were made for this plan. In addition, the evacuation routes, helicopter landing zones and bridges on the evacuation routes were defined. Lastly, each of the CIKR were analyzed for their "Hazard Risk".

With time still remaining in the meeting, the team then began working on *Table 6.1, Current Plans, Policies & Mutual Aid*; like other tables, this table was also pre-populated with information from the 2014 plan. Looking closely at the existing policies from the last plan and current mechanisms that are in place, the team determined if each plan, policy or mutual aid system should be designated as "No Improvements Needed" or "Improvements Needed" based on the "Key to Effectiveness" found in Chapter 6.

It was explained to the team that those items that needed improvements would become new "Action Items" for this plan and be discussed again and re-prioritized when we got to our final table*, Table 9.1, The Mitigation Action Plan.* With time running out June explained that Table 6.1 would be finished at the next meeting, she thanked the team and adjourned the meeting. The next meeting was set for February 19, 2019.

MEETING 3, FEBRUARY 19, 2019

Meeting attendance included Robert Ellis, John Rescigno, Ron Madan, Sara Smith, Elizabeth Bandkau (Citizen), Ruth Millet (Town Clerk), Olin Garneau and June Garneau.

The team first reviewed what has been finished on Table 6.1 to make sure the language was proper for each statement. After that review, the team used the remaining time in the meeting to complete Table 6.1.

June adjourned the meeting and promised to write statements to support the concepts and ideas that were expressed for Table 6.1. The next meeting was scheduled for March 19, 2019.

Meeting 3 – February 19, 2019

1) Last Meeting
- a) Reviewed….
  - i) Table 2.1, Town Information
  - ii) Table 3.1, Hazard Identification & Analysis
- b) Finished….
  - i) Hazard Descriptions
- c) Worked on….
  - i) Table 3.2, Historic Hazard Identification
  - ii) Table 4.1-4.4, Critical Infrastructure & Key Resources
  - iii) Table 6.1, Current Plans, Policies & Mutual Aid (did not finish)

2) Today's Topics
- a) Finish….
  - i) Table 6.1, Current Plans, Policies & Mutual Aid
- b) Work on….
  - i) Table 7.1, Accomplishments since the prior Plan
  - ii) Start thinking about mitigation ideas

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

4) Future Meetings
- a) _____

MEETING 4 – MARCH 19, 2019

Meeting attendance included Deb Johnson, Robert Ellis, John Rescigno, Ron Madan, Sara Smith, Ruth Millett, Tony Albert (Selectboard), Ann Joyce (Citizen), Gina Rescigno (Citizen), David Leone (Citizen), Lynn Kemma (Citizen), Slim Spafford (Conservation Commission), Olin Garneau and June Garneau.

June led the team through a review of the work that was done at the previous meetings, including a review of the CIKR that were listed in Tables 4.1-4.4. Time was also spent on a review of Table 3.2. The review also included a complete review of Table 6.1 to ensure that the comments and ideas expressed by the team were fully represented. Work on this table resulted in 13 new "Action Items" for this plan, some of which are also in Table 7.1.

Meeting 4 – March 19, 2019

1) Last Meeting
- a) Finished….
  - i) Table 6.1, Current Plans, Policies & Mutual Aid

2) Today's Topics
- a) Review….
  - i) Table 6.1, Current Plans, Policies & Mutual Aid
- b) Work on….
  - i) Table 7.1, Accomplishments since the prior Plan
  - ii) Start thinking about mitigation ideas

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

4) Future Meetings
- a) _____

Table 7.1, Accomplishments since the Last Plan, also pre-populated with data from the 2014 plan, was the next agenda item. June led the team through each strategy to determine which of these was "Completed" should be "Deleted" or should be "Deferred" to this plan as a new mitigation action item. Some of the action items from the 2014 plan had been completed or partially completed by the town while some were deleted as they were felt to be no longer useful or considered to be emergency preparedness, not mitigation. Still others were "deferred" for consideration as new "Action Items" for this plan.

To end the meeting, June provided the team with handouts detailing a comprehensive list of possible mitigation action items (see Chapter 8, Section A & B and Appendix F). June also encouraged team members to explore the link on their agendas for the FEMA Mitigation Idea booklet to see if any of the strategies in this book would be useful in Groton (see right).

Link to explore:

FEMA Mitigation Ideas

https://www.fema.gov/media-library-data/20130726-1904-25045-0186/fema_mitigation_ideas_final508.pdf

The next meeting was scheduled for April 16, 2019.

MEETING 5 – APRIL 16, 2019

Meeting attendance included Robert Ellis, John Rescigno, Ron Madan, Sara Smith, Ruth Millett, Tony Albert, Gina Rescigno, David Leone, Lynn Kemma, Mike Lemieux (Citizen), Bill Oakley (Emergency Management Director), Patti Oakley (Deputy Emergency Management Director), Mike Cryans (NH Executive Council), Olin Garneau and June Garneau.

To begin the meeting, June walked the team through a complete review of Table 7.1. Having translated her notes from the last meeting into paragraphs, June reviewed each item in Table 7.1 to see if the concepts and ideas of the team remained intact and to verify the accuracy of the information. With this review a few changes were made leaving 15 additional items from Table 7.1 (that were not also in Table 6.1) deferred to become new mitigation action items for this plan. Although several strategies from the last plan were determined to be emergency preparedness and not mitigation, the team decided to keep some of them in the plan as reminders to get these important action items completed.

Meeting 5 – April 16, 2019

1) Last Meeting
- a) Reviewed Table 6.1, Current Plans, Policies & Mutual Aid
- b) Worked on Table 7.1, Accomplishments since the prior Plan

2) Today's Topics
- a) Review Table 7.1, Accomplishments since the prior Plan
- b) Begin work on….
  - i) Table 8.1, Potential Mitigation Strategies & the STAPLEE
  - ii) Table 9.1, Mitigation Action Items

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

4) Future Meetings
- a) May 7, 2019

The meeting also included an overall recap of the work that had already been done. The recap included a brief look at each of the following completed tables:

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

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

In addition to the action items identified in Tables 6.1 and 7.1, the team then reviewed additional potential action items. Using the handouts that had been provided by June at the last meeting, the team reviewed a comprehensive list of mitigation strategies that was derived from several sources, including the FEMA document "Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards, January 2013" (see Chapter 8, Sections A & B and Appendix F).

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

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.

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

Although most of Tables 8.1 and 9.1 were complete, there were a few action items to discuss at the next meeting. The next meeting was scheduled for May 7, 2019.

MEETING 6 – MAY 7, 2019

Meeting attendance included Robert Ellis, John Rescigno, Ron Madan, Sara Smith, Tony Albert, Gina Rescigno, Bill Oakley, Angle Ekstrom (Central NH Public Health Network), Olin Garneau and June Garneau.

The meeting began where we had left off in Tables 9.1 & 8.1. After we had considered each strategy that was forwarded from Tables 6.1 & 7.1, the team considered additional mitigation items, some June had suggested from other plans. After much discussion and a careful review, ultimately, the team settled on 35 "Mitigation Action Items" that they felt were achievable and that would help to diminish the impact of natural hazards in the future.

The team was able to complete the tables and the STAPLEE, but there was not enough time to start "ranking" and "prioritizing" of each action item. June provided the team with one last handout that would be used during the next meeting, an explanation of the Ranking/Prioritizing (Chapter 9, Section A) method.

The next meeting was set for July 2, 2019.

Meeting 6 – May 7, 2019

1) Last Meeting
- a) Reviewed….
  - i) Table 7.1, Accomplishments since the prior Plan
- b) Worked on….
  - i) Table 8.1, Potential Mitigation Strategies & the STAPLEE

2) Today's Topics
- a) Review work from previous meeting
- b) Continue work on….
  - i) Table 8.1, Potential Mitigation Strategies & the STAPLEE
  - ii) Table 9.1, Mitigation Action Items

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

4) Future Meetings
- a) Tuesday July 2, 2019 @ 4:00 PM

MEETING 7 – JULY 2, 2019

Meeting attendance included Robert Ellis, John Rescigno, Sara Smith, Tony Albert, Marilyn Luto (Citizen), Paul Hatch, Olin Garneau and June Garneau.

Meeting 7 – July 2, 2019

5) Last Meeting
- a) Worked on….
  - i) Table 8.1, Potential Mitigation Strategies & the STAPLEE

6) Today's Topics
- a) Work on….
  - i) Ranking & Priority
  - ii) Steps going forward

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

8) Future Meetings
- a) _____

During the previous meeting, all of the mitigation action items had been determined and the STAPLEE was completed for each. The team was now ready for the ranking & prioritizing of the action items that had been identified.

Prior to the meeting, June had pre-ranked the action items based on the time frame, the town's authority to get the strategy accomplished, the type of strategy and the STAPLEE score and placed them in four categories as shown in Chapter 9, Section A. A handout with all of the identified action items was made for the team. Using this handout the team was able to see all of the action items clearly and to determine any changes that needed to be made, including the "rank".

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

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

POST MEETINGS

It is noted that after the final planning meeting for this hazard mitigation plan, the Town of Groton received significant road and bridge damage as a result of a mid-summer heavy rain event on July 11, 2019. This event was declared a Major Disaster Declaration, DR-4457. The estimate for damages includes $10,000 for debris removal, $760,000 for road/bridge repair and $75,000 for public buildings and equipment for a total of $845,000 in damage estimates. Please refer to Table 3.2 and Chapter 5 for more information on this natural hazard event.

Chapter 2: Community Profile

A. INTRODUCTION

Groton is a beautiful community located in Grafton County in the center of New Hampshire. Groton is bordered to the north by Rumney, to the east by Plymouth and Hebron, to the south by Orange and Alexandria and to the west by Dorchester. As a community in the "Dartmouth-Lake Sunapee" tourism region of New Hampshire, Groton is located in the hills and valleys of central NH.

TOWN GOVERNMENT

A three-member Selectboard governs the Town of Groton. The town's departments include, but are not limited to, Highway, Police, Planning, Zoning, Library and Conservation. The largest employer in Groton is Gordon Coursey & Sons LLC, Maxam and Groton Wind LLC with 6 employees each.[4]

DEMOGRAPHICS & HOUSING

Over the last 30 years, the population of Groton has increased significantly; the population change from 1980 (255) to 2010 (593) showed an increase of 338 according to US Census 2010. This represents a growth rate of approximately 132.55%. Groton's population in 2017 was estimated to be 590.[5]

The American Community Survey (2013-2017) estimates a total of 416 housing units, most of which are single family (333). Multiple-family structures total 7 and mobile homes and other housing units number 73. The median household income is estimated to be $46,818 and the median age is 51.9 years.[6] Census 2010 estimates that of the 174 vacant housing units, 157 are used for recreational, seasonal or occasional use thus confirming the presence of second home and seasonal residents.

EDUCATION & CHILD CARE

Groton students in grades K-5 attend Bridgewater Hebron Village School in Bridgewater. Students in grades 6-8 attend Newfound Memorial Middle School in Bristol. Students in grades 9-12 attend Newfound Regional High School in Bristol. There are no colleges or universities in Groton however, nor are there any licensed childcare facilities.

Incorporated: 1761

Origin: This area was named Cockermouth in 1761, after Charles Wyndham, Baron Cockermouth and Earl of Egremont, who succeeded William Pitt as Secretary of State. Few grantees took up their claims, and the land was regranted in 1766. These settlers also did not meet prescribed terms, but in 1772 Governor Wentworth renewed the charter for three years. In 1796, the town voted to change the name to Groton, and successfully petitioned the legislature to legally change the name. The name was suggested by Samuel Blood, for his hometown in Old Groton, which became a Massachusetts town when the boundary between the states was drawn in 1741.

Villages and Place Names: North Groton

Population, Year of the First Census Taken: 373 residents in 1790

Population Trends: Population change for Groton totaled 491 over 57 years, from 99 in 1960 to 590 in 2017. The largest decennial percent change was a 113 percent increase between 1970 and 1980, more than doubling the population over those ten years. The 2017 Census estimate for Groton was 590 residents, which ranked 213th among New Hampshire's incorporated cities and towns.

Population Density and Land Area, 2017 (US Census Bureau): 14.5 persons per square mile of land area. Groton contains 40.7 square miles of land area and 0.1 square miles of inland water area

Source: Economic & Labor Market Information Bureau, NH Employment Security, July 2019; Received 6/13/2017

[4] Economic & Labor Market Information Bureau, NH Employment Security, July 2019. Community Response 6/13/2017
[5] Ibid.
[6] American Community Survey, 2013-2017; the Census Bureau

NATURAL FEATURES

The Town of Groton covers approximately 40.7 square miles of land area and 0.1 square miles of inland water. The community is dominated by the hill and valleys of central New Hampshire. The highest peak is Tenney Mountain at 2,350' above sea level. The lowest elevation in town is about 636' above sea level at the bottom of Old Groton Road. Vegetation is typical of northern New England including both deciduous and conifer forests, open fields, swamp and riverine areas.

TRANSPORTATION

There are no major interstates running through Groton, however minor roadways include North Groton road, Halls Brook Road, Groton Hollow Road, Sculptured Rock Road, River Road and Stage Coach Road. The town is accessed by smaller and less travelled roadways that span out through the town. Groton is a very hilly area which could lead to hazardous conditions anywhere in the town.

B. EMERGENCY SERVICES

EMERGENCY OPERATIONS CENTER & EMERGENCY MANAGEMENT DIRECTOR

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

GROTON FIRE RESCUE & EMS

Groton does not have a fire department, all fire and emergency medical services (EMS) are routinely handled by Hebron and Rumney Fire Departments.

GROTON POLICE DEPARTMENT

Groton has a small police department and has recently hired a new Police Chief. The Grafton County Sheriff's Office and the NH State Police supply coverage for the town when the Groton Police Department is off-duty.

GROTON HIGHWAY DEPARTMENT

The Groton Highway Department operates on a year-round, 24-hour basis as needed. The department staffs a full-time Road Agent and three part-time employees. The Highway Department's mission is to support the citizens of Groton through the safe operation, proper maintenance and future development of highway, supporting infrastructure and utilities in a manner that is cost conscious without sacrificing quality. The department belongs to the NH Public Works Mutual Aid Association.

MEDICAL FACILITIES

Groton's closest medical facility is Speare Memorial Hospital in Plymouth (13 miles, 25 beds). If the need arises, an alternative medical facility is Dartmouth-Hitchcock Medical Center in Lebanon (32 miles, 396 beds).

EMERGENCY SHELTER(S)

The primary shelter is the location to which evacuees are directed at the time of an emergency. In Groton, the designated primary shelter is the Town House which offers a large sleeping area, rest rooms and kitchen facilities and has a permanent generator. Possible secondary shelters for the town include; Hebron Church, Sculptured Rocks Bed & Breakfast and Circle Camp Summer Camp.

C. GROTON'S CURRENT & FUTURE DEVELOPMENT TRENDS

Over the last 10 years development in Groton has been consistent with development trends in the rest of New Hampshire. Nearly every community in New Hampshire has experienced a significant drop in new home construction since the last 2010s. This trend is only now beginning to change, but in Groton, change has been slow. Information provided by City-Data.com (see chart to right) supports this trend in Groton, with a slight increase in new home construction in 2017.[7]

Single-family new house Construction building permits

- 1997: 5 buildings, average cost: $79,500
- 1998: 6 buildings, average cost: $79,500
- 1999: 6 buildings, average cost: $79,500
- 2000: 6 buildings, average cost: $79,500
- 2001: 7 buildings, average cost: $79,500
- 2005: 18 buildings, average cost: $150,200
- 2006: 6 buildings, average cost: $171,000
- 2007: 6 buildings, average cost: $181,200
- 2008: 4 buildings, average cost: $182,400
- 2009: 4 buildings, average cost: $150,000
- 2010: 3 buildings, average cost: $165,900
- 2012: 3 buildings, average cost: $184,000
- 2013: 1 building, cost: $193,300
- 2014: 3 buildings, average cost: $211,200
- 2016: 4 buildings, average cost: $209,300
- 2017: 5 buildings, average cost: $150,000

The team reported that development in Groton over the past five years has been slow, however, one minor subdivision with six lots off the main road and several single family homes have been constructed. A couple of new mobile homes have also been located on North Groton Road. The town badly needs a new Town Garage (Highway); this is further evidenced by the damage that was caused on July 11, 2019. However, no major subdivisions have been requested and no large-scale development is anticipated in the near future. No development has occurred in hazard prone areas or has impacted the town's hazard vulnerability.

The Planning Board and the Selectboard will monitor growth in Groton using existing regulatory documents such as the Flood Plain Management Ordinance, the Zoning Ordinance, the Subdivision Regulations, the Site Plan Review Regulations and the Groton Master Plan. Building Permits are required in Groton and as a small community, Planning Board and Selectboard members along with other town officials are almost always aware of building that is taking place.

The Planning Board will follow town building and subdivision regulations to ensure that any building in hazardous areas will be built to minimize vulnerability to the hazards identified in this plan. The town recognizes the importance of growth, but also understands the impact that hazards can have on new facilities and homes if built within hazardous areas of the community. Town officials will continue to monitor any new growth and development, including new critical facilities, with regards to potentially hazardous events.

[7] City-Data.com; http://www.city-data.com/city/Groton-New-Hampshire.html

TABLE 2.1: TOWN STATISTICS

Table 2.1 - Town Statistics				
Census Population Data	**2010**	**2000**	**1990**	**1980**
Groton, NH - Census Population Data	**593**	**458**	**318**	**255**
Grafton County	**89,118**	**81,826**	**74,998**	**65,806**
Population Estimate for 2017 *(US Census)*	590			
*Elderly Population-% over 65 (*ACS 2013-2017)*	12.2%			
*Median Age (*ACS 2013-2017)*	51.9			
*Median Household Income (*ACS 2013-2017)*	$46,818			
*Individuals below the poverty level (*ACS 2013-2017)*	17.3%			
Change in Population-Seasonal & Weekend (%)	30%			
Housing Statistics *(2010 Census)*				
Total Housing Units	436			
Occupied Housing Units	262 *(231 Owner Occupied, 31 Renter Occupied)*			
Vacant Housing Units	174 *(157 Seasonal, Recreation, Occasional Use, 13 All Other Vacant Units)*			
Assessed structure value (2018-MS1)	**Value**		**1% Damage**	**5% Damage**
Residential	$38,514,300		$385,143	$1,925,715
Manufactured Housing	$3,496,600		$34,966	$174,830
Commercial	$222,700		$2,227	$11,135
Tax Exempt	$989,800		$9,898	$49,490
Utilities	$11,843,060		$118,431	$592,153
Totals	$55,066,460		$550,665	$2,753,323
**Chart above indicates the value of structures only and the likely loss value based on either a loss of 1% or 5% of structures.*				
Regional Coordination				
County	Grafton			
Tourism Region	Dartmouth-Lake Sunapee			
Municipal Services & Government				
Town Manager or Administrator	No			
Board of Selectmen	Yes, elected (3 member)			
Planning Board	Yes, elected			
School Board	Yes, elected			
Zoning Board of Adjustment	Yes, elected			
Conservation Committee	Yes, elected			

Table 2.1 - Town Statistics	
Master Plan	Yes, 2017
Emergency Operation Plan (EOP)	Yes, 2010
Hazard Mitigation Plan (HMP)	Yes, 2014
Zoning Ordinances	Yes, 2007; 2015
Site Plan Review Regulations	Yes; 2012
Subdivisions Regulations	Yes, 2014
Capital Improvement Plan	No
Capital Reserve Funds	Yes
Building Permits Required	Yes
Town Web Site	Yes, www.grotonnh.org
Floodplain Ordinance	Yes, Stand Alone, 2007
Member of NFIP	April 18, 1983
Flood Insurance Rate Maps (DFIRMS)	February 20, 2008
Flood Insurance Rate Study (FIS)	February 20, 2008
Percent of Local Assessed Valuation by Property Type-2017 ***(NH Department of Revenue)***	
Residential Buildings	84.2%
Commercial Land & Buildings	0.3%
Other (including Utilities)	15.9%
Emergency Services	
Town Emergency Warning System(s)	CodeRED
School Emergency Warning System(s)	School Messenger
Emergency Page	No
Social Media	Facebook (Town)
ListServ	No
Local Newspapers	Penny Saver & Record Enterprise (Plymouth), Laconia Citizen
Public Access TV	No
Local TV Stations	WMUR channel 9
Local Radio	NHPR 97.3 FM (Plymouth), 104.9 FM, The Hawk
Police Department	Yes, Grafton County Sheriff's Office or NH State Police will cover the community when the Police Department is not staffed.
Police Dispatch	Plymouth Dispatch
Police Mutual Aid	Surrounding towns, NH State Police & Grafton County Sheriff's Office
Animal Control Officer	No

Table 2.1 - Town Statistics	
Fire Department	No, Hebron & Rumney Volunteer
Fire Dispatch	Lakes Regional Fire Mutual Aid
Fire Mutual Aid	Lakes Regional Fire Mutual Aid
Fire Stations	None
Fire Warden	Yes, 4 deputies and an issuing agent
Emergency Medical Services	Hebron & Rumney Volunteer
EMS Dispatch	Lakes Regional Fire Mutual Aid
Emergency Medical Transportation	Hebron & Rumney Volunteer
HazMat Team	Central NH HazMat Team
Established EMD	Yes
Established Deputy EMD	Yes
Public Health Network	Central NH Regional Public Health Network
Health Officer	Yes
Building Inspector	Selectboard
Established Public Information Officer (PIO)	Selectboard
Nearest Hospital(s)	Speare Memorial Hospital, Plymouth (13 miles, 25 beds)
	Dartmouth-Hitchcock, Lebanon (32 miles, 396 beds)
Local Humane Society or Veterinarians	Enfield Humane Society, Veterinarians in Plymouth or Rumney
Primary EOC	Town House
Secondary EOC	No
Primary Shelter	Town House
Secondary Shelter	Hebron Church, Sculptured Rocks Bed & Breakfast, Circle Camp Summer Camp (Spectacle Pond)
Utilities	
Town Sewer	Private septic
Highway Department @ the Town Garage	Yes, full-time Road Agent, 3 part-time
Public Works Mutual Aid	Yes
Water Supply	Private wells
Waste Water Treatment Plant	No
Electric Supplier	NH Electric Coop
Natural Gas Supplier	None
Cellular Telephone Access	Limited
Pipelines	No
High Speed Internet	Limited
Telephone Company	Consolidated Communications & Spectrum

Table 2.1 - Town Statistics		
Transportation		
Primary Evacuation Routes	North Groton Road, Halls Brook Road, Groton Hollow Road, Sculpture Rock Road, River Road, Stage Coach Road	
Secondary Evacuation Routes	None	
Nearest Interstate	I-93 Exit 26 (13 miles)	
Nearest Airstrip	Plymouth Regional (2,380 ft. turf runway)	
Nearest Commercial Airport(s)	Lebanon Municipal Airport (36 miles)	
	Manchester-Boston Regional Airport (73 miles)	
Public Transportation	No	
Railroad	No	
Education & Childcare		
Elementary/Middle/High School	Grades K-12 tuitioned to Newfound Area School District with Alexandria, Bristol, Danbury, Hebron, Bridgewater & New Hampton	
School Administrative Unit	SAU 4	
Licensed Childcare Facility	0 facilities, 0 capacity	
Conserved Land as a Percent of Land in the Community ***(GIS Analysis; 2019 Conservation Files, Granit, UNH)***		
	Square Miles	**Percent of Town Land**
Approximate Square Miles in Community (including water)	40.70	100.0%
Approximate Total Un-Conserved Land	25.86	63.5%
Approximate Total Conserved Land	14.84	36.5%
Municipal/County Land (1)	0.18	0.5%
Federal Owned Land (2)	0.00	0.0%
State Owned Land (3)	8.22	20.2%
Quasi Private(4)	0.00	0.0%
Private Land (5)	6.43	15.8%
Fire Statistics ***(NH Division of Forests & Lands, Fire Warden Report, 2017 and the Town)***		
Wildfire Fires (2017 & 2018)	None; 2017, Province Road in Dorchester	
Grafton County Fire Statistics (2017)	51 fires, 2 acres	
State Forest Fires Statistics (2017)	107 fires, 64 acres	
**ACS: The American Community Survey, a five-year average of randomly mailed long-form surveys from the Census Bureau*		
Information found in Table 2.1, unless otherwise noted, was derived from the Economic & Labor Market Information Bureau, NH Employment Security, July 2019. Community Response Received 6/13/2017; https://www.nhes.nh.gov/elmi/products/cp/profiles-pdf/groton.pdf		

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Chapter 3: Hazard Identification, Risk Assessment & Probability

A. HAZARD IDENTIFICATION

The first step in hazard mitigation is to identify hazards. The team determined that 10 natural hazards have potential to affect the community. *Table 3.1, Hazard Identification & Risk Assessment (HIRA),* provides estimates of 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 estimate of "probability" for each hazard is multiplied by its severity to establish an overall "relative threat" factor.

The NH State Hazard Mitigation Plan includes many of the same potential hazards that have been identified in Groton. Several of the state's hazards however were excluded from this plan. These include the following:

State Hazard	Reason for exclusion from this plan
Coastal Flooding	Distance away from the sea
Landslide	No known areas of landslide in the town
Solar Storm & Space Weather	The team felt this was out of their control and too expensive
Avalanches	No known areas of avalanches
Radiological	Distance away from any radiological sites
Conflagration	No known areas for a conflagration event
Known and Emerging Contaminates	The town felt this could not be mitigated

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

B. RISK ASSESSMENT

The hazards listed in Table 3.1 were then classified based upon the "Relative Threat" score as calculated in Column F; these were then separated into three categories using Jenks' Optimization, which is also known as natural breaks classification.[8] The "Relative Threat" score was then labelled 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. By using this grouping process, the plan demonstrates each hazard's likelihood of occurrence in combination with its potential effect on the town. This process illustrates a comprehensive hazard statement and assists the town with understanding which hazards should receive the most attention.

In addition to the relative threat analysis determined 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.

[8] 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

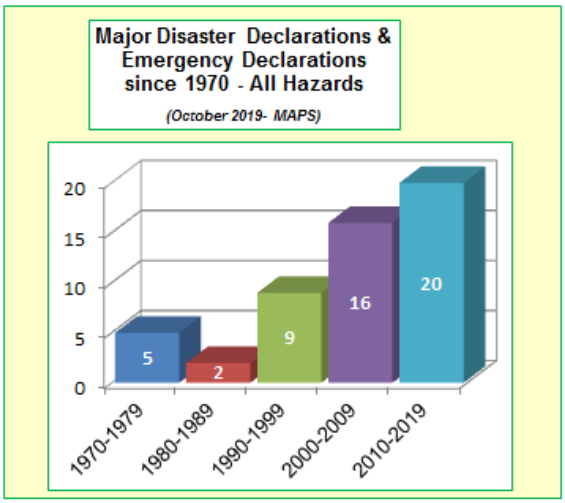
C. PROBABILITY

The determination of the probability of occurrence is contained within Column D in Table 3.1 which assesses hazards based upon the likelihood of the hazard's manifestation within a 25 year period. The probability scores indicate whether the identified hazard has a *Very Low, Low, Moderate, High and Very High* probability. Probability categories are also indicated in Chapter 5, Sections B-D.

Overall, the Town of Groton is fairly safe from the effects of natural, technological and human-caused hazards. However, due to Groton's geographic location, forested lands, hills, heavy snow pack 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 today without some discussion of the impact that climate change has had 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 new State Mitigation Plan Review Guide[9]. By including climate change in the new hazard mitigation guide for state planners, FEMA is recognizing the reality of climate change.



The chart to the right shows the increased frequency of Major Disaster Declarations and Emergency Declarations in the State of New Hampshire, which may be indicative of climate change.[10]

Communities in New Hampshire, such as Groton, should become increasingly aware of the effects of climate change on the hazards that are already being experienced and anticipate an increase in probability in the future.

HAZARD PROBABILITY COMBINED WITH LONG TERM UTILITY OUTAGE

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

[9] State Mitigation Pan Review Guide, FEMA, Released March 2015, Effective March 2016, Section 3.2, page 13
[10] Derived from FEMA's record of disasters; categorized by decade since 1970 by the planner

TABLE 3.1: HAZARD IDENTIFICATION & RISK ASSESSMENT (HIRA)

Table 3.1 - Hazard Identification & Risk Assessment (HIRA)							
Scoring for Probability (Columns A, B & C)	**Column A**	**Column B**	**Column C**	**Column D**	**Column E (A+B+C)/3**	**Column F D x E**	**Column G Risk**
1=Very Low (0-20%)	What is the probability of death or injury?	What is the probability of physical losses & damage?	What is the probability of interruption of service?	What is the probability of this occurring within 25 years?	Average of Human, Property & Business Impact	Relative Threat	**High** 10.0-15.0 **Medium** 5.0-9.9 **Low** 0-4.9
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	
5=Very High (81-100%)							
Natural Hazards							
1) Inland Flooding	2.00	4.00	3.00	5.00	3.00	15.00	High
2) Severe Winter Weather	3.00	3.00	3.00	4.00	3.00	12.00	High
3) High Wind Events	2.00	3.00	3.00	4.00	2.67	10.67	High
4) Extreme Temperatures	3.00	3.00	1.00	4.00	2.33	9.33	Medium
5) Tropical & Post-Tropical Cyclones	2.00	4.00	3.00	3.00	3.00	9.00	Medium
6) Lightning	1.00	2.00	2.00	4.00	1.67	6.67	Medium
7) Wildfires	2.00	2.00	2.00	2.00	2.00	4.00	Low
8) Drought	1.00	2.00	1.00	3.00	1.33	4.00	Low
9) Earthquakes	1.00	2.00	2.00	2.00	1.67	3.33	Low
10) Infectious Diseases	3.00	1.00	2.00	1.00	2.00	2.00	Low
Technological Hazards							
1) Aging Infrastructure	2.00	4.00	2.00	5.00	2.67	13.33	High
2) Long Term Utility Outage	2.00	2.00	3.00	4.00	2.33	9.33	Medium
3) Dam Failure	3.00	3.00	2.00	2.00	2.67	5.33	Medium
4) Hazardous Materials	2.00	3.00	2.00	1.00	2.33	2.33	Low
Human-cause Hazards							
1) Mass Casualty Incident	3.00	3.00	3.00	4.00	3.00	12.00	High
2) Transport Accident	2.00	2.00	3.00	4.00	2.33	9.33	Medium
3) Cyber Event	4.00	2.00	3.00	3.00	3.00	9.00	Medium
4) Terrorism & Violence	4.00	4.00	4.00	2.00	4.00	8.00	Medium

D. National Flood Insurance Program (NFIP) Status

Groton has been a member of the National Flood Insurance Program since; April 18, 1983. Groton has slightly over 26,000 acres of total land, just under 64 acres of surface water and approximately 159 acres of land in the 100-year floodplain. The floodplain area is primarily in the southeast corner of the town where the Cockermouth River, Hardy Brook and waters from Spectacle Pond meet; there is also a small 50-year flood zone within the same area. The latest D-Firm for Groton is dated February 20, 2008 and the last Flood Insurance Study (FIS) was also completed on February 20, 2008. The team noted that updated flood maps for the Cockermouth area had been done in 2010.

According to the NH Office Strategic Initiatives, there is one NFIP residential single-family policy in effect in Groton for a total of $350,000 of insurance in force. No losses have been paid and there have been no repetitive losses claimed[11]. However, in both this hazard mitigation plan and the prior plan, it was noted that the Town Garage is located in the floodplain; the Town Garage has been and is threatened by flooding.

NATIONAL FLOOD INSURANCE PROGRAM

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*

Groton Floodplain Development Ordinance

The Town of Groton developed and adopted the Groton Flood Plain Development Regulations"; the regulations were revised in February 2007 and updated on November 28, 2007. The Flood Plain Development Regulations is a stand-alone document; however, special flood hazard zones are also discussed in the Site Plan Review Regulations.[12]

The Town of Groton Flood Plain Development Regulations details the requirements for building in the floodplain and states:

*"**Purpose**…Certain areas of the Town of Groton, New Hampshire are subject to periodic flooding, causing serious damage to properties within these areas. Relief is available in the form of flood insurance as authorized by the National Flood Insurance Act of 1968. Therefore, the Town of Groton, New Hampshire has chosen to become a participating community in the National flood Insurance Program, and agrees to comply with the requirements of the National Flood Insurance Act of 1968 (P.L. 90-488, as amended) as detail in this Floodplain Development Regulation. This Regulation establishes a permit system and review procedure for development activities in the designate flood hazards areas of the Town of Groton, New Hampshire."*

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

[11] NH Office of Strategic Initiatives; Jennifer Gilbert, February 8, 2019
[12] http://www.grotonnh.org/planningboard/2007%20Flood%20Plain%20Regulations.pdf

The regulations further state that *"**Enforcement**…It shall be the duty of the Board of Selectmen (or their designee) to enforce and administer the provisions of this Ordinance in accordance with RSA 676."*

Other parts of the Groton floodplain regulations are synopsized below. Items in italic are taken directly from the regulations.

Item I. Definition of Terms
Item I provides definitions for terms that are used in the "Flood Plain Development Regulations".

Item II. Permit Required
"All proposed development in any special flood hazard areas shall require a permit."

Item III. Permit Review, Standard
"The selectmen or their designee shall review all building permit applications for new construction or substantial improvements to determine whether proposed building sites will be reasonably safe from flood. If a proposed building site is located in a special flood hazard area, all new construction or substantial improvements shall:

A. be designed (or modified) and adequately anchored to prevent floatation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyance;
B. be constructed with material resistant to flood damage;
C. be constructed by methods and practices that minimize flood damages, and
D. *be constructed with electrical, heating, ventilation, plumbing, and air condition equipment, and other service facilities that are designed and/or located so as to prevent water from entering or accumulating with the components during conditions of flooding*."

Item IV. Water and Sewer Systems

"Where new or replacement water and sewer systems (including on-site systems) are proposed in a special flood hazard area the applicant shall provide the selectmen or their designee with assurance that these systems will be designed to minimize or eliminate infiltration of flood water into the system and discharges from the systems in flood waters, and on-site waste disposal systems will be located to avoid impairment to them or contamination from them during periods of flooding."

Item V. New or Substantially Improved Structures

"For all new or substantially improved structures located in Zones A or AE the applicant shall furnish the following information to the selectmen or their designee:

A. the as-built elevation (in relation to NGVD) of the lowest floor (including basement) and include whether or not such structures contain a basement;
B. if the structure has been flood proofed, the as-built elevation (in relation to NGVD) to which the structure was flood proofed; and
C. any certification of flood proofing. The selectmen or their designee shall maintain for public inspection, and shall furnish such information upon request."

Item VI. Certification Required

"The selectmen or their designee shall not grant a building permit until the applicant certifies that all necessary permits have been received from those governmental agencies from which approval is required by federal or state law, including Section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1334."

Item VII. Alteration/Relocation of Watercourse

Item VII, details aspects of alteration or relocation of watercourses and regulations pertaining to riverine situations (A);, the need for *"…certification provided by a registered professional engineer, assuring that the flood carrying capacity of an altered or relocated watercourse can and will be maintained"* (B); the demonstration that encroachments would not *"…result in any increase in flood levels within the community during the base flood discharge"* (C); *the determination that "…no new construction, substantial improvements other development (including fill) shall be permitted…unless it has been demonstrated…that the cumulative effects…will not increase the water surface elevation of the base flood more than on foot at any point within the community."* (D); and that *"The Selectmen…shall obtain, review, and reasonably utilize any floodway data available…for requiring that all development located in Zone A meet the following requirement: "No encroachments, including fill, new construction, substantial improvements and other development are allowed within the floodway that would result in any increase in flood levels within the community during the base flood discharge""*. (E)

In Section 3.2 of the Subdivision Regulations, it is stated that all proposals for development in special flood hazard areas *"comply with the Town of Groton floodplain development regulations".*[13]

The floodplain is also mentioned in the Town's **Site Plan Review Regulations**. The excerpt to the right from the Site Plan Review Regulations outlines the requirement for "*all necessary permits*" and "*Sufficient evidence…that: 1) all such proposals are consistent with the need to minimize flood damage; and 2) adequate drainage is provided so as to reduce exposure to flood hazards."*[14]

Section VIII - Special Flood Hazard Areas

A. The Planning Board shall review the proposed development to assure that all necessary permits have been received from those governmental agencies from which approval is required by Federal or State law, including Section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1334.

B. The Board shall require that all subdivision/plat plan proposals and other proposed new developments greater than 50 lots or 5 acres, whichever is lesser, include within such proposals base flood elevation data. Sufficient evidence (construction drawings, grading and land treatment plans) shall be submitted so as to allow determination that:
   1. all such proposals are consistent with the need to minimize flood damage; and
   2. adequate drainage is provided so as to reduce exposure to flood hazards.

Item VIII. Determination of 100 Year Flood Elevation/Standards

Item VIII goes into detail on regulations that address the determination of the flood zone (A); how "the *100-year flood elevation determination will be used as criteria"* and *"that all new construction…have the lowest floor (including basement) elevated to or above the 100-year flood level…"(*B); that *"all manufactured homes…be elevated on a permanent foundation such that the lowest floor of the manufactured home is at or above the base flood level"* and that it be *"anchored to resist floatation, collapse, or lateral movement…*" (C); that, *"For all new construction and substantial improvements, fully enclosed areas below the lowest floor that are subject to flooding are permitted provided they meet* (certain) *requirements…"* (D); that, "*Recreational vehicles placed on sites within Zones A and AE shall either…be on site for fewer than 180 consecutive days, be fully licensed and ready for highway use or meet the standards of Section 60.3 (b) (1) Of the National Flood Insurance Program Regulations and the elevation and anchoring requirements for "manufactured homes: in Paragraph (c) (6) of Section 60.3."*

[13] Town of Groton, Subdivision Regulations, Adopted February 29, 2012, Amended, July 9, 2014
[14] Town of Groton, Site Plan Review Regulations, February 29, 2012

Item IX. Variances and Appeals

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

A. *"Any order, requirement, decision or determination…under this ordinance may be appealed to the Zoning Board of Adjustment set forth in RSA 676:5."*

B. *"If the applicant, upon appeal, requests a variance as authorized by RSA 674:331(b), the applicant shall have the burden of showing in addition to the usual variance standards under state law:"*

1. *"that the variance will not result in increased flood heights…"*
2. *"That...no increase in flood levels during the base flood discharge will result."*
3. *"That the variance is the minimum necessary, considering the flood hazard, to afford relief."*

C. "The Zoning Board…shall notify the applicant in writing that:

1. *the issuance of a variance to construct below the base flood level will result in increased premium rates for flood insurance…"*
2. *"such construction…increases risks to life and property…"*

D. *"The community shall:*

1. *maintain a record of all variance actions..."*
2. *"report such variances issued in its annual budget or biennial report submitted to FEMA's Federal Insurance Administrator".*

Although not addressed in the floodplain ordinance, erosion from flooding, including road and culvert washouts is always a potential concern in Groton, although many of these problems have been mitigated. With any significant rainfall, particularly when combined with rapid snow melt, roads, ditches and culverts within the town may become overwhelmed.

As a very small and close-knit community, the Groton Select and Planning Boards are most always aware of new construction and/or substantial improvements that take place in the town. And, although Groton has a relatively small designated Special Flood Hazard Area, the town remains committed to continuing their participation in the National Flood Insurance program and felt that it is worthwhile to have NFIP brochures and information available at the Town House for current homeowners and potential developers. Mitigation Action Items #3, 16 17, 18, 23, 24, 25, 30, 31, 32, 33 in Tables 8.1 & 9.1 specifically deal with flood and stormwater issues.

Damage to home on Sculptured Rocks Road, July 2019
Photo Credit: Snip from https://www.wmur.com/article/groton-homeowners-dealing-with-devastating-flood-damage/28391500

It has been explained to the team that benefits of the NFIP may extend to all structures in town, even if they are not in a flood zone; the town recognizes the need to notify its citizens of this fact. The town closely monitors the NFIP and those structures in town that are susceptible to flooding.

TABLE 3.2: HISTORIC HAZARD IDENTIFICATION

2014 HMPT = 2014 Hazard Mitigation Planning Team
2020 HMPT = 2020 Hazard Mitigation Planning Team

DR Major Disaster Declarations (DR) since 1953
EM Emergency Declarations (EM) since 1953

Type of Event	Date of Event	Location	Description	Source
A. Inland flooding including inland, riverine, heavy rainfall, rapid snowmelt, ice jam flooding, flooding as a result of dam failure & local road flooding: 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 townwide basis. No significant flooding events have taken place in Groton since the July 2019 heavy rain event (DR-4457).				
Summary of flood events including Major Disaster & Emergency Flood Declarations in the state & regionwide				
Flooding Prior to 1970	1927, 1936, 1938, 1943 (2), 1953, 1955, 1959		Spring and fall flooding events resulting from severe storms and/or heavy snowmelt	See below
Flooding 1970-1979	1972 **(DR-327)**, 1973 **(DR-399)**, 1974 **(DR-411)**, 1976, 1978 **(DR-549)**, 1979 **(EM-3073)**			
Flooding 1980-1989	1986 **(DR-771)**, 1987 **(DR-789)**			
Flooding 1990-1999	1990 **(DR-876)**, 1991 **(DR-923)**, 1991 **(DR -917)**, 1995, 1996 **(DR-1077)**, 1996 **(DR-1144)**, 1998 **(DR-1231)**			
Flooding 2000-2009	2003 **(DR-1489)**, 2005 **(DR-1610)**, 2006 **(DR-1643)**, 2007 **(DR-1695)**, 2008 **(DR-1787)**, 2008 **(DR-1799)**			
Flooding 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)**			
Detailed summary of flood events in the community				
Inland Flooding Heavy Rain	1973	Halls Brook Road	In 1973 (possibly DR-399), heavy rain caused washouts on Halls Brook Road washout. Flood waters were half way up to the door of the Old Town Hall and the entire intersection covered with water.	2007 HMPT & 2020 HMPT
Inland Flooding Heavy Rain	1998	Halls Brook Road	In 1998 (possibly DR-1231), heavy rain again caused major washouts on Halls Brook Road. Damage repair took the state almost two years leaving the one way out of Town via NH Route 118.	2007 HMPT & 2020 HMPT

Type of Event	Date of Event	Location	Description	Source
Inland Flooding Heavy Rain	October 7-18, 2005	Belknap, Cheshire, Grafton, Hillsborough, Merrimack & Sullivan	**Major Disaster Declaration DR-1610:** State and federal disaster assistance reached more than $3 million to help residents and business owners in New Hampshire recover from losses resulting from the severe storms and flooding in October. In Groton, major road washouts occurred on Sculptured Rocks Road where the Punch Brook remained intact but the road washed out around it. There was minor road damage on Province Road and the Groton Town Garage; the Old Town Hall & Library were flooded. The culvert still needs replacing on Sculptured Rocks Road.	FEMA, 2007 HMPT, 2014 HMPT & 2020 HMPT
Inland Flooding Heavy Rain	May 12-23, 2006	Belknap, Carroll, Grafton, Hillsborough, Merrimack, Rockingham & Strafford	**Major Disaster Declaration DR-1643:** Flooding occurred in most of southern NH during the period of May 12-23, 2006 (aka: Mother's Day Storm). In Groton heavy rain occurred but there were only minor road washouts.	FEMA & 2020 HMPT
Inland Flooding Heavy Rain	April 15-23, 2007	All Ten NH Counties	**Major Disaster Declaration DR-1695:** FEMA & SBA obligated more than $27.9 million in disaster aid for flood damages following the April nor'easter. (aka: Tax Day Storm). Groton experienced flooding and road washouts during this heavy rain storm with at least one metal culvert washing out on Sculptured Rocks Road.	FEMA, 2014 HMPT & 2020 HMPT
Inland Flooding Heavy Rain & Tornado	July 24-August 14, 2008	Belknap, Carroll & Grafton & Coos	**Major Disaster Declaration DR-1787:** A period of severe storms and flooding for the period of July 24-August 14 which also spawned a tornado on July 24, 2008. In Groton, road edges washed out on North Groton Road, Sculptured Rocks and Province Road and there was minor erosion damage to Bailey Hill Road.	FEMA, 2014 HMPT & 2020 HMPT
Inland Flooding Heavy Rain	February 23 - March 3, 2010	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan	**Major Disaster Declaration DR-1892:** Flood and wind damage occurred in southern NH including six counties resulting in 330,000 homes without power. More than $2 million was obligated by FEMA by June 2010. In Groton some road washouts occurred in the usual places, Sculptured Rocks Road, River Road, Blanchette Road, Edgar Albert Road, Province Road and parts of North Groton Road	FEMA, 2014 HMPT & 2020 HMPT
Inland Flooding Heavy Rain	May 26-30, 2011	Coos & Grafton County	**Major Disaster Declaration DR-4006:** Flooding and hail occurred as a result of a severe storm on May 26th-30th 2011 in Coos & Grafton County. (aka: Memorial Day Weekend Storm). In Groton, minor washouts in the usual places.	FEMA & 2020 HMPT
Inland Flooding Heavy Rain	July 9-10, 2013	Cheshire, Sullivan & Grafton	**Major Emergency Declaration DR-4139:** Severe storms, flooding, and landslides occurred during the period of June 26 to July 3, 2013 in Cheshire and Sullivan Counties and in southern Grafton County. In Groton, heavy rain fell and minor flooding and washouts occurred in the usual places.	FEMA & 2020 HMPT

Type of Event	Date of Event	Location	Description	Source
Inland Flooding Heavy Rain	July 1-2, 2017	Grafton & Coos	**Major Disaster Declaration DR-4329:** The Federal Emergency Management Agency (FEMA) announced that federal disaster assistance was available to supplement state and local recovery efforts in the areas affected by severe storms and flooding from July 1, 2017 to July 2, 2017 in two New Hampshire Counties. In Groton washouts occurred on Province Road, North Groton Road, Blanchette Lane, River Road & Bailey Hill Road. The Town received FEMA funding for $41,000 for damage repair (Town's share was $13,000-$14,000).	FEMA & 2020 HMPT
Inland Flooding Heavy Rain	October 29-November 1, 2017	Sullivan, Grafton, Coos, Carroll, Belknap & Merrimack	**Major Disaster Declaration DR-4355:** The Federal Emergency Management Agency (FEMA) announced that federal disaster assistance is available to the state of New Hampshire to supplement state and local recovery efforts in the areas affected by severe storms and flooding from October 29-November 1, 2017 in five New Hampshire Counties. In Groton washouts occurred on Sculptured Rocks Road, Province Road, North Groton Road, Edgar Albert Road, Blanchette Lane & River Road. The town's Town Garage was also flooded along with some small highway equipment. Estimated total damage was $493,919. The Town has received approximately $50,000 to date. Town will receive $370,589 from FEMA and will contribute $123,529.	FEMA & 2020 HMPT
Inland Flooding Heavy Rain	July 11-12, 2019	Grafton County	**Major Disaster Declaration DR-4457:** The Federal Emergency Management Agency announced a major disaster declaration for a period of severe storms and flooding from July 11-12, 2019 in one New Hampshire County. In Groton, Sculptured Rocks, North Groton, Edgar Albert and Province Roads as well as Blanchette Lane received significant damage. In addition to damaging the building, the flood waters that backed into the Town Garage resulted in the loss of 18 yards of rock salt, loss of the heating system, the Police Cruiser and other items. The town has submitted an estimate of $845,000 in damages and is working with HSEM and FEMA on a settlement.	FEMA 2020 HMPT
B. Wildfires: 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 Jurisdiction on a townwide basis. No significant wildfire events have taken place in Groton since the prior hazard mitigation plan.				
Summary of wildfire events including Major Disaster & Emergency Declarations in the state and other recent large fires				
Wildfire (Shaw Mountain)	July 2, 1953	Carroll County	**Major Disaster Declaration DR-11:** This wildfire occurred in Carrol County at Shaw Mountain and did not reach Grafton County or Groton.	Local Resources

Type of Event	Date of Event	Location	Description	Source
Wildfire (Bayle Mountain)	May 2015	Carroll County	**The Bayle Mountain Fire:** This Class D fire burned 275 acres and took five days to put out on rocky and steep terrain in Ossipee, NH. Blackhawk and private helicopters along with fire crews from all over the state assisted to extinguish this fire. The Bayle Mountain Fire did no damage to homes. This fire did not reach Grafton County or Groton.	Local Resources
Wildfire (Stoddard)	April 2016	Cheshire County	**Fire Management Assistance Declaration FM-5123:** Stoddard, NH. The Stoddard Fire burned 190 acres in April 2016 and caused the evacuation of 17 homes; Class D fire. This fire did not reach Grafton County or Groton.	Local Resources
Wildfire (Covered Bridge Fire)	November 2016	Carroll County	**The Covered Bridge Fire:** A brush fire near the Albany Covered Bridge grew to 329 acres, primarily on White Mountain National Forest land. No structures were lost; Class E fire. This fire did not reach Grafton County or Groton.	Local Resources
Wildfire (Dilly Cliff)	October 2017	Grafton County	**The Dilly Cliff Fire** 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 Grafton County or Groton.	Local Resources
Detailed summary of wildfire events in the community				
Wildfire	1942	Power line next to Halls Brook Road	Class C (500 acres): Unknown	2007 HMPT & 2020 HMPT
Wildfire	5/18/1995	Unknown (Forest/Lands)	Class A, Debris	2007 HMPT & 2020 HMPT
Wildfire	3/12/1998	Unknown (Forest/Lands)	Class A, Brush	2007 HMPT & 2020 HMPT
Wildfire	2000	Province Rd before Coolidge Road	Class A (.5 acres): Campfire	2007 HMPT & 2020 HMPT
Wildfire	8/17/2002	Unknown (Forest/Lands)	Class A, Lightning	2007 HMPT & 2020 HMPT
Wildfire	2004	Back side Mt. Crosby by Hebron Line	Class B (6 acres): Lightning	2007 HMPT & 2020 HMPT

Type of Event	Date of Event	Location	Description	Source
Wildfire	3/29/2004	Unknown (Forest/Lands)	Class A, Brush/Debris Burning	2007 HMPT & 2020 HMPT
No wildfires of significance have occurred in Groton since the 2014 Hazard Mitigation Plan was completed.				
C. High Wind Events including Tropical & Post-Tropical Cyclones, Tornadoes, Downbursts & Windstorms: 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, as compared to other states in New England. 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 townwide basis. No significant high wind events have taken place in Groton since Tropical Storm Irene in 2011.				
Summary of high wind events & tropical & post-tropical cyclone events including Major Disaster & Emergency High Wind Declarations in the state & regionwide				
Tropical & Post-Tropical Cyclones	1804, 1869, 1938, 1944, 1954 (2), 1960, 1976, 1978, 1985, 1991 **(DR-917)**, 1999 **(DR-1305)**, 2005 **(EM-3258)**, 2011 **(EM-3333 & DR-4026),** 2012 **(EM-3360)**		Number 4 (1938), Number 7 (1944), Carol (1954), Edna (1954), Donna (1960), Belle (1976), Amelia (1978), Gloria (1985), Bob (1991), Floyd (1999), Katrina (2005), Irene (2011), Sandy (2012)	See below
High Wind Events Tornadoes	1814, 1890, 1951, 1953, 1957, 1961, 1963, 2008 **(DR-1782)**		All listed tornadoes were reported as F2 tornadoes except for the June 1953 tornado which was reported as an F3.	See below
Detailed summary of high wind & tropical & post-tropical cyclone events in the community				
Tropical & Post-Tropical Cyclone Great New England Hurricane	September 21, 1938	State & Regionwide	**The Great New England Hurricane:** Statewide there were multiple deaths and damages in NH were about $12.3 million dollars in 1938 dollars (about $200 million now). Throughout New England 20,000 structures were damaged and 26,000 automobiles, 6,000 boats and 325,000 sugar maples were lost. 80% of the people lost power. Although there was no local recollection, it was expected that in Groton damage would have been similar to the rest of the state *(Source http://nhpr.org/post/75th-anniversary-new-englands-greatest-hurricane).*	FEMA & 2020 HMPT
Tropical & Post-Tropical Cyclone Hurricanes Carol & Edna	August 31, 1954	State & Regionwide	**Hurricane Carol:** Hurricane Carol resulted in an extensive amount of trees blown down and damage to damage as well as large crop losses. Localized flooding and winds measuring over 100 mph also occurred. Hurricane Carol was followed by Hurricane Edna just 12 days later, which caused already weakened trees to fall. Although there was no local recollection, it was expected that in Groton damage would have been similar to the rest of the state. *(Source: http://www.wmur.com/Timeline-History-Of-NH-Hurricanes/11861310)*	FEMA & 2020 HMPT

Type of Event	Date of Event	Location	Description	Source
Tropical & Post-Tropical Cyclone Hurricane Bob	August 18-20, 1991	State & Regionwide	**Major Disaster Declaration DR-917:** Groton received heavy rain, but no wind or flood damage.	FEMA & 2020 HMPT
High Wind Events Macroburst **Long Term Utility Outage**	1999	Merrimack, Grafton, and Hillsborough Counties	A macroburst in Groton downed trees damaged utility poles and wires and caused widespread power outages. Roofs blown off two structures in Groton and power outage were experienced in parts of the community.	2007 HMPT & 2020 HMPT
Tropical & Post-Tropical Cyclone Tropical Storm Floyd	September 16-18,1999	Belknap, Cheshire & Grafton	**Major Disaster Declaration DR-1305:** The declaration covers damage to public property from the storm that spawned heavy rains, high winds and flooding over the period of September 16-18. Groton received heavy rain during this storm, but no wind or flood damage.	FEMA & 2020 HMPT
High Wind Events Windstorm **Long Term Utility Outage**	2003	Townwide	As reported in the 2007 HMP, a significant windstorm brought trees and powerlines down, resulting in power outages in parts of Groton.	2007 HMPT & 2020 HMPT
Tropical & Post-Tropical Cyclone Hurricane Katrina (evacuation)	August 29-October 1, 2005	All Ten NH Counties	**Emergency Declaration EM-3258:** Assistance was provided to evacuees from the 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. No pets or evacuees came to Groton as a result of Hurricane Katrina.	FEMA & 2020 HMPT
High Wind Events Windstorm **Long Term Utility Outage**	2007	Townwide	As reported in the 2007 HMP, a significant windstorm brought trees and powerlines down, resulting in power outages for up 5 days in parts of Groton.	2007 HMPT & 2020 HMPT
High Wind Events Microburst	August 2010	Dorchester & small part of Groton	As reported in the 2014 HMP, a microburst struck Dorchester and a small portion of Groton including Bailey Hill Road. The most significant impact was the ability for emergency responders to access Groton.	2014 HMPT & 2020 HMPT

Type of Event	Date of Event	Location	Description	Source
Tropical & Post-Tropical Cyclone Tropical Storm Irene	August 26-September 6, 2011	**EM 3333**: All Ten NH Counties **DR-4026:** Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, & Sullivan	**Major Disaster Declaration DR-4026 & Emergency Declaration EM-3333:** Tropical Storm Irene, August 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. In Groton, water was over several roads including North Groton Road, Sculptured Rocks Road, Province Road, and Baily Hill Road. In addition, part of NH Route 118 was lost; Rumney and North Dorchester Road was damaged, leaving the Town cut off from emergency responders.	FEMA, 2014 HMPT & 2020 HMPT
Tropical & Post-Tropical Cyclone Hurricane Sandy	October 26-November 8, 2012	Belknap, Carroll, Coos, Grafton, Rockingham & Sullivan	**Major Disaster Declaration DR-4095 & Emergency Declaration EM-3360:** The declaration covers damage to property from the storm that spawned heavy rains, high winds, high tides and flooding over the period of October 26-November 8, 2012. Hurricane Sandy came ashore in NJ and brought high winds, power outages and heavy rain to six New Hampshire counties. Heavy rain occurred in Groton, but there was no significant impact in Groton.	FEMA, 2014 HMPT & 2020 HMPT
D. Severe Winter Weather including Nor'easters, Blizzards & Ice Storms: Severe winter weather in NH may include heavy snow storms, 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 townwide basis. No significant winter weather events have taken place in Groton since the "Town Meeting" snowstorms that occurred in March 2017 and 2018.				
Summary of severe winter weather events including Major Disaster & Emergency Severe Winter Weather Declarations in the state & regionwide				
Severe Winter Weather Ice Storms	1942, 1969, 1970, 1979, 1991, 1998 **(DR-1199),** 2008 **(DR-1812)**		Major ice storms that have occurred causing major disruptions to power, transportation, public and private utilities.	FEMA & 2020 HMPT
Severe Winter Weather Snowstorms	1920, 1929, 1940, 1950, 1952, 1958 (2), 1960, 1961, 1969, 1978, 1982, 1993 **(EM-3101)**, 2001 **(EM-3166)**, 2003 **(EM-3177)**, 2003 **(EM-3193)**, 2004, 2005 **(EM-3207)**, 2005 **(EM-3208),** 2005 **(EM-3211)**, 2008 **(EM-3297)**, 2009, 2011 **(EM-3344 & DR-4049), 2013 (EM-1405),** 2015 **(DR-4209),** 2017 **(DR-4316),** 2018 **(DR-4371)**		Major severe winter weather events marked by snowfalls exceeding 2' in parts of the state which resulted in disruptions to power and transportation systems.	FEMA & 2020 HMPT

Type of Event	Date of Event	Location	Description	Source
Detailed summary of severe winter storm events in the community				
Severe Winter Weather Snowstorm	Winter of 1968-69	State & Regionwide	The winter of 1968-69 brought record amounts of snow to all of New Hampshire. Pinkham Notch at the base of Mount Washington recorded more than 75" of snowfall in a four day period at the end of February 1969 in addition to snow that had already fallen in previous storms. All of NH experienced difficulty with snow removal because of the great depths that had fallen from December 1968 to April 1969. Local recollection recalls heavy snow falling in Groton throughout the winter of 1968-69; however the high accumulation was handled by the Highway Department.	2020 HMPT
Severe Winter Weather High Winds, Tidal Surge, Coastal Flooding & Snow	February 16, 1978	State & Regionwide	**Major Disaster Declaration DR-549:** The Blizzard of '78, a region-wide Blizzard severely affecting southern New England, resulted in high accumulations of snow throughout all of 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 to occur this century across the northeastern United States. Heavy snow fell in Groton but it was handled by the Highway Department.	FEMA & 2020 HMPT
Severe Winter Weather Ice Storm	January 7-25, 1998	State & Regionwide	**Major Disaster Declaration DR-1199:** A significant ice storm struck nearly every part of the state with a more significant impact in northern communities and in areas over 1,000 feet above sea level. Groton received ice damage at higher elevations (Town House, 1,700'). This ice storm also impacted the logging industry in Groton and in the state.	FEMA & 2020 HMPT
Severe Winter Weather Snowstorm	March 5-7, 2001	Cheshire, Coos, Grafton, Hillsborough, Merrimack, & Strafford	**Emergency Declaration EM-3166:** The emergency declaration covers jurisdictions with record and near-record snowfall from a late winter storm that occurred March 2001 and affected six New Hampshire counties. Heavy snow fell in Groton but it was handled by the Highway Department.	FEMA & 2020 HMPT
Severe Winter Weather Snowstorm	December 6-7, 2003	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack & Sullivan	**Emergency Declaration EM-3193:** The emergency declaration covers jurisdictions with record and near-record snowfall that occurred over the period of December 6-7, 2003 and affected eight New Hampshire counties. Heavy snow fell in Groton but it was handled by the Highway Department.	FEMA & 2020 HMPT

Type of Event	Date of Event	Location	Description	Source
Severe Winter Weather Snowstorms	January 22-23, 2005 February 10-11, 2005 March 11-12, 2005	**EM-3208-002** (Jan, Feb & Mar): All Ten NH Counties	**Emergency Declaration EM 3208-002:** 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 snow storms that hit the state in 2005. The total aid for all three storms was $6,892,023.87 (January: $3,658,114.66; February: $1,121,727.20; March: $2,113,182.01). Heavy snow fell in Groton but it was handled by the Highway Department.	FEMA & 2020 HMPT
Severe Winter Weather Snowstorm	January 22-23, 2005	**EM-3207** (Jan): Belknap, Carroll, Cheshire, Grafton, Hillsborough, Rockingham, Merrimack, Strafford & Sullivan	**Emergency Declaration EM-3207:** More than $3.5 million had been approved to help pay for costs of the heavy snow and high winds for the January storm which affected nine New Hampshire Communities. The total aid for the January storm was **$3,658,114.66** (Grafton: $137,118.71; State of NH: $1,107,426.59). Heavy snow fell in Groton but it was handled by the Highway Department.	FEMA & 2020 HMPT
Severe Winter Weather Snowstorm	February 10-11, 2005	**EM-3208** (Feb): Carroll, Cheshire, Coos, Grafton & Sullivan	**Emergency Declaration EM-3208**: More than $1 had been approved to help pay for costs of the heavy snow and high winds that occurred in February 2005 and affected five New Hampshire counties. The total aid for the February storm was **$1,121,727.20** (Grafton: $213,539.52; State of NH: $521,536.78). Heavy snow fell in Groton but it was handled by the Highway Department.	FEMA & 2020 HMPT
Severe Winter Weather Snowstorm	March 11-12, 2005	**EM-3211** (Mar): Carroll, Cheshire, Hillsborough, Rockingham & Sullivan	**Emergency Declaration EM-3211:** More than $2 million was approved to help pay for costs of the snow removal for the March storm that affected five New Hampshire counties. The total aid for the March storm was **$2,112,182.01** (No aid was given to Grafton County; State of NH: $697,501.41). Heavy snow fell in Groton but it was handled by the Highway Department.	FEMA & 2020 HMPT
Severe Winter Weather Snowstorm Ice Storm **Long Term Utility Outage**	December 11-23, 2008	All Ten NH Counties	**Major Disaster Declaration DR-1812 & Emergency Declaration EM-3297:** 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 been obligated by May 2009. Groton experienced fallen trees and large scale power outages for up to two weeks.	FEMA, 2014 HMPT & 2020 HMPT
Severe Winter Weather Snowstorm	October 29-30, 2011	**DR-4049:** Hillsborough & Rockingham **EM-3344:** All Ten NH Counties	**Major Disaster Declaration DR-4049 & Emergency Declaration EM-3344:** A severe winter storm occurred on October 29-30, 2011 in two New Hampshire counties. **EM-3344:** The emergency declaration for snow removal and damage repair included all ten NH countries. (aka: Snowtober) Heavy snow fell in Groton but it was handled by the Highway Department.	FEMA & 2020 HMPT

Type of Event	Date of Event	Location	Description	Source
Severe Winter Weather Snowstorm	February 8, 2013	All Ten NH Counties	**Major Disaster Declaration DR-4105:** Severe winter storm Nemo resulted in heavy snow in February 2013 in all ten New Hampshire counties. Heavy snow fell in Groton but it was handled by the Highway Department.	FEMA & 2020 HMPT
Severe Winter Weather Snowstorm	March 14-15, 2017	Belknap & Carroll	**Major Disaster Declaration DR-4316:** A severe winter storm and snowstorm occurred in two New Hampshire counties resulting in disaster aid to supplement state and local recovery efforts. Although not declared in Grafton County, heavy snow fell in Groton. Town Meeting was held on this evening and the snow accumulation was handled by the Highway Department.	FEMA & 2020 HMPT
Severe Winter Weather Snowstorm	March 13-14, 2018	Carroll, Strafford & Rockingham	**Major Disaster Declaration, DR 4371:** The Federal Emergency Management Agency announced a major disaster declaration on June 8, 2018 for a period of a severe winter storm from March 13-14, 2018. Although not declared in Grafton County, heavy snow fell in Groton. Town Meeting was held on this evening and the snow accumulation was handled by the Highway Department.	FEMA & 2020 HMPT
E. Earthquakes: According to the NH State Hazard Mitigation Plan, New Hampshire is considered to lie in an area of "Moderate" seismic activity when compared to other areas of the United States. New Hampshire is bordered to the north and southwest by areas of "Major" activity. Generally, earthquakes in NH cause little or no damage and have not exceeded a magnitude of 5.5 since 1940. Earthquakes have the potential to impact the community on a townwide basis. No significant earthquakes have taken place in Groton since the last hazard mitigation plan.				
Summary of Earthquakes with a magnitude of 4.0 or greater in the state & 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

Type of Event	Date of Event	Location	Description	Source
Detailed summary of Earthquake events 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 & 2020 HMPT
Earthquake	December 24, 1940	Ossipee, NH	Magnitude 5.5	
Earthquake	June 15, 1973	Quebec Border / NH	Magnitude 4.8	
Earthquake	January 19, 1982	West of Laconia, NH	Magnitude 4.5	
Earthquake	June 23, 2010	Ontario-Quebec Border	Magnitude 5.0	
Earthquake	June 26, 2010	Boscawen, NH	Magnitude 3.1	
Earthquake	October 16, 2012	Hollis Center, ME	Magnitude 4.0. In Groton, buildings shook for 10-30 seconds but no damage was reported.	
F. Drought: Droughts are generally not as damaging or disruptive as floods and other hazards and they are 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 townwide basis. No significant droughts have occurred in Groton since the 2016 drought.				
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		Occurrences of serious droughts in recorded New Hampshire history.	State of NH Multi-Hazard Mitigation Plan, Update 2018
Summary of Drought in the community since 1929				
Drought	1929-1936	State & Regionwide	Regional	State of NH Multi-Hazard Mitigation Plan, Update 2018 & 2020 HMPT
Drought	1939-1944	State & Regionwide	Severe in southeast and moderate elsewhere	
Drought	1947-1950	State & Regionwide	Moderate	
Drought	1960-1969	State & Regionwide	Regional longest recorded continuous spell of less than normal precipitation	
Drought	2001-2002	State & Regionwide	Third worst drought on record	

Type of Event	Date of Event	Location	Description	Source
Drought	2016-2017	State & Regionwide	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 Groton with several wells in the communities drying up.	
G. Miscellaneous Past or Potential Hazards: Natural, Technological and Human-caused hazards and other unusual hazardous events have been noted throughout New Hampshire. Among others, one concern is the transport of hazardous material through communities by rail and tractor-trailer. Other natural or human-caused hazards have the potential to impact the community on a townwide basis. No additional hazards have taken place in Groton since the last hazard mitigation plan.				
Cyber Event	September 15, 2015	Groton	The Groton Police Department was "hacked". The files were locked and the Town had to pay the hackers around $2,500 in bitcoin.	2020 HMPT
No additional natural, technological or human-caused hazards since the 2014 plan were reported.				2020 HMPT
H. Other Hazards: Identified hazards with no specific example of occurrence.				
Natural Hazards	Although the team did not identify specific examples or past occurrences of these hazards, it was felt worthwhile to list them as potential hazards to the town. These hazards have the potential to impact the community either locally or on a townwide basis. See Table 3.1, Hazard Threat Analysis and Chapter 5 for more details on these hazards.			
Extreme Temperatures				
Lightning				
Infectious Diseases				
Technological Hazards				
Aging Infrastructure				
Dam Failure				
Hazardous Materials				
Human Caused				
Mass Casualty Incident				
Transport Accident				
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
- FEMA Disaster Information: http://www.fema.gov/disasters
- The Tornado Project: http://www.tornadoproject.com/alltorns/nhtorn.htm
- The Tornado History Project: http://www.tornadohistoryproject.com/
- The Disaster Center (NH): http://www.disastercenter.com/newhamp/tornado.html
- EarthquakeTrack.com; http://www.Earthquaketrack.com

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

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Chapter 4: Critical Infrastructure & Key Resources (CIKR)

With team discussion and brainstorming, Critical Infrastructure & Key Resources (CIKR) within Groton were identified. 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 (ERF) & EVACUATION

EMERGENCY RESPONSE FACILITIES (ERF)			
ERF'S are primary facilities and resources that may be needed during an emergency response.			
Facility	**Type of Facility**	**Hazard Risk**	
Town House (generator)	Emergency Operations Center (EOC)	All Hazards	1
	Primary Shelter	All Hazards	
	Police Department	All Hazards	
	Town Records	All Hazards	
	Repeater (Communications)	All Hazards	
Hebron Fire, Ambulance & EMT (generator)	Fire, Emergency Medical Services, Heli LZ	All Hazards	1
Rumney Fire, Ambulance & EMT (generator)	Emergency Medical Services (EMS)	All Hazards	1
Town (Highway) Garage (in floodplain) (portable generator)	Heavy Equipment & Diesel	Flood & All Hazards	3
Dry Hydrant at the Town Garage (functional)	Water Supply & Fire Suppression	Flood & All Hazards	3
Tenney Mountain Towers (cell & radio & repeater)	Communications & Repeater	Flood (road access) & All Hazards	2
Verizon Switching Station	Public Utility	All Hazards	1
HELICOPTER LANDING ZONES (ERFH)			
Ball Field (South Groton)	Heli Landing Zone	All Hazards	1
Hebron Safety Building	Heli Landing Zone	All Hazards	1
Cersosimo Lumber Company Field (Rumney)	Heli Landing Zone (also PR)	All Hazards	1
One landing zone remains at the Groton Wind project. This landing zone is on private land and 2 miles from public access but it will be useful in emergency situation at Groton Wind. For additional landing zones, please refer to the Emergency Operation.			
Bridges & Culverts on Evacuation Routes (ERFB)			
Bridge on Hall's Brook Road (near Mary Baker Eddy House)	Bridge on Evacuation Route	All Hazards & Flooding	2
Bridge on Hall's Brook Road over Hall's Brook at "Dead Man's Curve"	Bridge on Evacuation Route	All Hazards & Flooding	2
Bridge on N Groton Rd over Hall's Brook at intersection with Hall's Brook Road	Bridge on Evacuation Route	Flood & All Hazards	2
Bridge on North Groton Road over Punch Brook	Bridge on Evacuation Route	Flood & All Hazards	2
Bridge on North Groton Road over Cockermouth River near Town Garage	Bridge on Evacuation Route	Flood & All Hazards	2

EMERGENCY RESPONSE FACILITIES (ERF)			
ERF'S are primary facilities and resources that may be needed during an emergency response.			
Facility	**Type of Facility**	**Hazard Risk**	
Bridge on Sculptured Rock Road called “Atwell/Orange Brook Bridge”	Bridge on Evacuation Route	Flood & All Hazards	2
EVACUATION ROUTES			
Hall’s Brook Road	Primary Evacuation Route	All Hazards	1
North Groton Road (From Hall’s Brook Road to Dorchester Town line)	Primary Evacuation Route	All Hazards	1
North Groton Road (From Hall’s Brook Road to Sculptured Rocks Road)	Primary Evacuation Route	Flood & All Hazards	3
Sculptured Rocks Road (only to pavement end; becomes Province Road and cannot be used to evacuate from that point)	Primary Evacuation Route	Flood & All Hazards	3
River Road	Primary Evacuation Route	Flood & All Hazards	2
Groton Hollow Road	Primary Evacuation Route	All Hazards	1
Stage Coach Rd	Primary Evacuation Route	All Hazards	1

TABLE 4.2 – NON-EMERGENCY RESPONSE FACILITIES (NERF)

NON-EMERGENCY RESPONSE FACILITIES (NERF)			
NERF'S are facilities, that although they are critical, they are not necessary for the immediate emergency response efforts. This would include facilities to protect public health and safety and to provide backup emergency facilities.			
Facility	**Type of Facility**	**Hazard Risk**	
Hebron Church	Secondary Shelter	All Hazards	1
Spectacle Pond	Draft Site	Wildfire & All Hazards	1
Baker Site # 8 Reservoir	Draft Site	All Hazards	1
Sculptured Rocks Bed & Breakfast	Secondary Shelter	All Hazards	1
Circle Camp Summer Camp (Spectacle Pond)	Possible Secondary Shelter	Wildfire & All Hazards	3
National Grid Power Lines	Utilities	Wind & All Hazards	2
Telephone Lines	Utilities	Wind & All Hazards	2

TABLE 4.3 – FACILITIES & POPULATIONS TO PROTECT (FPP)

FACILITIES & PEOPLE TO PROTECT (FPP)			
FPPs are facilities that need to be protected because of their importance to the town and to residents who may need help during a hazardous event.			
Facility	**Type of Facility**	**Hazard Risk**	
Circle Camp Summer Camp (Ossipee Pond)	Camp - Gathering of People	Wildfire & All Hazards	3
MIT Outing Club Wilderness Camp	Camp - Gathering of People	Wildfire & All Hazards	3
Diesel Fuel Storage Tank at Town Garage	Hazardous Material Storage	Flood & All Hazards	3

FACILITIES & PEOPLE TO PROTECT (FPP)			
FPPs are facilities that need to be protected because of their importance to the town and to residents who may need help during a hazardous event.			
Facility	**Type of Facility**	**Hazard Risk**	
Maxam - Explosive Material Storage	Hazardous Material Storage	Wildfire & All Hazards	3
Palermo Mica Mine	Hazardous Material Storage	Wildfire & All Hazards	3
Baker Site #8 Flood Control Dam (refurbished in 2023, DES)	Dam	Dam Failure & All Hazards	2
Spectacle Pond Dam (Hebron)	Dam	Dam Failure & All Hazards	2
Spectacle Pond Dam (Boat Ramp)	Dam	Dam Failure & All Hazards	2
School House #4 (Hall's Brook Road)	Historic Significance	All Hazards	1
Mary Baker Eddy House (Hall's Brook Road)	Historic Significance	All Hazards	1
Old Church Marker (Old Rumney Road)	Historic Significance	All Hazards	1
Buck N Horse Campground	Campground	All Hazards	1
Sculptured Rocks State Forest	Recreation (hikers & snowmobilers)	Wildfire & All Hazards	3
Cockermouth Forest	Recreation (hikers & snowmobilers)	Wildfire & All Hazards	3
Province State Forest	Recreation (hikers)	Wildfire & All Hazards	3

TABLE 4.4 – POTENTIAL RESOURCES (PR)

POTENTIAL RESOURCES (PR)			
PRs are potential resources that could be helpful for emergency response in the case of a hazardous event.			
Facility	**Type of Facility**	**Hazard Risk**	
TLC Logging	Heavy Equipment	All Hazards	1
Dave Leone LLC	Heavy Equipment	All Hazards	1
Gordon Coursey (GFC & Son Logging)	Heavy Equipment	Wildfire & All Hazards	2
Mike Either Construction	Heavy Equipment; Sand & Gravel	Wildfire & All Hazards	2
Town Garage	Diesel	Flood & All Hazards	3
Groton Wind Farm (office and location)	Equipment	Wildfire, Flood (office) & All Hazards	3
Cersosimo Lumber Company (Rumney)	Heavy Equipment	All Hazards	-
NH DNCR	Emergency Response Trailer	All Hazards	-
Grafton County Sheriff	Emergency Response Trailer	All Hazards	-
GR Hansen	Heavy Equipment & Trucking	All Hazards	-
Public Health Network (Old Hebron Fire Station)	Logistics Trailer	All Hazards	-
Refer to EOP for Resource Inventory List for other Potential Resources			

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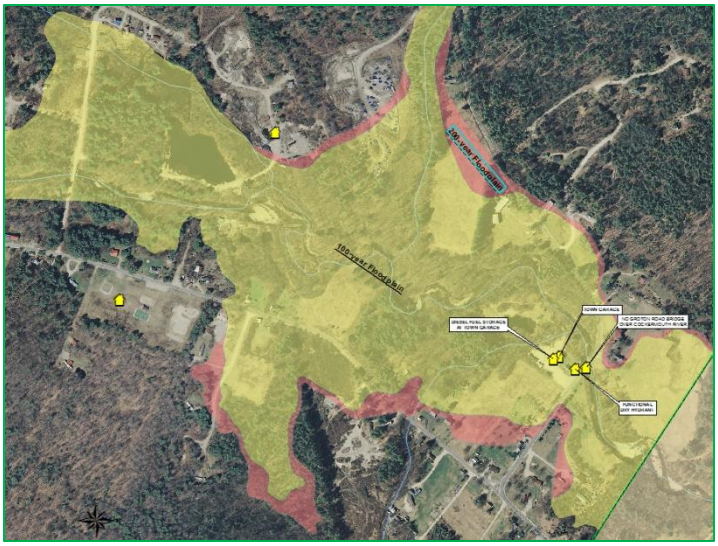
Chapter 5: Hazard Effects in Groton

A. Identifying Vulnerable Critical Infrastructure & Key Resources (CIKR)

Because damages from floods and wildfires are more predictable than damages from other disasters, it is important to identify the Critical Facilities and Key Resources (CIKR) and that are most likely to be damaged by these events. Using Geographic Information System (GIS) analysis and aerial imagery, at-risk CIKR were identified throughout the town.

All CIKR in Groton were identified in GIS; this list was then narrowed by those CIKRs that were located in the FEMA floodplain. Four CIKRs were found in the FEMA flood zone (see map to the right). The Groton Town Garage, the dry hydrant and the diesel fuel storage at the garage and the bridge on North Groton Road over the Cockermouth River are the four CIKRs at risk. As evidenced by the July 2019 rain event (DR-4457), the Town Garage is in a very risky and hazardous location; moving the garage to higher ground would be a huge advantage for the town.



Map derived from GIS analysis. Yellow shading represents the 100-year floodplain and red shading represents the 200-year floodplain.

No additional CIKR were found to be in the designated FEMA floodplain although it is expected that many non-CIKR structures are within the FEMA floodplain. Town officials should keep all of these CIKR in mind when a flood hazard is likely.

Using the same methodology that was used for flooding, CIKR falling within the Wildland Urban Interface (WUI) were reviewed. Identifying these facilities assists the team in creating wildfire mitigation action items and prioritizing those action items; it is important to determine which Critical Infrastructure & Key Resources are most vulnerable to wildfires.

Many structures were found to be in the traditional WUI, however, only five CIKR were found in the WUI as shown in the chart to the right. The rest of the town's Critical Infrastructure & Key Resources were found to be within the 300 foot WUI buffer, therefore accessible by fire apparatus and hoses. However, as stated elsewhere in this plan, the entire Town of Groton, including many structures, is thought to be in the WUI because it is so heavily forested. Therefore, all structures in town can be assumed to be in the WUI.

MAPS_Structures

ALL_H	NAME
PR	Eithier Gravel Pit
PR	GFC & Son Logging
FPP	MIT Outing Club
FPP	Circle Summer Camp-3
NERF	Spectacle Pond

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

B. Calculating the Potential Loss

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

MS-1 Assessed Value of All Structures			
2018-MS1	**Value**	**1% Damage**	**5% Damage**
Residential	$38,514,300	$385,143	$1,925,715
Manufactured Housing	$3,496,600	$34,966	$174,830
Commercial	$222,700	$2,227	$11,135
Tax Exempt	$989,800	$9,898	$49,490
Utilities	$11,843,060	$118,431	$592,153
Total	$55,066,460	$550,665	$2,753,323
Groton 2018 town supplied information			

Based on this assumption, the potential loss from any of the identified natural hazards would range from **$0 to $550,665** or **$550,665 to $2,753,323** based on the 2018 Groton town valuations which lists the assessed value of all structures in Groton to be **$55,066,460** (see chart above).

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

C. Natural Hazards

Descriptions below represent the **"local impact"** to the community for the hazards that were identified by the team. For the **"extent"** of these hazards, please refer to *Appendix C, The Extent of Hazards*, which includes 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. The numbers preceding the hazard name in this section, correspond to the numbers in *Table 3.1, Hazard Identification & Risk Assessment (HIRA)*.

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 analysis done in Table *3.1, Hazard Identification & Risk Assessment (HIRA).* The numbers preceding the hazard name in this section correspond to the numbers in Table 3.1 and are ordered by "Relative Threat". The estimated loss is determined using the methodology and table that are explained in Section B of this chapter.

1) Inland Flooding

Hazard Identification & Risk Assessment (HIRA) ..... High
Probability ..... Very High
Estimated Structure Loss Value ..... $550,665 to $2,753,323

100-Year Flood Events, Riverine Flooding & Heavy Rain Events

Riverine flooding and 100-year flood events can occur as result of hurricanes, tropical and post-tropical cyclones, heavy summer and fall rains as well ice jams. Nearly every spring, rapid snowmelt and heavy rain cause the flooding of the rivers and streams in Groton, particularly the Cockermouth River.

Local road flooding is often the result of rapid snowmelt and heavy spring or fall rain events. It is estimated that the town experiences some sort of stormwater problem whenever two or more inches of rain falls in a short period of time. Heavy rain from tropical downpours, hurricanes or severe thunderstorms along with rapid snowmelt often cause culverts to be overwhelmed and roads to wash out. In addition timber harvesting, undersized or aging culverts and inadequate ditching are some of the major causes of local road flooding in Groton.

During an extraordinary rain event on July 1-2, 2017 (DR-4329), Groton experienced minor flooding at the Town Garage and major washouts on Province Road which was closed until September 2018 when it was made "passable". Other roads that were impacted include North Groton Road, Blanchette Lane, River Road, Bailey Hill Road and a number of private roads throughout the community. Fortunately there were no injuries and no structure flooding. FEMA funding in the amount of $41,000 was provided to repair the damage on several roads; the town's contribution was $13,000-$14,000.

Another major rain event took place on October 29-30, 2017 (DR-4355). During this storm, trees and power lines fell causing the closure of several of Groton's roadways. Washouts occurred on Sculptured Rocks Road, Province Road, North Groton Road, Edgar Albert Road, Blanchette Lane and River Road as well as many private roads in the community. A few homes on Sculptured Rocks Road experienced flooding and the Orange Brook Bridge on Sculptured Rocks Road suffered scouring on both sides of the bridge. Damage was also done to the following: one large culvert on Sculptured Rocks Road at Punch Brook; the logging bridge on Halls Brook; the Jewell Hill Bridge; and Beaver Pond Road. The most significant damage was done on Sculptured Rocks Road and Province Road. FEMA funding in the amount of $370,589 was received to assist with the repair of these roads; the town's contribution was $123,529.

In yet another rain event, the town experienced an estimated $845,000 worth of damage during the July 11-12, 2019, Major Disaster Declaration, DR-4457. Reimbursement from FEMA is expected to assist with debris removal ($10,000), Roads/Bridges ($760,000) and Public Buildings/Equipment ($75,000). Debris removal included the removal of logs, branches and trees in roadways, the clearing of clogged culverts and the clean-up of rocks and stones and broken asphalt on the side of roadways.[15]

Many of the "usual" roads were impacted during the July 2019 storm:

- Sculptured Rocks Road experience extensive pavement damage, part of the road collapsed, sections were lifted and undermined and culverts were blocked with one 5-foot culvert 100% blocked and needing replacement;
- North Groton Road experienced damage to the state portion of the road;
- 90% of the gravel on Edgar Albert Road washed away, several culverts were blocked and channels of erosion appeared in the roadway;
- Blanchette Lane experienced erosion in the lane of travel;
- Province Road experienced channels of erosion in the lane of travel, blocked culverts and ditches.

[15] Much of the information regarding the July 2019 storm was provided by the town in a copy of a report sent by the Selectmen to HSEM Planning; DOS: NH HSEM Field Services, written on July 15, 2019 regarding the impact of the storm

Public buildings and equipment damages resulted from the overflow of the Cockermouth River and the backup onto the Town Garage property. The walls and floors of the interior of the Town Garage were damaged by four feet of water and mud and debris were left behind. In addition, the toilets overflowed depositing sewage in the building; also lost were the heating system, a Police Cruiser and 18-yards of rock salt. Other small items were also damaged. The process for FEMA assistance is still underway.

Many of the roads in Groton are long and winding and subject to some of the most severe weather in the state. The continuous erosion of roads makes for a daunting task of "up-keep" for the Highway Department. Fortunately, some of town's major thoroughfares are the responsibility of the state. The Highway Department maintains a total of 13.6 miles of Class V roads in the community, 9.07 miles of which are paved and 4.64 miles of which are gravel.

Fortunately, Groton has been very proactive in the maintenance and repairs of culverts and has made attempts to reduce the incidence of local road erosion and washouts. In 2018, the Highway Department replaced 28 culverts of the approximate 150 culverts townwide. Work has been done in the past on Province Road, Sculptured Rocks Road, River Road and other compromised culverts in the community. As evidenced by the impact of the July 2019 storm, there is still much work to be done; hopefully FEMA post-disaster funding will assist the town with the mitigation in flood prone areas.

The expected loss value from flooding would be based not only on the cost to repair roadways but also the potential cost of damage to structures. Flooding can be severe enough to take out utilities and create areas of town that become inaccessible to emergency responders. The economic impact on the community, the loss of accessibility and the time and cost of road repair also factor into the estimate loss value. Therefore, the estimated loss value was determined to be between 1% and 5% of the total structure value.

2) Severe Winter Weather

Hazard Identification & Risk Assessment (HIRA) ..... High
Probability ..... High
Estimated Structure Loss Value ..... $550,665 to $2,753,323

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 degrees of severity each year. Power outages, extreme cold and impacts to infrastructure are all effects of winter storms that have been felt in Groton in the past. All of these impacts are a risk to the community, including isolation, especially of the elderly (12.2% of the population) and other vulnerable populations (17.3% below poverty level). The ability to get in and out of town and emergency service access can be hindered. Damage caused by severe winter snowstorms varies according to wind velocity, snow accumulation, duration and moisture content. Seasonal accumulation can also be as significant as an individual snowstorm. Heavy overall winter accumulations can impact the roof-load of some buildings. Significant snowstorms, nor'easters and blizzards could diminish food supplies within two days.

In both March 2017 and March 2018, snowstorms with unusually high spring accumulation received Major Disaster Declarations (DR-4316 and DR-4371). Although neither declaration was declared in Grafton County, Groton did receive a significant accumulation of snow; however, in both cases, the scheduled Town Meeting was held and voting continued.

Although Groton's road crew generally handles usual snow amounts without difficulty, Groton's roads are often impacted by poor weather conditions which can make travel difficult. Fire and other emergency response may be hindered by poor road conditions.

Ice Storms

Of more concern in Groton than 2-4' snowstorms are ice storms, though the probability of the occurrence of a major ice storm is lower than that of a major snowstorm. A significant ice storm can inflict several million dollars' worth of damage to forests and structures. Unlike normal snowstorms which are generally handled well by the Highway Department, ice storms present significant problems. Downed power lines and fallen trees make it difficult for the Road Agent and his crew as well as emergency responders. School buses are also at risk.

Ice storms in 1998 and 2008 inflicted significant damage in Groton causing ice on trees, downed power lines, closed roads, limited EMS access and power outages. The 1998 ice storm left some residents without power and was particularly damaging in the higher elevations (the Town House is at approximately 1,700 feet above sea level; highest elevation is Tenney Mountain at 2,350'). Although the 2008 ice storm was not as significant as the 1998 storm, the 2008 ice storm felled trees and power lines causing minor property damage and power outages for up to two weeks.

Due to the widespread nature of severe winter weather, particularly from ice storms, the potential loss value is estimated to be between 1% and 5% of the total assessed value of all structures in town.

3) HIGH WIND EVENTS

Hazard Identification & Risk Assessment (HIRA) ..... High
Probability ..... High
Estimated Structure Loss Value ..... $0 to $550,665

Isolated High Wind Events

Isolated high winds and down drafts have occurred in Groton. These wind events are unpredictable and could fall timber, which in turn could block roadways, down power lines and impair emergency response. Old-growth softwood is affected by these unexpected windstorms, particularly in the spring when the water table is high. As with other wind events, emergency response could be difficult.

The town often experiences sporadic high winds due to its elevation in the mountains. The team did not report any damages since the last plan, but they did make note of the Groton Wind Project. The turbines were installed due to the high winds that Groton experiences. NH Electric Coop has aggressively trimmed trees, particularly those near power lines which could cause damage throughout the community, but the risk still exists.

Tornadoes & Downbursts

The biggest difference between tornadoes, microbursts and macrobursts is the direction, size and the location that the wind comes from, but all 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 that lie in a swirling pattern. Straight-line winds and winds that burst downward are indicative of a microburst; the fallen trees that are 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 that is greater than 2.5 miles wide and generally lasts longer than a microburst.

In Groton, a microburst would be more likely than a tornado. Microbursts are becoming more common and often result in damage. Although the incidence of downbursts is becoming more common, damaging high wind events are relatively uncommon natural hazards in New Hampshire. On average only about six tornadoes touch down each year.

Damage from high wind events largely depends on where the hazard strikes. If a high wind event were to strike a densely populated or commercial area, the impact could be significant and could result in personal injury and property damage. However, due to the rareness of tornadoes and the localized nature of downbursts, the potential loss value was determined to be between 0% and 1%.

4) EXTREME TEMPERATURES

Hazard Identification & Risk Assessment (HIRA) ..... Medium
Probability ..... 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. In the past, there was more concern about extreme cold temperatures, but with improved heating systems and local communications, most New Hampshire residents are able to cope with extreme cold. Additionally, many New Hampshire residents have equipped their homes with generators and woodstoves and many cities and towns offer warming centers or have established a functional needs list to check on vulnerable citizens.

Of concern today are extreme heat conditions, which seem to be more common with climate change. A heat wave with temperatures in excess of 95° for a week or more can have a substantial impact on the elderly and other vulnerable populations. Few residents, particularly vulnerable populations, have air conditioners and are less able to cope with extreme heat. The estimated elderly population in Groton is 12.2% and the estimated poverty rate is 17.3% of the total population[16]. The team noted that the winter of 2014 brought many days of negative temperatures to Groton; luckily no deaths or injuries were reported.

Extreme Temperatures combined with Long Term Utility Outage

Extreme temperatures when combined with power failure are of the most concern; power failure could result in no water, heat and air conditioning for the town's most vulnerable populations. Town officials and the community as a whole should be concerned and should look after its citizens to ensure that extreme temperatures do not create a life or property threatening disaster.

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

[16] US Census Bureau, American Community Survey, ACS, 2013-2017

5) Tropical & Post-Tropical Cyclones

Hazard Identification & Risk Assessment (HIRA) ..... Medium
Probability ..... Moderate
Estimated Structure Loss Value ..... $0 to $550,665

Wind damage due to tropical and post-tropical cyclones (hurricanes) is a consideration because of the forest and valley floors in Groton. Like the 1938 hurricane and hurricanes Carol and Edna in 1954, major forest damage could occur. Although tropical and post-tropical cyclones could fit into several different categories (wind and flooding), the team considered tropical and post-tropical cyclones to be separate events. Tropical and post-tropical cyclones are rare in New Hampshire, but they should not be ruled out as potential hazards. In most cases, tropical cyclones have been down-graded to post-tropical cyclones by the time they reach central New Hampshire.

The heavy rains from Tropical Storm Irene put North Groton Road underwater on both ends, closed Punch Brook Bridge due to the washing out of the "roadsides" and caused parts of Sculptured Rocks Road, Province Road and Bailey Hill Road to wash out. To make matters worse, washouts on part of Route 118 in Rumney and North Dorchester Road effectively cut the town off from emergency responders. Tropical Storm Sandy had little impact in Groton, with the exception of heavy rain.

The probability that a tropical and post-tropical cyclone would remain a Category 1 or greater 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 0% and 1% of the total assessed structure value.

6) Lightning

Hazard Identification & Risk Assessment (HIRA) ..... Medium
Probability ..... High
Estimated Structure Loss Value ..... $0 to $550,665

Lightning

Severe lightning as a result of summer storms or as a residual effect from hurricanes and tornadoes has occurred in Groton. Some of the town's structures are older and historic buildings, as detailed in Table 4.3. Many of these historic buildings are located in high elevation, making them more susceptible to lightning.

Other vulnerable structures are surrounded by forest. Dry timber on the forest floor, some of which remains from past ice or windstorms and the age of many buildings and out-buildings combined with lightning strikes can pose a significant disaster threat. Lightning could do damage to specific structures, injure or kill an individual, but the direct damage would not be widespread. Although lightning is a potential problem, the town reports few occurrences, none of which were severe.

It was noted that severe thunder and lightning storms seem to happen more often in the recent years, perhaps the result of 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 Groton, hailstorm events resulting from significant thunder and lightning storms can occur at any time. Summer storms may produce hail large enough to damage roofs, siding and automobiles. Damage from hail could also result in failed crops, thus creating an economic impact for the local economy and individual citizens. It should be noted however, that Groton is not a heavily farmed community. Overall, it was felt that a hailstorm event would be unlikely and would cause minimal damage.

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

7) WILDFIRES

Hazard Identification & Risk Assessment (HIRA) ..... Low
Probability ..... Low
Estimated Structure Loss Value ..... $550,665 to $2,753,323

There are two main potential losses with a wildfire, the forest itself 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 it threatens the built-up human environment.

Any wildfire discussion must include a discussion of the Wildland Urban Interface (WUI). The WUI can be determined in a variety of ways; however it basically represents the area in which 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 others times it is determined to be areas with substantial tree cover and limited egress. For most northern New Hampshire communities, entire towns are considered 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 large canopy of old-growth trees and limited access make people and structures more vulnerable. All structures within the WUI are generally assumed to be at some level of risk and therefore, vulnerable to wildfire.

Due to the abundance of slash on the forest floor left by logging operations, blow downs and the mixture of hardwood and softwood trees throughout the northern forests, there is potential for fast burning fuels and a wildfire could potentially occur. In addition, the recreational use of woods-trails by snowmobilers, ATV operators, campers and other outdoor enthusiasts creates an opportunity for sparks and out-of-control fires to ignite the town's forested areas. To help combat fire, the Hebron and Rumney Fire Departments maintain and improve firefighting equipment, offer ongoing training to their members and continuously maintain dry hydrants and fire ponds.

The team described the forests of Groton as consisting of primarily a combination of softwoods and northern hardwoods. With a low probability of drought and high humidity, it was felt that most fires are "duff" fires, the burning of *"the layer of decomposing organic materials lying below the litter layer of freshly fallen twigs, needles, and leaves and immediately above the mineral soil."*[17] Burn permits are required in Groton, as they are throughout the state, but often burning takes place without the proper permits. The steep terrain and heavily forested areas of the town are difficult to monitor, therefore the occasional unauthorized burn will take place.

[17] http://www.fs.fed.us/nwacfire/home/terminology.html

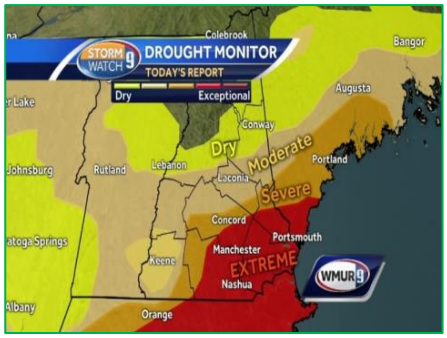
Currently available documentation on fires in Groton and New Hampshire indicates that the majority of fires are human-caused; however no significant wildfires have occurred in Groton in many years. In 2017 a small wildfire occurred on Province Road in the neighboring town of Dorchester, but did not reach Groton. Otherwise fires in Groton have been small brush fires of little significance. The team noted that more buildings are being built in the Wildland Urban Interface (WUI) which could add to the possibility of a large damage-producing wildfire.

Large wildfires in New Hampshire are uncommon; however four large fires have occurred in the state in recent years, the Dilly Cliff Fire in Woodstock, the Covered Bridge Fire in Albany, the Stoddard Fire in Stoddard and the Bayle Mountain Fire in Ossipee. No large fires have occurred in Groton, however, given the right set of conditions (drought, lightning, human interface), the potential for large wildfires is good. Because the Town of Groton is heavily forested, the potential loss value was determined to be between 1% and 5% of the total assessed structure value.

8) DROUGHT

Hazard Identification & Risk Assessment (HIRA) ..... Low
Probability ..... Moderate
Estimated Structure Loss Value ..... $0 to $550,665

An extended period without precipitation, or drought, could elevate the risk for wildfire and blow-downs in the forested areas of the community and with an extreme drought, the water supply and aquifer levels could be threatened. All of Groton's residents rely on private wells. Fortunately, significant droughts rarely occur in New Hampshire or Groton. According to the NH Department of Environmental Services, only seven significant droughts had occurred since 1929[18] including the drought of 2016.



WMUR Archives; September 15, 2016

The 2016 drought in New Hampshire was significantly worse in the southern part of the state than in the central and northern regions. The image to the right from WMUR-TV in September 2016 shows drought conditions in New Hampshire during the summer of 2016[19].

During the 2016 drought, in Groton a few dug-wells dried up and some residents were without water for some time. The town supplied bottled water to those residents that did not have water in their homes. Well drillers from all over the east coast remained busy for several weeks. The 2016 drought continued into 2017 with dry conditions throughout the summer in some communities, but the impact was not as significant as the prior year. Fortunately, there are no longer drought conditions in New Hampshire.

The cost of future droughts in Groton is difficult to calculate as any cost would likely result from an associated fire risk, crop loss and diminished water supply which, in Groton, is supplied by private wells. An extended period without precipitation could elevate the risk for wildfire and with an extreme drought; the water supply and aquifer levels could be threatened. Based on these assumptions, the loss value was estimated to be between 0% and 1% of the total assessed structure value.

[18] NH DES; http://des.nh.gov/organization/divisions/water/dam/drought/documents/historical.pdf
[19] https://www.wmur.com/article/extreme-drought-conditions-worsen-in-new-hampshire/5269231

9) EARTHQUAKES

Hazard Identification & Risk Assessment (HIRA) ..... Low
Probability ..... Low
Estimated Structure Loss Value ..... $550,665 to $2,753,323

Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric and phone lines and are often associated with landslides and flash floods. Two earthquakes with a magnitude greater than 5.0 have occurred in New Hampshire since 1940, both of which occurred in Ossipee in in December of 1940 (5.5-5.8). Three earthquakes with a magnitude greater than 4.0 have occurred in the state since 1982, one in Laconia (4.0), one in Berlin in 1988 (4.0) and another in Berlin in 1989 (4.1). The most recent earthquake to be felt by many New Hampshire residents occurred in October 2012 with its epicenter in nearby Hollis Center, ME. The team noted that this earthquake was felt in Groton but no damage occurred.

It is well documented that there are fault lines running throughout New Hampshire, but high magnitude earthquakes have not been frequent in New Hampshire history. More recently, many small earthquakes have occurred, but only the 2012 earthquake was felt in Groton (see Table 3.2).

Although historically earthquakes have been rare in northern New Hampshire, the potential does exist, 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.

10) INFECTIOUS DISEASES

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

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

Some infectious diseases can be passed from person to person. Some are transmitted by bites from insects or animals. And others are acquired by ingesting contaminated food or water or being exposed to organisms in the environment."[20]

Groton's hiking and snowmobile trails provide seasonal recreation enthusiasts many opportunities to visit the town. The community's population shows a slight increase during seasonal weekends. In addition, the town's students attend school at Newfound Area School District along with students from the neighboring towns of Alexandria, Bristol, Danbury, Hebron, Bridgewater and New Hampton, thus enabling infection and viruses to be transmitted from elsewhere.

Because of these factors, the team decided that infectious diseases and epidemics or pandemics could present a possible threat to Groton. With the occurrence of world-wide pandemics such as SARS, the Zika Virus, H1N1 and Avian Flu, Groton could be susceptible to an epidemic and subsequent quarantine.

[20] Infectious diseases, Overview, https://www.mayoclinic.org/diseases-conditions/infectious-diseases/symptoms-causes/syc-20351173

As part of our discussion about infectious disease, it makes sense to discuss the opioid epidemic that is affecting the state and the nation in general. According to the National Institute on Drug Abuse, *"New Hampshire has the second highest rate of opioid-related overdose deaths in the country. In 2016, there were 437 opioid-related overdose deaths…from 2013 through 2016, opioid-related deaths in New Hampshire tripled"*[21]. Like many New Hampshire communities, Groton has also struggled with the use of opioids. Although the availability and use of NARCAN® has helped lower the death rate in New Hampshire, opioid-related overdose deaths are still a common occurrence.

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 nonetheless worth mentioning as real and possible hazards that could occur in Groton. 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."[22]

Aging infrastructure is the continued deterioration of roads, bridges, culverts, ports, railroads, waste water facilities, airports, dams, utilities and public water and sewage systems. The American Society of Civil Engineers gave NH a C- rating overall in its 2017 report card.[23]. 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.[24]

Aging infrastructure is a concern in Groton as it is throughout New Hampshire and the United States. In Groton, of particular concern are old roads, aging culverts, bridges and the Town (Highway) Garage (health hazard and repetitive flooding). The town is in the planning process to build a new Town Garage; funding and approval for this project is dependent upon the citizens of Groton. Perhaps public opinion and the availability of funding will be enhanced after the flooding event at the Town Garage in July 2019.

Town Garage, after July 2019 flood event
Photo Credit: Bea Lewis, Union Leader

[21] NH Opioid Summary, National Institute on Drug Abuse; https://www.drugabuse.gov/drugs-abuse/opioids/opioid-summaries-by-state/new-hampshire-opioid-summary
[22] https://www.infrastructurereportcard.org/wp-content/uploads/2016/10/2017-NH-Report-Card-hq-with-cover.pdf
[23] Ibid
[24] NH Multi-hazard Mitigation Plan, 2018, page 156

2) Long Term Utility Outage

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

Long term utility outages of five or more days have occurred in Groton, both as a result of local line damage from high winds and storms and problems with the power grid. If a major and/or extended power outage occurs and lasts for more than a week, a significant hardship on individual residents could result, particularly those citizens who are elderly, handicapped or poor. The team reported that long term power outages have diminished as a result of continued efforts by public utility companies to trim trees and branches near power lines, but the problem still exists.

The team reported that power outages happen on a regular basis in Groton whenever there are strong winds and rain, however the power is usually only out for a short period of time. However, after the October 2017 storm, outages ranged from four days to two weeks, depending on the location in town. Flooding and closed roads prevented utility crews from restoring the power.

Long term utility outage is a concern, particularly when combined with any of the natural hazards detailed above. However, the team felt that many residents were somewhat self-sufficient as many are now equipped with generators and woodstoves. The biggest impact from an expended power failure would be the inconvenience caused by the inability to pump water for residents who rely on wells. It is also noted that driving can be difficult due to weather conditions and steep terrain and that virtually all services including pharmacies and grocers are located out of town.

As a small close-knit community, town officials are aware of persons who may need help in emergency situations. Nonetheless, a long term utility outage causing frozen pipes and a lack of heat and water is potentially a serious hazard for the community.

3) Dam Failure

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

The Town of Groton has three dams of concern: the Spectacle Pond Dam (the only dam in Groton), another Spectacle Pond Dam (Hebron), and the Baker River Site #8 (Dorchester). The Spectacle Pond Association has performed some upgrades on the Spectacle Pond Dam in Groton and continues to monitor the dam. To date, this dam has not breached, however, failure of this dam could affect a few homes and could damage the state section of North Groton Road. Failure of the other Spectacle Pond Dam (Hebron) would have little or no effect in Groton.

The third dam of concern, Baker River Site #8 is a flood control dam located on the Baker River Reservoir in Dorchester. Baker River Site #8 is owned by the NH Department of Environmental Services (DES) and is maintained by the Army Corp of Engineers. Failure of this dam could potentially cause flood damage to homes and potentially washout the road on the lower part of River Road below the dam. The Team reported that Baker River Site #8 is scheduled to be refurbished in 2023.

4) HAZARDOUS MATERIALS

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

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

Maxam Explosives is the one facility in Groton that causes concern for a hazardous materials accident in a fixed location. Detonators for construction explosives are stored at Maxam as well as other materials that could potentially create a hazardous materials event. The actual explosives are stored in a neighboring town, but could still affect Groton in the right conditions.

Although there is a ½ mile buffer around the Maxam facility which prevents development, there is always the potential for an explosion and a resulting fire. However, unless drought conditions are in effect, such an event would be localized.

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 nonetheless worth mentioning as real and possible hazards that could occur in Groton. Estimated structure loss was not determined for human-caused hazards.

1) MASS CASUALTY INCIDENTS (MCI)

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

A Mass Casualty Incident is a situation where the number of casualties exceeds the emergency resources that are normally available locally. MCIs have been known to occur as a result of bus, auto, train and aircraft accidents, and incidents involving large crowds. MCIs can also be a result of natural hazards such as hurricanes, floods, earthquakes and tornadoes.

With limited emergency services in Groton, the town is reliant upon the Hebron and Rumney Fire Departments for most emergency response. Depending on the location of an MCI, the time to respond may be longer than optimal, simply due to traveling distance.

2) TRANSPORT ACCIDENTS

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

Some of Groton's roads are narrow and winding and subject to severe winter weather; when affected by flooding, winter snow conditions and ice they become treacherous. In these conditions, vehicular accidents, wildlife collisions and truck accidents involving hazardous materials are always a possibility. A major ice storm or other

significant event can make egress and access difficult for individuals and first responders. All roadways in Groton are susceptible to hazards such as road flooding and high winds leading to downed trees in the roadways and potential hazardous materials spills.

The possibility of vehicular accidents involving hazardous materials is identified as a significant hazard in Groton. The town has two primary roads, Sculptured Rocks Road (which changes to a dirt road) and North Groton Road. Both of these roads, as well as other roads in town, are long, winding, steep and subject to severe weather. In addition, large and small vehicles make deliveries to the town's citizens every day; the contents of some these vehicles are unknown while other vehicles, such as trucks hauling fuel and propane are common.

Maxam Explosives maintains a storage depot for demolition materials in Alexandria. Explosive materials are carried regularly to and from Maxam in Groton where an office, a maintenance building and a detonator magazine are located. Although the explosives themselves are not stored in Groton, there is still potential for hazardous materials accidents as access to the facility is through Groton.

3) Cyber Events

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

Presidential Policy Directive (PDD-41) describes a cyber incident as *"An event occurring on or conducted through a computer network that actually or imminently jeopardizes the integrity, confidentiality, or availability of computers, information or communications systems or networks, physical or virtual infrastructure controlled by computers or information systems, or information resident thereon. For purposes of this directive, a cyber incident may include vulnerability in an information system, system security procedures, internal controls, or implementation that could be exploited by a threat source."*[25]

With 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 take place almost anywhere, from very small towns to large facilities in New Hampshire, causing large expenditures, disruption in normal business practices and the loss of data.

The Groton planning team reported that their police department was hit with a Cyber Event. The hackers locked all of their files and demanded $2,500 in bitcoin to release them; the town paid the ransom. Several other communities in the State of New Hampshire have had their data held for ransom. Added security on computer networks and user education on cyber threats is important to protect sensitive town information and data.

4) Terrorism & Violence

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

Terrorism is a fear throughout our country and the world, but Groton is not host to any known soft-targets. As with many small towns, the terrorism threat is minimal; if a terrorist incident were to occur, it would most likely be a home-grown terrorist event.

[25] PDD-41; https://obamawhitehouse.archives.gov/the-press-office/2016/07/26/presidential-policy-directive-united-states-cyber-incident

Chapter 6: Current Policies, Plans & Mutual Aid

A. Analysis of Effectiveness of Current Programs

After researching historic hazards, identifying CIKR and determining potential hazards, the team determined what is already being done to protect its citizens and structures. Once identified, the team addressed each current policy or plan to determine its effectiveness and to determine whether or not improvements were needed. This analysis became one of the tools the team used to identify mitigation action items for this plan.

With the knowledge of what regulations Groton currently had in place, creating new action items was less difficult. This process was helpful in identifying current plans and policies that were working well and those that should be addressed as a new "Action Item" as well as the responsible departments. The table that follows, *Table 6.1, Policies, Plans & Mutual Aid*, shows the analysis that resulted from discussion with the team.

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

Table 6.1: Current Policies, Plans & Mutual Aid

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

Current Program or Activity	Description	Area of Town Covered	Managing Department	Effective-ness	Improvements or Changes Needed
NIMS & ICS Training for Town Officials & EOC Staff	Ensure effective command, control, and communications during emergencies	Townwide	Emergency Management Director	Poor	**Improvements Needed:** NIMS & ICS training has been done by some in the community including first responders. Although this is preparedness, this is deferred to this plan to provide NIMS (IS-700) & ICS (ICS 100 & ICS 200) training to new first responders and to new Town officials as they become elected and/or appointed **Action Item #2** ***(also in Table 7.1).***

Current Program or Activity	Description	Area of Town Covered	Managing Department	Effective-ness	Improvements or Changes Needed
National Flood Insurance Program (NFIP) & Flood Ordinance (2007)	The minimum National Flood Insurance Program (NFIP) requirements (Section 60.3(c)) have been adopted. Groton has been a member of the NFIP since April 18, 1983. The Flood Ordinance regulates all new and substantially improved structures located in the 100-year floodplain, as identified on the FEMA Flood Maps dated February 20, 2008.	Townwide	Selectboard	Good	**Improvements Needed:** The Town's Flood Ordinance works well to successfully prohibit or force compliance to the ordinance for building and substantial improvements to structures within the FEMA flood zone. This is deferred to this Plan to comply with the National Flood Insurance Program, obtain NFIP brochures to have available at the Town Office and to provide public outreach regarding the benefits of membership in the NFIP, whether or not properties are in the FEMA floodplain. Also, to provide robust information on flood mitigation techniques that can be taken to protect individual homes and properties and links to ready.gov and other pertinent websites **Action Item #12** ***(also in Table 7.1).***
911 Signage Compliance	A system that complies with recommended signage size, location and visibility to ensure identification by emergency responders. Markers are placed at driveway entrances that identify residence locations in conjunction with the E-911 alerting system.	Townwide	Selectboard	Good	**Improvements Needed:** The Town is about 55% compliant with appropriate 911 signage. The Hebron Fire Department has sold and installed signs since the prior plan, but the compliance rate could be improved. This is deferred to this Plan to consider ways to get this signage more compliant so that emergency responders can better assist the public at the time of need by utilizing public outreach opportunities to promote better compliance or other means. **Action Item #21** ***(also in Table 7.1).***
Master Plan (2017)	A Master Plan serves as the guiding document for future development and serves as the guiding document to assist the Planning Board as it updates the Town Zoning Ordinances and Subdivision Regulations.	Townwide	Planning Board	Good	**Improvements Needed:** The Groton Master Plan was last updated in 2017 and will not be ready for a recommended complete update until 2027, which is outside the scope of this Plan. However this is deferred to review this Hazard Mitigation Plan whenever a review of the Master Plan is done and consider the inclusion of a Natural Hazards Section and mitigation action items from this Plan. **Action Item #7** ***(also in Table 7.1).***

Current Program or Activity	Description	Area of Town Covered	Managing Department	Effective-ness	Improvements or Changes Needed
Grafton County CodeRED	County-wide warning system using phones and cell phones to notify citizens of pending or actual emergencies. Individuals are automatically notified for emergencies via listed phone numbers.	Townwide	Grafton County Dispatch	Excellent	**Improvements Needed:** CodeRED is an excellent warning system but it only stores resident phone numbers that are listed in the phone book. The Town has continuously provided information to residents on CodeRED but this is deferred to provide public outreach to encourage all residents to contact CodeRED to add cell numbers, emails, unlisted numbers and to verify information. Provide public education using the website, a possible brochure at the Town Office, with available social media or a sign up at Town Meeting. **Action Item #13** ***(also in Table 7.1).***
Culvert Maintenance / Replacement Program	The Groton Road Agent and the state DOT clean the drainage basins once a year and after major flooding events. Culverts are repaired as needed.	Townwide	Road Agent	Good	**Improvements Needed:** Although the Groton Highway Department does a good job cleaning and repairing drainage basins and culverts, a written stormwater maintenance plan should be developed to ensure continuity of actions and efficient stormwater management; deferred for maintenance and the development of a written stormwater maintenance plan detailing such items as the size, material, date of installation, recommended date for improvement, GPS location and any problems associated with the location (i.e. flooding); several culverts and drainage systems in Town need improvement. **Action Items #16, #18, #23, #24, #25, #30, #31, #32 & #33** ***(also in Table 7.1).***
Zoning Ordinances (2007/2015)	Constantly updated, they are considered current. Include drainage and infrastructure provisions.	Townwide	Selectboard & Planning Board	Average	**Improvements Needed:** The Zoning Ordinance is a working document that is reviewed and updated whenever an issue arises that needs the attention of the Planning or Selectboards. A proposed update to the Zoning Ordinance was voted down at the 2019 Town Meeting. This is deferred to review the Zoning Ordinance and to discuss any changes that can be made to diminish the impact of hazards. ***Action Item #26 (also in Table 7.1).***

Current Program or Activity	Description	Area of Town Covered	Managing Department	Effective-ness	Improvements or Changes Needed
Emergency Generators	In the event of an emergency, backup power is available at the Town House which is the EOC and Shelter. A portable generator is currently available at the Town Garage, but a new Town Garage is expected to be built in the future and will need a generator.	Townwide	Emergency Management Director	Good	**Improvements Needed:** The Town is anticipating moving the town garage from its current location in the floodplain to a new location and would like to obtain a generator for the new town garage when the garage is constructed. Otherwise, the emergency generator capabilities in the Town are good. **Action Item #34** ***(also in Table 7.1).***
Subdivision Regulations (2014)	The purpose of subdivision regulations is to provide for the orderly present and future development of the town by promoting the public health, safety, convenience and welfare of the town's residents.	Townwide	Planning Board	Good	**Improvements Needed:** The Groton Subdivision Regulations, most recently updated in 2014 are in good shape. The Subdivision Regulations address set-backs, road frontage and size of the lot. The regulations do not specifically address the availability of water resources for fire suppression. This is deferred to review the Subdivision Regulations and discuss the possibility of adding regulations that will require builders to provide fire ponds, cisterns or other mechanisms to fight fires. **Action Item #22** ***(also in Table 7.1).***
Emergency Operation Plan (2010)	This plan offers all members of the emergency management team a better understanding of procedures in case of disasters.	Townwide	Emergency Management Director	Good	**Improvements Needed:** The Groton Emergency Operations Plan (EOP) was last updated in 2010 and will need to be updated again as soon as possible following the state's 5-year recommended guidelines. The new EOP should include an EOC Call Alert List as well as a detailed Resource Inventory List and Player Packets. This is deferred to this Plan to update the EOP. **Action Item #20** ***(also in Table 7.1).***
Hazard Mitigation Plan (2014)	Addresses all potential hazards, natural, man-made and wildland fires	Townwide	Emergency Management Director	Excellent	**Improvements Needed:** The 2014 Groton Hazard Mitigation Plan is being updated with this Plan. Improvements and recommendations based on changing circumstances have been incorporated into this Plan. This is deferred to provide an annual review of the Plan, implementation of the "Action Items" and to get approval from the local elected body on an annual basis. **Action Item #5**

Current Program or Activity	Description	Area of Town Covered	Managing Department	Effective-ness	Improvements or Changes Needed
Tree Removal Program	Tree Removal Program to reduce damage from fallen trees and limbs to power lines and structures; line item in budget to remove hazardous trees	Townwide	Road Agent & Planning Board	Excellent	**Improvements Needed:** As trees become damaged and threaten power lines and structures on town roads, the highway department removes them. NH DOT does this for state roads along with NH Electric Coop as needed. This is deferred to trim hazardous trees and brush to help diminish the impact of hazards such as ice storms and severe wind events. **Action Item #3**
Fire Department Training	Fire Department personnel receive yearly training addressing wildfire attack strategies	Townwide	Fire Chief & State Fire Warden	Excellent	**Improvements Needed:** Training of all fire responders is coordinated by the Hebron and Rumney Fire Departments and through Lakes Region Fire Mutual Aid. Training includes the many aspects of emergency response, wildfire response, hazmat response and all other aspects of fire training. This deferred to continue fire training. **Action Item #4**
Local Road Design Standards	Standards and specifications for construction of roads.	Townwide	Selectboard, Planning Board & Road Agent	Good	**No Improvements Needed:** Road design standards are detailed within the Town's planning mechanisms (Subdivision Regulations) and adhere to State standards. The Town will not assume maintenance of substandard roads and roads must be up to state standards and voted on at Town Meeting to be accepted as town-maintained roads ***(also in Table 7.1).***
Building Code & Permits	The Town has not adopted International Building Codes (IBC) but does require builders to follow the NH state adopted codes for new construction to meet national standards for flood, wind, earthquake, fire and snow load.	Townwide	Selectboard	Good	**No Improvements Needed:** The Town of Groton does not have a Building Inspector however, building permit guidelines are available and building permits are required. The permitting process requires builders to abide by the International Building Codes (IBC) and the International Residential Codes (IRC) which have been adopted by the State of New Hampshire. The building permit process in Groton works well ***(also in Table 7.1).***
State Health Department Public Health Plan	State plan, "Regional Public Health Emergency Response Annex" written by state health department to be prepared for any public health emergency; the Town is part of the Central NH Public Health Network.	Townwide	Selectboard & Central NH Public Health Network Coordinator	Excellent	**No Improvements Needed:** The Public Health Plan does what it is meant to do. The Town participates in regional public health meetings whenever possible.

Current Program or Activity	Description	Area of Town Covered	Managing Department	Effective-ness	Improvements or Changes Needed
Town Ordinances	Town ordinances governing public rules and regulations	Townwide	Selectboard	Excellent	**No Improvements Needed:** The Town's ordinances are reviewed and updated by the Selectboard to measure and/or adjust the ordinances that govern public rules and regulations.
State Division of Forest and Lands/Fire Permits	State regulations for open burning and permits	Townwide	NH Forests & Lands permit but local fire wardens issue	Excellent	**No Improvements Needed:** The system that is in place with NH Forests & Lands (DNCR) and the local fire warden works well. The public is aware of fire permitting requirements (not online).
Mutual Aid Agreements (Fire, Police, Highway & EMS)	Mutual Aid agreements provide communications capabilities and cooperative assistance between area cities and towns; mutual aid provides access to resources that are appropriate to the scope of the emergency; fire, police and EMS are dispatched out of the Grafton County Sheriff's Office.	Townwide	Fire, Police, EMS & Highway	Excellent	**No Improvements Needed:** Fire and EMS service in Groton is provided the Hebron & Rumney Volunteer Fire Departments which have mutual aid agreements with and are dispatched by the Lakes Region Fire Mutual Aid Association. Law enforcement is provided by Groton Police Department (which needs staffing) which has mutual aid agreements with areas towns, the NH State Police (Troop F) and the Grafton County Sheriff's Office and is dispatched through Plymouth Dispatch. The Groton Highway Department is a member of the NH Public Works Mutual Aid Association.
Groton Health Ordinance	Regulations dealing with public health issues including EEE, West Nile, Lyme disease and avian flu pandemic	Townwide	Selectboard	Good	**No Improvements Needed:** The Groton Health Ordinance is reviewed and updated by the Selectboard. The ordinance works as it was designed and is reviewed when a situation warrants.
Life safety and fire codes	Provides guidance for all buildings for life safety and fire codes; state and NFPA codes are adopted	Townwide	Selectboard & Groton Fire Chief, and the Hebron & Rumney Fire Departments	Good	**No Improvements Needed:** The National Fire Protection Association (NFPA) along with NH safety and fire codes provides guidance to the Groton Fire Chief and Hebron and Rumney Fire Departments for inspection of all commercial and rental properties (3 units or more) in the community. The Fire Chief and the local Departments do the best they can to provide timely inspections based on available manpower.

Current Program or Activity	Description	Area of Town Covered	Managing Department	Effective-ness	Improvements or Changes Needed
Capital Reserve Fund (CRF)	A projection of major equipment replacement(s) and supply needs for each department, with funds being placed in reserve in the Town's budget on an annual basis.	Townwide	Board of Selectmen & Planning Board & Department Heads	Good	**No Improvements Needed:** Groton does not have a Capital Improvement Plan but does have Capital Reserve Funds which are reviewed annually at budget time. Through the Capital Reserve Funds the Town has laid out projected capital improvement needs for the next ten years. The Groton Capital Reserve Funds work well.
Bridge Maintenance Program	The one bridge on the state Red List has been replaced. Inspection and clean-up occur annually. The state inspects all bridges every other year.	Townwide	Road Agent	Good	**No Improvements Needed:** Groton has replaced the only red-listed town-owned bridge. There are no other town-owned bridges of concern in the community at this time.
Burning Index	New Hampshire Forests & Lands (DNCR) has a burning index, which measures the risk for wildfires; how likely they are to start on a given day. It also evaluates the potential damages wildfires can create, the number of people that will be needed to fight it and the type of equipment that might be needed as well.	Townwide	DNCR & Hebron & Rumney Fire Departments	Excellent	**No Improvements Needed:** The Fire Departments receive regular notification of the burning index via fax and email from NH Forests & Lands; this notification is made daily during the fire danger season; both Rumney and Hebron have Fire Danger Signs.

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Chapter 7: Last Mitigation Plan

A. Date of Last Plan

Based on the Disaster Mitigation Act (DMA) of 2000, Groton has participated in the development of hazard mitigation plans in the past. The most recent update was formally approved in 2014. This plan, the "Groton Hazard Mitigation Plan Update 2020" is an update to the 2014 plan.

Below are the action items that were identified in the 2014 plan. The team identified the current status of each strategy based on three sets of questions:

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

Completed

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

Deleted

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

Deferred

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

Table 7.1: Accomplishments since the Last Plan

NOTE: Items in red were extracted word-for-word from the 2014 Hazard Mitigation Plan and do not represent a time frame for this plan.

Rank	New Mitigation Project	Responsibility or Oversight	Time Frame	Completed, Deleted or Deferred
0-01	**Action Item (24)** While respecting HIPAA laws, create a list of "at risk" citizens to have available for emergency responders; information provided on voluntary basis (website a possible means of asking for this information); create a database to track those individuals at high risk to death, such as the elderly, homeless, etc. (ET3) **(Table 7.1)**	Police Chief & Fire Chief	3/27/2014 & then annually from 2014-2017	**Completed & Deferred:** Efforts have been made in the past to establish a functional needs list. This is deferred to promote a functional needs "sign-up" through public education, on the website and other means, such as at Town Meeting or other social gatherings. **Action Item #6**
0-02	**Action Item (4)** Replace the Atwell Brook Bridge (some money has been set aside by the Town for this purpose) in order to protect this valuable critical infrastructure and to mitigate the potential for a hazard to the public (F17). **(Table 7.1)**	Highway Department	5/27/2016 or when DOT says it must be done	**Completed & Deleted:** As recommended in the prior hazard mitigation plan, the replacement of Atwell Brook Bridge was completed (local money). This is deleted as the project is complete.

Rank	New Mitigation Project	Responsibility or Oversight	Time Frame	Completed, Deleted or Deferred
0-03	**Action Item (22)** NIMS & ICS Training for Town Officials. **(Table 6.1)**	EMD & Deputy EMD	As staff changes 2013-2018	**Completed & Deferred:** NIMS & ICS training has been done by some in the community including first responders. Although this is preparedness, this is deferred to this plan to provide NIMS (IS-700) & ICS (ICS 100 & ICS 200) training to new first responders and to new Town officials as they become elected and/or appointed. **Action Item #2** ***(also in Table 6.1)***
1-01	**Action Item (1)** Advise the public about the local flood hazard, flood insurance and flood protection measures (F10) by obtaining and keeping on hand a supply of NFIP brochures to have available in the Town Offices; give NFIP materials to homeowners and builders when proposing new development or substantial improvements; encourage property owners to purchase flood insurance (F22), whether or not they are in the flood zone and provide appropriate links to the NFIP and Ready.gov on the Town's website.	Planning Board	10/28/2013	**Completed & Deferred:** The Town's Flood Ordinance works well to successfully prohibit or force compliance to the ordinance for building and substantial improvements to structures within the FEMA flood zone. This is deferred to this Plan to comply with the National Flood Insurance Program, obtain NFIP brochures to have available at the Town Office and to provide public outreach regarding the benefits of membership in the NFIP, whether or not properties are in the FEMA floodplain. Also, to provide robust information on flood mitigation techniques that can be taken to protect individual homes and properties and links to ready.gov and other pertinent websites. **Action Item #12** ***(also in Table 6.1)***
1-02	**Action Item (9)** Obtain and have available "Firewise" brochures to educate homeowners on methods to reduce fire risk around their homes (WF10); 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 water and the removal of dead or dry leaves, needles, twigs, and combustible materials from roofs, decks, eaves, porches and yards. (WF12) **(Table 7.1)**	Fire Department	10/28/2013	**Completed & Deferred:** Although the Town has provided Firewise brochures in the past, the supply has diminished; the team felt that it is important to have Firewise brochures available to promote the development of defensible space around Town and privately owned structures. Burn permits are issued in person. Deferred to provide Firewise brochures, or other fire-related brochures, to those persons seeking burn permits in person. **Action Item #9**
1-03	**Action Item (15)** Obtain a copy of the Groton Wind response plan and participate in any training programs that are developed at this extensive wind farm. **(Table 6.1)**	Groton Fire with EMD, Fire Chief & Police Department	10/28/2013	**Completed & Deferred:** Groton Wind provides the Town with a new response plan every year and provides training one or two times a year. This is deferred for future training. **Action Item #8**
1-04	**Action Item (18)** Obtain a copy of the Maxam response plan and participate in any training programs that are developed at this explosive storage facility. **(Table 6.1)**	Maxam with EMD, Fire Chief & Police Department	10/28/2013	**Completed & Deleted:** Maxam has provided the Town with a response plan that is kept on file at the Town House. Training is not required for this site; therefore this strategy from the prior plan is deleted.
1-05	**Action Item (17)** Using the Town's website, provide more public outreach to educate and encourage homeowners to place 911 markers in appropriate locations.	Fire Department	11/25/2013	**Partially Completed & Deferred:** The Town is about 30% compliant with appropriate 911 signage. The Bridgewater Fire Department is selling signs for homeowners to install, but the compliance rate could be improved. This is deferred to this Plan to consider ways to get this signage more compliant so that emergency responders can better assist the public at the time of need by utilizing public outreach opportunities to promote better compliance or other means of establishing more compliance. **Action Item #21** ***(also in Table 6.1)***

Rank	New Mitigation Project	Responsibility or Oversight	Time Frame	Completed, Deleted or Deferred
1-06	**Action Item (20)** Complete the Master Plan review and update to measure and/or adjust the objectives that have been laid out and to incorporate a natural hazards section into Town's Master Plan. **(Table 6.1)**	Planning Board	10/28/2013	**Completed & Deferred:** The Groton Master Plan was last updated in 2017 and will not be ready for a recommended complete update until 2027, which is outside the scope of this Plan. However this is deferred to review this Hazard Mitigation Plan whenever a review of the Master Plan is done and consider the inclusion of a Natural Hazards Section and mitigation action items from this Plan **Action Item #7** ***(also in Table 6.1)***
1-07	**Action Item (2)** Through Public Outreach and the Town's website, educate homeowners regarding the risks of building in flood zone and measures that can be taken to reduce the chance of flooding, and the need to secure 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 (F23); establish an interactive website for educating the public on flood hazard mitigation and preparedness measures (MU14).	Administrative Assistant	3/27/2014	**Completed & Deferred:** See **Action Item #12** regarding the NFIP and Flood Education.
1-08	**Action Item (16)** Educate residents who live on private roads of the importance of maintaining their roads for first responders by adding information to the Town's website. (WF8)	Administrative Assistant	3/27/2014	**Completed & Deferred:** Provide public education to those residents that live on private roads about the importance of maintaining these roads for emergency responders by adding information to the Town's website via an Emergency Webpage or by using available social media. **Action Item #11**
1-09	**Action Item (25)** Create an emergency information brochure or add an emergency page to the Town's website; Establish an interactive webpage for educating the public on hazard mitigation and preparedness measures (MU14) by adding a page to the Town's recently enhanced website that will include such information as emergency contacts, shelter locations, evacuation routes (SW7, WF11 & T3), methods of emergency alerting, 911 compliance, water saving techniques (D9), earthquake risk and mitigation activities that can be taken in residents' homes (EQ7), steps homeowners can take to protect themselves and their properties when extreme temperatures occur (ET1 & ET4), safety measures that can be taken during hail (HA3) and lightning storms (L2), mitigation techniques for property protection and links to available sources; educate homeowners regarding the risks of building in hazard zones and encourage homeowners to install carbon monoxide monitors and alarms (WW5). (Table 7.1)	EMD & Deputy EMD & Administrative Assistant	3/27/2014	**Deferred:** The Town has not established an "Emergency Webpage" due to oversight. A Town "Emergency Webpage" is a great way to provide outreach to residents on not only emergency preparedness but also mitigation techniques property owners can use to reduce or eliminate the impact of natural hazards. This is deferred to this Plan to develop and provide robust information and links on an "Emergency Webpage" to educate the public on general and seasonal mitigation techniques. The Town also has the ability to get information out via Facebook pages for the Town. **Action Item #10**

Rank	New Mitigation Project	Responsibility or Oversight	Time Frame	Completed, Deleted or Deferred
1-10	**Action Item (28)** Provide public information either in a brochure or on the Town's website to encourage residents to provide Code Red with alternative phone numbers. (MU14) **(Table 6.1)**	EMD & Deputy EMD	3/27/2014	**Completed & Deferred:** CodeRED is an excellent warning system but it only stores resident phone numbers that are listed in the phone book. The Town has continuously provided information to residents on CodeRED but this is deferred to provide public outreach to encourage all residents to contact CodeRED to add cell numbers, emails, unlisted numbers and to verify information. Provide public education using the website, a possible brochure at the Town Office, with available social media or a sign up at Town Meeting. **Action Item #13** ***(also in Table 6.1)***
1-11	**Action Item (32)** Upgrade the 42" culvert on Sculptured Rocks Road near the bridge to improve stormwater drainage capacity. (F13)	Road Agent	5/28/2014	**Partially Completed & Deferred:** The replacement of the culvert on Sculptured Rocks Road was not done due to oversight and funding. The Town has applied for a HMPG grant and the Town's financial share of the project has been approved at Town Meeting. This is deferred to replace the 60" metal culvert with a 10' concrete culvert to improve the flow of stormwater. Note: The grant includes three separate culverts (all on Sculptured Rocks Road) **Action Item #30**
1-12	**Action Item (13)** Establish a steep slopes ordinance to restrict and/or prohibit development ~~in difficult to reach areas~~ in order to maintain safe access for fire apparatus to wildland-urban interface neighborhoods and properties (WF8). **(Table 7.1)** ***(strike-through was suggested by the 2020 HMPT)***	Planning Board	12/26/2013	**Partially Completed & Deferred:** The Town has attempted to pass a steep slope ordinance but it has failed at Town Meeting. There is currently a 20% slope performance standard relating to subdivisions only (not an ordinance). This is deferred to once again consider the development of a steep slopes ordinance to prohibit development. **Action Item #27**
1-13	**Action Item (7)** Improve storm water management by establishing an actual program for storm water upgrades & maintenance; work is currently done based on need; some new culverts are called for; effort to assess culvert capabilities and to replace culverts as deemed necessary (F5). **(Table 6.1)**	Road Committee & Road Agent	9/30/2013	**Completed & Deferred:** Although the Groton Highway Department does a good job cleaning and repairing drainage basins and culverts, a written stormwater maintenance plan should be developed to ensure continuity of actions and efficient stormwater management. This is deferred for culvert maintenance and the development of a written stormwater maintenance plan detailing such items as the size, material, date of installation, recommended date for improvement, GPS location and any problems associated with the location (i.e. flooding). **Action Item #23** ***(also in Table 6.1)***
2-01	**Action Item (19)** A Road Committee has been established to set standards for new roads to insure that the Town does not assume ownership of substandard roads; in order to maintain safe access for fire apparatus to wildland-urban interface neighborhoods and properties (WF8) and to insure that roads are built or rebuilt to enhance storm water management (F6), this Committee will be responsible for identifying and reconstructing existing roads, reviewing proposals for new roads and the establishment of road design standards for local roads. **(Table 6.1)**	Board of Selectmen, Road Committee & Road Agent	9/30/2014	**Completed & Deleted:** Road design standards are detailed within the Town's planning mechanisms (Subdivision Regulations and Site Plan) and adhere to state standards. The Town will not assume ownership of substandard roads and roads must be up to state standards and voted on at Town Meeting to be accepted as town-maintained roads. Deleted as this strategy is complete ***(also in Table 6.1)***

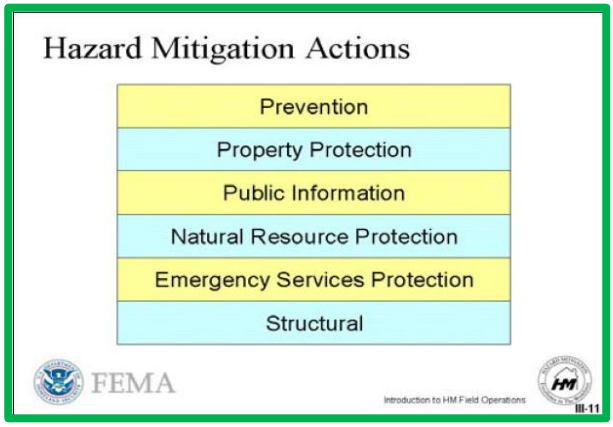
Rank	New Mitigation Project	Responsibility or Oversight	Time Frame	Completed, Deleted or Deferred
2-02	**Action Item (26)** Do a complete review of the Town's Zoning Ordinances and update the Ordinance with new development, fire suppression (WF3) and storm water drainage (F6 & F13) in mind. **(Table 7.1)**	Planning Board	12/26/2014	**Completed & Deferred:** The Planning Board is currently researching whether a requirement for fire suppression and stormwater drainage can be placed in the subdivision regulations and would withstand a legal challenge. The Zoning Ordinance is a working document that is reviewed and updated whenever an issue arises that needs the attention of the Planning or Selectboards. A proposed update to add zoning ordinances was voted down at the 2019 Town Meeting. This is deferred to review the Zoning Ordinance and to discuss any changes that can be made to diminish the impact of hazards. **Action Item #26** ***(also in Table 6.1)***
2-03	**Action Item (23)** Obtain better cell phone service by installing new cell tower; encourage the Board of Selectmen to continue their efforts to locate an adequate tower site. **(Table 7.1)**	Board of Selectmen	9/27/2014	**Partially Completed & Deferred:** Although some research has been done with cell phone companies to improve cell service in Groton, this strategy from the prior plan was not completed. This is deferred to take actions to entice cell companies to come to Groton to provide better cell coverage for the community and to improve the overall communications capabilities of emergency responders. **Action Item #35**
2-04	**Action Item (8)** Repair or replace Dry Hydrant system at Cockermouth River so that an adequate water resource will be available to mitigate the effects and spread of wildfire (WF4). **(Table 7.1)**	Fire Department	10/28/2014	**Completed & Deleted:** The dry hydrant system at the Cockermouth River has been replaced. This action item from the prior plan is deleted as the project is complete.
2-05	**Action Item (14)** In order to maintain safe access for fire apparatus to wildland-urban interface neighborhoods and properties, establish driveway standards that address slope, width and access. (WF8) **(Table 7.1)**	Planning Board & Selectboard *(Selectboard added by the HMPT)*	12/26/2014	**Partially Completed & Deferred:** Although some work has been done to improve access for fire apparatus, more can be done. This is deferred to work on the driveway standards to address the slope, width and access of new driveways to ensure better emergency response accessibility. **Action Item #28**
2-06	**Action Item (10)** Map and assess water sites and other resources along woods roads and trails for wildland firefighting (WF1 & WF4). **(Table 7.1)** (note: 18 miles of new roads that can be used for firefighting have resulted from the work at Groton Wind)	Fire Department	5/28/2015	**Completed & Deleted:** This strategy from the prior plan, a common element in Rural Fire Water Resource Plans that were done in the late 2000s, is deleted as the team felt that the benefit of completing this strategy was not worth the cost. With local knowledge of hiking and snowmobile trails (mapped by the state), the mapping of woods roads was felt to be unnecessary.
3-01	**Action Item (6)** Upgrade remaining undersized or aging culverts on Sculptured Rocks and Province Roads to improve stormwater drainage capacity. (F13) **(Table 7.1)**	Road Agent	6/26/2016	**Completed & Deferred:** Sixteen culverts on Province Road have been replaced, but there are still 30-40 more that need improvement. The majority of these culverts are scheduled for improvement within the next five years using FEMA funding that was provided after the October 2017 heavy rain and wind storm (PDD #4355; $370,000 (FEMA)/$123,000 (local)). Three culverts on Sculptured Rocks Road also need improvements (see Action Item #30). **Action Item #24**
3-02	**Action Item (5)** Upgrade the Hardy Brook culvert to a bridge, or at least a box culvert to improve stormwater drainage capacity. (F13) **(Table 7.1***)*	Highway Department	6/26/2016	**Deferred:** The Hardy Brook culvert is one of three culverts that need improvements on Sculptured Rocks Road. This is deferred to address not only the Hardy Brook culvert but also the other two culverts on Sculptured Rocks Road. **Action Item #30**

Rank	New Mitigation Project	Responsibility or Oversight	Time Frame	Completed, Deleted or Deferred
3-03	**Action Item (3)** Build a new Town Garage in a location outside of the floodplain and include fuel tanks and bulk fuel storage; encourage Board of Selectmen to continue the process of obtaining land for this purpose. (F12 & F18) **(Tables 6.1 & 7.1)**	Board of Selectmen	8/27/2015	**Partially Completed & Deferred:** Although plans and a location have been determined, a new Town Garage was not approved at a special Town Meeting in 2019. This is deferred to add funding to the Capital Reserve Fund and to once again pursue approval by the citizens of Groton at the next Town Meeting (2020) to build this important critical facility. **Action Item #19**
3-04	**Action Item (27)** Obtain a generator for the new town garage when it is completed in order to protect this critical facility and to have it functional at the time of a hazardous event. (MU13) **(Table 6.1)**	Emergency Management Director	By 12/31/2015 or when the new town garage is complete see Strategy #3	**Deferred:** The Town is anticipating moving the town garage from its current location in the floodplain to a new location and would like to obtain a generator for the new town garage when the garage is constructed. Otherwise, the emergency generator capabilities in the Town are good. **Action Item #34** ***(also in Table 6.1)***
3-05	**Action Item (31)** Address water availability at this critical building by adding a cistern as a storage source or water at the top of the Hill near the Town House, perhaps 20,000 gallons. (WF4)	Fire Department	4/26/2016	**Deferred:** This strategy from the prior plan was not completed due to budget constraints. This is deferred to this Plan to consider the development of a fire pond, instead of a cistern, near the Town House to address water availability to fight fires at this important critical facility (EOC, Shelter, Police Department, and Town Records & Government). **Action Item #15**
3-06	**Action Item (11)** Develop new subdivision regulations to require onsite water storage, minimum fire flow and/or fire breaks in the Wildland Urban Interface. (WF2 , WF3 & WF4) (**Table 7.1)**	Planning Board	4/26/2016	**Deferred:** The Groton Subdivision Regulations, most recently updated in 2014 are in good shape. The Subdivision Regulations address road frontage and size of the lot and generally address building on steep slopes. The regulations do not specifically address the availability of water resources for fire suppression. This is deferred to review the Subdivision Regulations and discuss the possibility of adding regulations that will require builders to provide fire ponds, cisterns or other mechanisms to fight fires. **Action Item #22** ***(also in Table 6.1)***
3-07	**Action Item (12)** Town to obtain a copy of the Water Resource Plan from NCRC&D and encourage referral to Water Resource Plan and maps by the Planning Board when reviewing subdivision proposals. (WF2, WF3 & WF4) **(Table 7.1)**	Planning Board	4/26/2016	**Deferred:** The Town of Groton completed a Rural Fire Water Resource Plan (WRP) in 2007; however the copy of that Plan is not currently available at the Town House. This is deferred to this Plan to locate a copy of the WRP and to encourage referral to that Plan by the Planning Board whenever they are reviewing subdivision proposals. **Action Item #29**
3-08	**Action Item (21)** Update the Emergency Operations Plan; current plan was updated in 2010 but will ready for its five year update in 2015 as part of the emergency phases of emergency management. **(Table 7.1)**	EMD & Deputy EMD	9/26/2016	**Completed & Deferred:** The Groton Emergency Operations Plan (EOP) was last updated in 2010 and will need to be updated again as soon as possible following the state's 5-year recommended guidelines. The new EOP should include an EOC Call Alert List as well as a detailed Resource Inventory List and Player Packets. This is deferred to this Plan to update the EOP. **Action Item #20** ***(also in Table 6.1)***
3-09	**Action Item (30)** Add cistern as a storage source near the top of North Groton Road near T.L.C. Tree & Crane Service.(WF4)	Fire Department	4/27/2018	**Deleted:** A cistern at the top of North Groton Road near TLC Tree & Crane was not installed as it was determined to not be needed. This strategy from the last plan is deleted as it is felt that it is no longer necessary.
3-10	**Action Item (29)** Establish building codes for new development and substantial improvements to go beyond state and federal regulations to ensure buildings meet safety and energy efficiency codes; consider adopting the International Building Code (IBC) and/or the International Residential Code (IRC). (EQ1, SW1 & WW1) **(Table 6.1)**	Board of Selectmen	8/27/2018	**Completed & Deleted:** The Town of Groton does not have a Building Inspector however, building permit guidelines are available and building permits are required. The permitting process requires builders to abide by the International Building Codes (IBC) and the International Residential Codes (IRC) which have been adopted by the State of New Hampshire. The building permit process in Groton works well; therefore this strategy from the prior Plan is deleted. ***(also in Table 6.1)***

Chapter 8: New Mitigation Strategies & STAPLEE

A. Mitigation Strategies by Type

The following list of mitigation categories and comprehensive possible strategy ideas was compiled from a number of sources including the USFS, FEMA, other Planners and past hazard mitigation plans. This list was used during a brainstorming session to discuss what issues there may be in town. Team involvement and the brainstorming sessions proved helpful in bringing new ideas, better relationships and a 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) awareness
- Public hazard notification
- Defensible space brochures

Emergency Service Protection

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

Property Protection

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

Natural Resource Protection

- Best management practices within the forest
- Forest and vegetation management
- Forestry and landscape management
- Wetlands development regulations
- 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 and/or realignment

B. Potential Mitigation Strategies by Hazard

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

Strategies that may apply to more than one hazard	Type of Project
Community Outreach and Education	*Public Awareness*
Changes to Zoning Regulations	*Prevention*
Changes to Subdivision Regulations	*Prevention*
Steep Slopes Ordinance	*Prevention*
Density Controls	*Prevention*
Driveway Standards	*Prevention*
Emergency Website Creation	*Public Awareness*
Critical Infrastructure & Key Resources	*Emergency Service Protection*
Emergency Training for Town Officials	*Emergency Service Protection*
High Risk Notification to Homeowners	*Property Protection*
Master Plan Update or Development	*Prevention*
Capital Improvement Plan	*Prevention*

Flood Mitigation Ideas	Type of Project
Stormwater Management Ordinances	*Prevention*
Floodplain Ordinances	*Prevention*
Updated Floodplain Mapping	*Prevention*
Watershed Management	*Natural Resource Protection*
Drainage Easements	*Prevention*
Purchase of Easements	*Prevention*
Wetland Protection	*Natural Resource Protection*
Structural Flood Control Measures	*Prevention*
Bridge Replacement	*Structural Project*
Dam Removal	*Structural Project*
NFIP Compliance	*Prevention*
Acquisition, Demolition & Relocation	*Structural Project*
Structure Elevation	*Structural Project*
Flood Proofing	*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	
• *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*
Thunderstorms & Lightning	
• *Building Construction*	*Property Protection*
Tornado & Severe Wind	
• *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*
Winter Weather Snowstorms	
• *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 as well as the results of the STAPLEE evaluation as explained below. It should also be noted that although some areas are identified as "All Hazards", many of these would apply indirectly to wildfire response and capabilities. Many of these potential mitigation action items overlap.

The goal of each proposed mitigation action item is "*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 the **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic and **E**nvironmental aspects of a project and is commonly used by public administration officials and planners for making planning decisions. The following questions were asked about the proposed mitigation action items discussed in Table 8.1.

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

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

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

Political: ..... Is the action item politically acceptable? Is there public support both to implement and to 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 likely benefits?

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

Each proposed mitigation action item was then evaluated and assigned a score 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 prior to 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 in large part a management document designed to assist the Selectboard and other town officials in all aspects of managing and tracking potential emergency planning action items. For instance, the team was aware that some of these action items are more properly identified as preparedness or readiness issues. As there are no other established planning mechanisms that recognize some of these issues, the team did not want to "lose" any of the ideas discussed during these planning sessions and thought this method was the best way to achieve that objective.

Also, it should be noted that the town understands that the action items for a town of 200 are not the same as the action items for a town of 30,000. In addition, the action items for a town in the middle of predominantly hardwood forests, are not the same as the ation items for a town on the Jersey Shore. Therefore the Town of Groton has accepted the "Mitigation Action Items" in Tables 8.1 and 9.1 as the complete list of "Mitigation Action Items" for this town and only this town and hereby indicates that having carefully considered a comprehesive list of other possible mitigation action items (see sections A & B of this chapter) for this plan, there are no additional "Mitigation Action Items" to add at this time.

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.

Table 8.1: Potential Mitigation Action Items & the STAPLEE

Action Items are listed in numerical order.

Proposed Mitigation Action Items	Affected Location	Type of Activity	S	T	A	P	L	E	E	TTL
Action Item #1: Routinely inspect the functionality of fire hydrants and repair all hydrants and other water resources in Groton. Consider other areas of the community that have limited water resources and address these issues by installing new hydrants, fire ponds and/or cisterns as needed **(WF8).**	Dry Hydrant by Town Garage	•Prevention •Emergency Service Protection •Property Protection •Natural Resource Protection	3	3	3	3	3	3	3	21
			No apparent difficulty with this action item							
Action Item #2: The Emergency management Director (EMD) to encourage all town officials who may be required to respond to an emergency and any new emergency responders to take NIMS 700 (S-700) & ICS (ISC100 & ISC200); additional, the EMD and other vital emergency responders to learn about and become adept with WEB-EOC **(Tables 6.1 & 7.1).**	Townwide	•Prevention •Emergency Service Protection	3	3	3	3	3	3	3	21
			No apparent difficulty with this action item							

Proposed Mitigation Action Items	Affected Location	Type of Activity	S	T	A	P	L	E	E	TTL
Action Item #3: In addition to work that is done by and with local utility companies, monitor the need for brush cutting, drainage system clearance and tree removal as part of a tree trimming program and create defensible space around power lines, oil and gas lines and other infrastructure; work to reduce wildfire risk by clearing dead vegetation, cutting high grass and other fuel loads in the community. **(SW4, WF7, WF9 & F14) (Table 6.1).**	Townwide	•Prevention •Emergency Service Protection •Property Protection •Natural Resource Protection	3	3	3	2	3	3	2	19
			Political: *Some may not want trees cut on their properties* ***Environmental:*** *Possible negative reaction from environmentalists*							
Action Item #4: Train all fire responders on the many aspects of emergency response including wildfire and HazMat response in coordination with the Hebron and Rumney Fire Departments and Lakes Region Fire Mutual Aid **(Table 6.1).**	Townwide	•Prevention •Emergency Service Protection	3	3	3	3	3	3	3	21
			No apparent difficulty with this action item							
Action Item #5: Provide an annual review of the Groton Hazard Mitigation Plan Update 2020 including a review of the status of "Action Items" listed in this Plan to encourage completion; get approval from the local elected body on an annual basis **(MU11) (Table 6.1).**	Townwide	•Prevention	3	3	3	3	3	3	3	21
			No apparent difficulty with this action item							
Action Item #6: The Hebron & Rumney Fire Departments will update their current databases to track vulnerable populations such as the elderly, the poor and the homeless, by developing a new and updated survey of the functional needs population and a method of keeping the data up-to-date. **(ET3 & WW6) (Table 7.1).**	Townwide	•Prevention •Emergency Service Protection	3	3	2	2	2	3	3	18
			Administrative: *Gathering and keeping information up-to-date may be difficult* ***Political:*** *Some people may not want to be on a list* ***Legal:*** *HIPPA regulations must be respected*							
Action Item #7: Review this Hazard Mitigation Plan whenever an annual review of the Master Plan is done and consider the incorporation of a Natural Hazards section and mitigation action items from this Plan **(MU6) (Tables 6.1 & 7.1).**	Townwide	•Prevention	3	3	3	3	3	3	3	21
			No apparent difficulty with this action item							
Action Item #8: The Fire Departments to participate in training opportunities at Groton Wind to ensure readiness **(Table 7.1).**	Townwide	•Prevention •Emergency Service Protection	3	3	3	3	3	3	3	21
			No apparent difficulty with this action item							
Action Item #9: Post important information on the Town's Emergency website and notices of red flag burning days; obtain and have available "Firewise" brochures to educate homeowners on methods to reduce fire risk around their homes **(WF10)** and provide a link to "Firewise" on the Emergency page of the Town's website. Provide "Firewise" brochures to those residents seeking burn permits and 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 **(WF12) (Table 7.1).**	Townwide	•Prevention •Public Education & Awareness •Property Protection •Natural Resource Protection	3	3	3	3	3	3	3	21
			No apparent difficulty with this action item							

Proposed Mitigation Action Items	Affected Location	Type of Activity	S	T	A	P	L	E	E	TTL
			3	3	3	3	3	3	3	21
Action Item #10: Provide robust information on a town emergency webpage and on available social media platforms for educating the public on hazard mitigation and preparedness measures **(MU14)** by adding to the Town's website a webpage that will include such information as emergency contacts, shelter locations, evacuation routes **(SW7, WF11 & T3)**, methods of emergency alerting, 911 compliance, water saving techniques **(D9)**, earthquake risk and mitigation activities that can be taken in residents' homes **(EQ7)**, steps homeowners can take to protect themselves and their properties when extreme temperatures occur **(ET1 & ET4)**, safety measures that can be taken during hail **(HA3)** and lightning storms **(L2)**, mitigation techniques for property protection and links to available sources; educate homeowners regarding the risks of building in hazard zones and encourage homeowners to install carbon monoxide monitors and alarms **(WW5)**. Develop ways to provide notification to citizens **(Table 7.1).**	Townwide	•Prevention •Public Education & Awareness •Property Protection •Natural Resource Protection	*No apparent difficulty with this action item*						
Action Item #11: Provide public education to those residents that live on private roads about the importance of maintaining these roads for emergency responders by adding information to the Town's website via an Emergency Webpage or by using available social media **(MU16)** ***(Table 7.1).***	Townwide	•Prevention •Public Education & Awareness •Emergency Service Protection •Property Protection •Natural Resource Protection	3	3	3	2	3	3	3	20
			Political: *Some may not want to be told how to maintain their private roads*							
Action Item #12: 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 Town Offices; give NFIP materials to homeowners and builders when proposing new development or substantial improvements; encourage property owners to purchase flood insurance **(F22)**, whether or not they are in the flood zone and provide appropriate links to the NFIP and Ready.gov on the Emergency webpage or available Facebook pages; through Public Outreach, educate homeowners regarding the risks of building in the 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 and available Facebook pages as well as a community Newsletter; actively work with residents to ensure they are in compliance with the Town's Floodplain Ordinance **(F23)** **(Tables 6.1 & 7.1).**	Townwide	•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							
Action Item #13: Provide public outreach to encourage all residents to contact CodeRED to add cell numbers, unlisted numbers, emails and to verify information; use the website, a possible brochure, a community Newsletter or a sign up at Town Meeting **(MU14)** **(Tables 6.1 & 7.1).**	Townwide	•Prevention •Public Education & Awareness	3	3	3	3	3	3	3	21
			No apparent difficulty with this action item							

Proposed Mitigation Action Items	Affected Location	Type of Activity	S	T	A	P	L	E	E	TTL
Action Item #14: Provide public outreach to the citizens of Groton regarding the availability of the Town House as a "cooling or warming center" during times of extended high temperatures and severe winter weather **(ET3 & WW6).**	Town House	•Prevention •Public Education & Awareness	3	3	3	3	3	3	3	21
			No apparent difficulty with this action item							
Action Item #15: Develop a fire pond, instead of a cistern, near the Town House to address water availability to fight fires at this important critical facility (EOC, Shelter, Police Department, Town Records & Government) **(Table 7.1).**	Town House	•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							
Action Item #16: Improve the flow of stormwater on the Province Road by upgrading the twenty underperforming/aging culverts, eighteen 12" metal culverts and two 15" plastic, with twenty 18"-24" plastic culverts. FEMA funding was provided after the October 2017 heavy rain and wind storm (PDD #4355; $370,000 (FEMA)/$123,000 (local)). The Road Agent will replace with larger ones where possible **(F13) (Table 7.1).**	Sculptured Rocks Road & Province Road	•Prevention •Emergency Service Protection •Property Protection •Natural Resource Protection •Structural Project	3	3	3	3	3	2	3	20
			Economical: *Budget constraints*							
Action Item #17: Lobby the state to mitigate the flooding problems at the bridge on North Groton Road over the Cockermouth River to improve the flow of stormwater and to eliminate the flood hazard **(F13).**	North Groton Road	•Prevention •Emergency Service Protection •Property Protection •Natural Resource Protection	3	3	3	3	3	3	3	21
			No apparent difficulty with this action item							
Action Item #18: Improve the flow of stormwater on North Fletcher Road by upgrading the 12" plastic culvert with an 18" plastic culvert **(F13).**	North Fletcher Road	•Prevention •Emergency Service Protection •Property Protection •Natural Resource Protection •Structural Project	3	3	3	3	3	2	3	20
			Economical: *Budget constraints*							
Action Item #19: Pursue approval by the citizens of Groton at the next Town Meeting (2020) to first hire an engineer and then to build this important critical facility **(Table 7.1).**	Town Garage	•Emergency Service Protection •Property Protection •Natural Resource Protection •Structural Project	3	3	3	1	3	2	3	18
			Political: *Residents do not want their taxes to go up as a result of the cost of building a new garage* ***Economical:*** *Budget constraints*							
Action Item #20: Update the Groton Emergency Operations Plan to coincide with the new state 15-ESF format. Include an analysis of the impact of natural hazards on Critical Infrastructure and Key Resources that may be needed during an emergency and include an EOC Call Alert List as well as a detailed Resource Inventory List and Player Packets **(MU6) (Tables 6.1 & 7.1).**	Townwide	•Prevention •Emergency Service Protection	3	3	3	3	3	3	3	21
			No apparent difficulty with this action item							
Action Item #21: Consider ways to improve 911 signage compliance so that emergency responders can better assist the public at the time of need; perhaps through purchase of signs by the Town and/or through public outreach **(MU14) (Tables 6.1 & 7.1).**	Townwide	•Prevention •Public Education & Awareness •Emergency Service Protection •Property Protection	3	3	3	2	3	3	3	20
			Political: *Some people will not want 911 signage*							

Proposed Mitigation Action Items	Affected Location	Type of Activity	S	T	A	P	L	E	E	TTL
Action Item #22: Review the Groton Subdivision Regulations to consider changes to the regulations that could potentially reduce the impact from future hazards, such as addressing water resources in new subdivisions, adequate storm water flow and the steepness of driveways and roads **(WF2, F1 & MU6) (Tables 6.1 & 7.1).**	Townwide	•Prevention	3	3	3	3	3	3	3	21
			Political: *Some people do not want to be told what to do with their properties; resistance to change and government interference.*							
Action Item #23: Maintain culverts and ditches in the community and develop a written storm water maintenance plan in order to ensure more efficient storm water management. Include the location, date of installation, GPS coordinates, material, type, size, age and expected replacement date of all culverts, catch basins and drainage ditches in the community **(F5) (Tables 6.1 & 7.1).**	Townwide	•Prevention •Emergency Service Protection •Property Protection •Natural Resource Protection	3	3	2	3	3	3	3	20
			Administrative: *Time and staff resources may make this project difficult*							
Action Item #24*:* Improve the flow of stormwater on the Sculptured Rocks Road by upgrading the six underperforming/aging culverts, three 24" metal culverts and three 18" plastic, with 18"-24" plastic culverts. The Road Agent will replace with larger ones where possible **(F13).**	Sculptured Rocks Road	•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							
Action Item #25: Improve the flow of stormwater on Bailey Hill Road by upgrading the 18" metal culvert with an 18" plastic culvert. The Road Agent will replace with larger ones where possible **(F13).**	Bailey Hill Road	•Prevention •Emergency Service Protection •Property Protection •Natural Resource Protection •Structural Project	3	3	3	3	3	2	3	20
			Economical: *Budget constraints*							
Action Item #26: Review the Zoning Ordinance and discuss any changes that can be made to diminish the impact of hazards **(Tables 6.1 & 7.1).**	Townwide	•Prevention	3	3	3	1	3	3	3	19
			Political: *Some people do not want to be told what to do with their properties; resistance to change and government interference.*							
Action Item #27: Consider the development of a steep slopes ordinance to prohibit development. **(Table 7.1).**	Townwide	•Prevention •Emergency Service Protection •Property Protection •Natural Resource Protection	3	3	2	1	3	3	3	18
			Administrative: *Planning Board may be hesitant to do this due to past failed ordinances* ***Political:*** *Residents want less regulations, not more*							
Action Item #28: Work on the driveway standards in the Subdivision Regulations, to address the slope, width and access of new driveways to ensure better emergency response accessibility **(Table 7.1).**	Townwide	•Prevention •Emergency Service Protection •Property Protection •Natural Resource Protection	3	3	2	1	3	3	3	18
			Administrative: *Planning Board may be hesitant to do this due to past failed ordinances* ***Political:*** *Residents want less regulations, not mor**e***							
Action Item #29: Review current subdivision regulations and the Water Resource Plan (WRP) and consider including requirements for builders and developers to install onsite water storage in new subdivisions based on criteria to be determined by the Planning Board and Emergency Responders. Encourage the Planning and other Boards to use of the WRP to assist with the review of future subdivision requests **(WF3) (Table 7.1).**	Townwide	•Prevention •Emergency Service Protection •Property Protection •Natural Resource Protection	3	3	2	1	3	3	3	18
			Administrative: *Planning Board may be hesitant to do this due to past failed ordinances* ***Political:*** *Residents want less regulations, not more*							

Proposed Mitigation Action Items	Affected Location	Type of Activity	S	T	A	P	L	E	E	TTL
Action Item #30: Improve the flow of stormwater on Sculptured Rocks Road by upgrading the three 5-foot steel culverts with 10-foot concrete box culverts. The Administrative Assistant and Road Agent have applied for a Hazard Mitigation Grant to try to obtain funding for this project.	Sculptured Rocks Road Hardy Brook Phelps 7-Kids Lane	•Prevention •Public Education & Awareness •Emergency Service Protection •Property Protection •Natural Resource Protection •Structural Project	3	3	3	3	3	2	3	20
			Economical: *Budget constraints*							
Action Item #31: Improve the flow of stormwater on River Road by upgrading the ten underperforming/aging 18"-24" metal culverts with 18"-24" plastic culverts. The Road Agent will replace with larger ones where possible **(F13).**	River Road	•Prevention •Emergency Service Protection •Property Protection •Natural Resource Protection •Structural Project	3	3	3	3	3	2	3	20
			Economical: *Budget constraints*							
Action Item #32: Improve the flow of stormwater on the North Groton Road by upgrading the four underperforming/aging 18" metal culverts with four 18" plastic culverts. The Road Agent will replace with larger ones where possible (located between Halls Brook and Nedeau Lane) **(F13).**	North Groton Road	•Prevention •Emergency Service Protection •Property Protection •Natural Resource Protection •Structural Project	3	3	3	3	3	2	3	20
			Economical: *Budget constraints*							
Action Item #33: Improve the flow of stormwater on North Groton Road by upgrading the 7-foot round metal culvert with a 10-foot box culvert **(F13).**	North Groton Road	•Prevention •Emergency Service Protection •Property Protection •Natural Resource Protection •Structural Project	3	3	3	3	3	2	2	19
			Economical: *Budget constraints* ***Environmental:*** *DES approvals will be required*							
Action Item #34: Include plans to install a permanent generator for a new Town Garage to ensure functionality at the time of an emergency **(MU13)** **(Tables 6.1 & 7.1).**	Town Garage	•Emergency Service Protection	3	3	3	1	3	1	3	17
			Political: *Some do not see the need to build a new Town Garage, let alone a generator* ***Economical:*** *Budget Constraints*							
Action Item #35: Entice cell companies to come to Groton to provide better cell coverage for the community and to improve the overall communications capabilities of emergency responders **(Table 7.1).**	Townwide	•Emergency Service Protection	3	3	3	3	3	3	3	21
			No apparent difficulty with this action item							

Chapter 9: Implementation Schedule for Prioritized Action Items

A. Priority Methodology

After reviewing the finalized STAPLEE numerical ratings, the team prepared to develop *Table 9.1, The Mitigation Action Plan.* To do this, team members created four categories into which they would place the potential mitigation action items.

Category 0

Category 0 includes those items which are being done and will continue to be done in the future.

Category 1

Category 1 includes those items under the direct control of town officials, within the financial capability of the town using only town funding, those already being done or planned and those that could generally be completed within one year.

Category 2

Category 2 includes those items that the town does not have sole authority to act upon, those for which funding might be beyond the town's capability and those that would generally take between 13-36 months to complete.

Category 3

Category 3 includes those items that would take a major funding effort, those that the town has little control over the final decision and those that would take in excess of 37 months to complete.

Each potential mitigation action item was placed in one of these four categories and then those action items were prioritized within each category according to cost-benefit, time frame and capability. Actual cost estimates were unavailable during the planning process, although using the STAPLEE process along with the methodology detailed above and a Low-High estimate (see following page) the team was able to come up with a general consensus on cost-benefit for each proposed action item.

The team also considered the following criteria 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 seriously evaluate the new hazard mitigation action items that they had brainstormed throughout the hazard mitigation planning process. While all actions would help improve the town's hazard and wildfire responsiveness capability, funding availability will be a driving factor in determining what and when new mitigation action items are implemented.

B. WHO, WHEN, HOW?

Once this was completed, the team developed an action plan that outlined who is responsible for implementing each action item, as well as when and how the actions will be implemented. The following questions were asked in order 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, located on the next page, includes problem statements that were expressed by the planning team. These action items are listed in order of priority and indicate if they were derived from other tables in this plan.

The estimated cost was determined using the following criteria:

- **Low Cost**.....$0 - $1,000 or staff time only
- **Medium Cost** .....$1,000-$10,000
- **High Cost** .....$10,000 or more

The time frame was determined using the following criteria:

- **Short Term**..... Ongoing for the life of the plan
- **Short Term**..... 1 year or less (0-12 months)
- **Medium Term**..... 1-3 years (13-36 months)
- **Long Term:** ..... 3-5 years (37-60 months)

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
0-1	***Problem Statement:*** *There is only one dry hydrant to maintain; this maintenance needs to continue.* **Action Item #1:** Routinely inspect the functionality of fire hydrants and repair all hydrants and other water resources in Groton. Consider other areas of the community that have limited water resources and address these issues by installing new hydrants, fire ponds and/or cisterns as needed **(WF8).**	Wildfire	Fire Departments	Local	**Short Term** **Ongoing** (For the life of the Plan)	**Low Cost** ($0 - $1,000 or staff time only)
0-2	***Problem Statement:*** *Although first responders including firefighters have received NIMS & ICS training, not all of Groton's town officials have.* **Action Item #2:** The Emergency management Director (EMD) to encourage all town officials who may be required to respond to an emergency and any new emergency responders to take NIMS 700 (S-700) & ICS (ISC100 & ISC200); additional, the EMD and other vital emergency responders to learn about and become adept with WEB-EOC **(Tables 6.1 & 7.1).**	All Hazards	Emergency Management Director	Local	**Short Term** **Ongoing** (For the life of the Plan)	**Low Cost** ($0 - $1,000 or staff time only)
0-3	***Problem Statement:*** *As tree limbs fall into or near roadways and water systems and as vegetation grows around utilities, there is a need to continue to work to keep this hazard to a minimum.* **Action Item #3:** In addition to work that is done by and with local utility companies, monitor the need for brush cutting, drainage system clearance and tree removal as part of a tree trimming program and create defensible space around power lines, oil and gas lines and other infrastructure; work to reduce wildfire risk by clearing dead vegetation, cutting high grass and other fuel loads in the community **(SW4, WF7, WF9 & F14) (Table 6.1).**	Severe Wind, Wildfire, Ice Storms & Flooding	Highway Department	Local	**Short Term** **Ongoing** (For the life of the Plan)	**Low Cost** ($0 - $1,000 or staff time only)
0-4	***Problem Statement:*** *Training of all fire responders is coordinated by the Hebron and Rumney Fire Departments and through Lakes Region Fire Mutual Aid. Training includes the many aspects of emergency response, wildfire response, hazmat response and all other aspects of fire training. This training needs to continue into the future.* **Action Item #4:** Train all fire responders on the many aspects of emergency response including wildfire and HazMat response in coordination with the Hebron and Rumney Fire Departments and Lakes Region Fire Mutual Aid **(Table 6.1).**	Hazardous Materials, Wildfires	Rumney & Hebron Fire Departments	Local	**Short Term** **Ongoing** (For the life of the Plan)	**Low Cost** ($0 - $1,000 or staff time only)

Final R/P	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
0-5	***Problem Statement:*** *This Plan, the Groton Hazard Mitigation Plan Update 2020, will require an annual review and a complete update in five years.* **Action Item #5:** Provide an annual review of the Groton Hazard Mitigation Plan Update 2020 including a review of the status of "Action Items" listed in this Plan to encourage completion; get approval from the local elected body on an annual basis **(MU11)** **(Table 6.1).**	All Hazards	Emergency Management Director & Selectboard	Local	**Short Term** **Ongoing** (For the life of the Plan)	**Low Cost** ($0 - $1,000 or staff time only)
0-6	***Problem Statement:*** *Although the Hebron and Rumney Fire Departments have developed a functional needs list, this effort needs to continue.* **Action Item #6:** The Hebron & Rumney Fire Departments will update their current databases to track vulnerable populations such as the elderly, the poor and the homeless, by developing a new and updated survey of the functional needs population and a method of maintaining the data **(ET3 & WW6)** **(Table 7.1).**	Extreme Temperatures, Severe Winter Weather & All Hazards	Fire Departments	Local	**Short Term** **Ongoing** (For the life of the Plan)	**Low Cost** ($0 - $1,000 or staff time only)
0-7	***Problem Statement:*** *The Groton Master Plan (2017) will not be in need of an update based on the recommended ten year guidelines until 2027, but the current Master Plan does not have a Natural Hazards section.* **Action Item #7:** Review this Hazard Mitigation Plan whenever an annual review of the Master Plan is done and consider the incorporation of a Natural Hazards section and mitigation action items from this Plan **(MU6)** **(Tables 6.1 & 7.1).**	All Hazards	Planning Board	Local	**Short Term** **Ongoing** (For the life of the Plan)	**Low Cost** ($0 - $1,000 or staff time only)
0-8	***Problem Statement:*** *Groton Wind provides the Town with a new response plan every year and provides training one or two times a year. Fire Department training at Groton Wind needs to continue.* **Action Item #8:** The Fire Departments to participate in training opportunities at Groton Wind to ensure readiness **(Table 7.1).**	All Hazards	Fire Departments	Local	**Short Term** **Ongoing** (For the life of the Plan)	**Low Cost** ($0 - $1,000 or staff time only)

Final R/P	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
0-9	***Problem Statement:*** *Although the Town does a great job using its Emergency webpage to promote preparedness, residents may not be aware of the steps they can take to reduce the risk of fire at their homes.* **Action Item #9:** Post important information on the Town's Emergency website and notices of red flag burning days; obtain and have available "Firewise" brochures to educate homeowners on methods to reduce fire risk around their homes **(WF10)** and provide a link to "Firewise" on the Emergency page of the Town's website. Provide "Firewise" brochures to those residents seeking burn permits and 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 **(WF12)** **(Table 7.1).**	Wildfire	Selectboard	Local	**Short Term** **Ongoing** (For the life of the Plan)	**Low Cost** ($0 - $1,000 or staff time only)
0-10	***Problem Statement:*** *Although the Town has made a good effort in providing public education, more can be done to provide not only emergency preparedness but also hazard mitigation techniques that residents can take to protect their homes and properties.* ***Action Item #10:*** Provide robust information on a town emergency webpage and on available social media platforms for educating the public on hazard mitigation and preparedness measures **(MU14)** by adding to the Town's website a webpage that will include such information as emergency contacts, shelter locations, evacuation routes **(SW7, WF11 & T3)**, methods of emergency alerting, 911 compliance, water saving techniques **(D9)**, earthquake risk and mitigation activities that can be taken in residents' homes **(EQ7**), steps homeowners can take to protect themselves and their properties when extreme temperatures occur **(ET1 & ET4)**, safety measures that can be taken during hail **(HA3)** and lightning storms **(L2)**, mitigation techniques for property protection and links to available sources; educate homeowners regarding the risks of building in hazard zones and encourage homeowners to install carbon monoxide monitors and alarms **(WW5)**. Develop ways to provide notification to citizens **(Table 7.1).**	All Hazards including: Severe Wind, Drought, Earthquake, Extreme Temperatures, Hail, Lightning, Severe Winter Weather, Tornado & Wildfire	Selectboard	Local	**Short Term** **Ongoing** (For the life of the Plan)	**Low Cost** ($0 - $1,000 or staff time only)
0-11	***Problem Statement:*** *The general public may not be aware of the importance of maintaining private roads and driveways to enable access by emergency responders.* **Action Item #11:** Provide public education to those residents that live on private roads about the importance of maintaining these roads for emergency responders by adding information to the Town's website via an Emergency Webpage or by using available social media **(MU16)** **(Table 7.1).**	Wildfire	Selectboard	Local	**Short Term** **Ongoing** (For the life of the Plan)	**Low Cost** ($0 - $1,000 or staff time only)

Final R/P	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
0-12	***Problem Statement:*** *Residents and Builders may not be aware of flood regulations & the availability of flood insurance through the NFIP and they also may not be aware of the risk of building in the floodplain and the steps they can take to reduce flooding.* **Action Item #12:** 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 Town Offices; give NFIP materials to homeowners and builders when proposing new development or substantial improvements; encourage property owners to purchase flood insurance **(F22)**, whether or not they are in the flood zone and provide appropriate links to the NFIP and Ready.gov on the Emergency webpage or available Facebook pages; through Public Outreach, educate homeowners regarding the risks of building in the 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 and available Facebook pages as well as a Community Newsletter; actively work with residents to ensure they are in compliance with the Town's Floodplain Ordinance **(F23)** **(Tables 6.1 & 7.1).**	Inland Flooding	Selectboard	Local	**Short Term** **Ongoing** (For the life of the Plan)	**Low Cost** ($0 - $1,000 or staff time only)
0-13	***Problem Statement:*** *CodeRED is an excellent warning system but it only stores resident phone numbers that are listed in the phone book; residents may not be aware that they can add cell numbers, emails and unlisted numbers.* **Action Item #13:** Provide public outreach to encourage all residents to contact CodeRED to add cell numbers, unlisted numbers, emails and to verify information; use the website, a possible brochure, a Community Newsletter or a sign up at Town Meeting **(MU14)** **(Tables 6.1 & 7.1).**	All Hazards	Selectboard & Emergency Management Director	Local	**Short Term** **Ongoing** (For the life of the Plan)	**Low Cost** ($0 - $1,000 or staff time only)
0-14	***Problem Statement:*** *Although public outreach has been done to advise the citizens of Groton of the possibility of using the Town House as a cooling shelter in times of extended high temperatures but additional public outreach needs to be done.* **Action Item #14:** Provide public outreach to the citizens of Groton regarding the availability of the Town House as a "cooling or warming center" during times of extended high temperatures and severe winter weather **(ET3 & WW6).**	Extreme Temperatures & Severe Winter Weather	EMD & BOS	Local	**Short Term** **Ongoing** (For the life of the Plan)	**Low Cost** ($0 - $1,000 or staff time only)
1-1	***Problem Statement:*** *There are inadequate water resources in the vicinity of the Town House/EOC to fit wildfires or a major structure fire.* **Action Item #15:** Develop a fire pond, instead of a cistern, near the Town House to address water availability to fight fires at this important critical facility (EOC, Shelter, Police Department, Town Records & Government) **(Table 7.1).**	Wildfire	Selectboard, Fire Departments & Highway Department	Local	**Short Term** (1 year or less: 0-12 months)	**Medium Cost** ($1,000 - $10,000)

Final R/P	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
1-2	***Problem Statement:*** *Sixteen culverts on Province Road have been replaced, but there are still 20 more that need improvement. The majority of these culverts are scheduled for improvement within the next five years using FEMA funding that was provided after the October 2017 heavy rain and wind storm (PDD #4355; $370,000 (FEMA)/$123,000 (local)).* **Action Item #16:** Improve the flow of stormwater on the Province Road by upgrading the twenty underperforming/aging culverts, eighteen 12" metal culverts and two 15" plastic, with twenty 18"-24" plastic culverts. FEMA funding was provided after the October 2017 heavy rain and wind storm (PDD #4355; $370,000 (FEMA)/$123,000 (local)). The Road Agent will replace with larger ones where possible **(F13)** **(Table 7.1).**	Inland Flooding	Highway Department & Selectboard	Local & Grants	**Short Term** (1 year or less: 0-12 months)	**High Cost** ($10,000 or more)
1-3	***Problem Statement:*** *Flooding occurs near the Town Garage as a result of bridge construction over the Cockermouth River.* **Action Item #17:** Lobby the state to mitigate the flooding problems at the bridge on North Groton Road over the Cockermouth River to improve the flow of stormwater and to eliminate the flood hazard **(F13).**	Inland Flooding	Selectboard	Local	**Short Term** (1 year or less: 0-12 months)	**Low Cost** ($0 - $1,000 or staff time only)
1-4	***Problem Statement:*** *One culvert on North Fletcher Road does not effectively handle the flow of stormwater and cause local flooding and road washouts.* ***Action Item #18:*** Improve the flow of stormwater on North Fletcher Road by upgrading the 12" plastic culvert with an 18" plastic culvert **(F13).**	Inland Flooding	Highway Department & Selectboard	Local & Grants	**Short Term** (1 year or less: 0-12 months)	**Medium Cost** ($1,000 - $10,000)
1-5	***Problem Statement:*** *Although the town continues to add money to the Capital Reserve Funds for a new Town Garage, a new facility has not been built.* **Action Item #19:** Pursue approval by the citizens of Groton at the next Town Meeting (2020) to first hire an engineer and then to build this important critical facility **(Table 7.1).**	All Hazards	Selectboard & Highway Department	Local	**Short Term** (1 year or less: 0-12 months)	**High Cost** ($10,000 or more)
1-6	***Problem Statement:*** *The Groton Emergency Operations Plan (EOP) was last updated in 2010 and is in need of a complete update based on the state's 5-year recommendation.* **Action Item #20:** Update the Groton Emergency Operations Plan to coincide with the new State 15-ESF format. Include an analysis of the impact of natural hazards on Critical Infrastructure and Key Resources that may be needed during an emergency and include an EOC Call Alert List as well as a detailed Resource Inventory List and Player Packets **(MU6)** **(Tables 6.1 & 7.1).**	All Hazards	Emergency Management Director	Local & Grants	**Short Term** (1 year or less: 0-12 months)	**Low Cost** ($0 - $1,000 or staff time only)

Final R/P	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
1-7	***Problem Statement:*** *The Town has continuously used public outreach to advise residents of the need for proper 911 signage; however, the town is currently only about 30% compliant with the proper 911 signage.* **Action Item #21:** Consider ways to improve 911 signage compliance so that emergency responders can better assist the public at the time of need; perhaps through purchase of signs by the Town and/or through public outreach **(MU14) (Tables 6.1 & 7.1).**	All Hazards	Selectboard, Emergency Management Director & Fire Department	Local	**Short Term** (1 year or less: 0-12 months)	**Low Cost** ($0 - $1,000 or staff time only)
1-8	***Problem Statement:*** *The Groton Subdivision Regulations, most recently updated in 2014 are in good shape. The Subdivision Regulations address set-backs, road frontage and size of the lot. However, the regulations do not address the availability of water resources for fire suppression in new subdivisions.* **Action Item #22:** Review the Groton Subdivision Regulations to consider changes to the regulations that could potentially reduce the impact from future hazards, such as addressing water resources in new subdivisions, adequate storm water flow and the steepness of driveways and roads **(WF2, F1 & MU6) (Tables 6.1 & 7.1).**	Wildfire & Flooding	Planning Board	Local	**Short Term** (1 year or less: 0-12 months)	**Low Cost** ($0 - $1,000 or staff time only)
2-1	***Problem Statement:*** *Although the Bath Highway Department works to clean and repair drainage basins and culverts, a written storm water maintenance plan should be developed to insure continuity of actions and efficient storm water management.* **Action Item #23:** Maintain culverts and ditches in the community and develop a written storm water maintenance plan in order to ensure more efficient storm water management. Include the location, date of installation, GPS coordinates, material, type, size, age and expected replacement date of all culverts, catch basins and drainage ditches in the community **(F5) (Tables 6.1 & 7.1).**	Flooding	Highway Department & Selectboard	Local	**Medium Term** (1-3 years: 13-36 months)	**Low Cost** ($0 - $1,000 or staff time only)
2-2	***Problem Statement:*** *Six culverts on Sculptured Rocks Road do not effectively handle the flow of storm water and cause local flooding and road washouts.* ***Action Item #24:*** Improve the flow of stormwater on the Sculptured Rocks Road by upgrading the six underperforming/aging culverts, three 24" metal culverts and three 18" plastic, with 18"-24" plastic culverts. The Road Agent will replace with larger ones where possible **(F13).**	Inland Flooding	Highway Department & Selectboard	Local & Grants	**Medium Term** (1-3 years: 13-36 months)	**Low Cost** ($0 - $1,000 or staff time only) **Medium Cost** ($1,000 - $10,000) **High Cost** ($10,000 or more)

Final R/P	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
2-3	***Problem Statement:*** *One culvert on Bailey Hill Road does not effectively handle the flow of stormwater and causes local flooding and road washouts.* **Action Item #25:** Improve the flow of stormwater on Bailey Hill Road by upgrading the 18" metal culvert with an 18" plastic culvert. The Road Agent will replace with larger ones where possible **(F13).**	Inland Flooding	Highway Department & Selectboard	Local & Grants	**Medium Term** (1-3 years: 13-36 months)	**Medium Cost** ($1,000 - $10,000)
2-4	***Problem Statement:*** *The Zoning Ordinance is a working document that is reviewed and updated whenever an issue arises that needs the attention of the Planning or Selectboards. The Zoning Ordinance should be reviewed and updated with an eye towards diminishing the impact of hazards.* **Action Item #26:** Review the Zoning Ordinance and discuss any changes that can be made to diminish the impact of hazards **(Tables 6.1 & 7.1).**	All Hazards	Planning Board	Local	**Medium Term** (1-3 years: 13-36 months)	**Low Cost** ($0 - $1,000 or staff time only)
2-5	***Problem Statement:*** *The Town has attempted to pass a steep slope ordinance but it has failed at Town Meeting. There is currently a 20% slope performance standard (not an ordinance). This may have more teeth if this is an "ordinance".* **Action Item #27:** Consider the development of a steep slopes ordinance to prohibit development (**Table 7.1).**	All Hazards	Planning Board	Local	**Medium Term** (1-3 years: 13-36 months)	**Low Cost** ($0 - $1,000 or staff time only)
2-6	***Problem Statement:*** *Although some work has been done to improve access for fire apparatus, more can be done.* **Action Item #28:** Work on the driveway standards in the Subdivision Regulations, to address the slope, width and access of new driveways to ensure better emergency response accessibility **(Table 7.1).**	All Hazards	Planning Board, Selectboard, Highway Department & Fire Departments	Local	**Medium Term** (1-3 years: 13-36 months)	**Low Cost** ($0 - $1,000 or staff time only)
2-7	***Problem Statement:*** *The Rural Fire Water Resource Plan (WRP) that was developed when the prior hazard mitigation was completed has been used as a tool by the Planning Board in the past. Reference to and guidance from the WRP should continue.* **Action Item #29:** Review current subdivision regulations and the Water Resource Plan (WRP) and consider including requirements for builders and developers to install onsite water storage in new subdivisions based on criteria to be determined by the Planning Board and Emergency Responders. Encourage the Planning and other Boards to use of the WRP to assist with the review of future subdivision requests **(WF3) (Table 7.1).**	Wildfire	Planning Board	Local	**Medium Term** (1-3 years: 13-36 months)	**Low Cost** ($0 - $1,000 or staff time only)

Final R/P	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
3-1	***Problem Statement:*** *Three culverts on Sculptured Rocks Road do not effectively handle the flow of stormwater and cause local flooding and road washouts.* **Action Item #30:** Improve the flow of stormwater on Sculptured Rocks Road by upgrading the three 5-foot steel culverts with 10-foot concrete box culverts. The Administrative Assistant and Road Agent have applied for a Hazard Mitigation Grant to try to obtain funding for this project. This project is also affected by the July 2019 storm, when one of these culverts became 100% blocked. HSEM & FEMA are working with the town for FEMA assistance.	Inland Flooding	Highway Department & Selectboard	Local & Grants	**Long Term** (3-5 years: 37-60 months)	**High Cost** ($10,000 or more)
3-2	***Problem Statement:*** *Ten culverts on River Road do not effectively handle the flow of stormwater and cause local flooding and road washouts.* **Action Item #31:** Improve the flow of stormwater on River Road by upgrading the ten underperforming/aging 18"-24" metal culverts with 18"-24" plastic culverts. The Road Agent will replace with larger ones where possible **(F13).**	Inland Flooding	Highway Department & Selectboard	Local & Grants	**Long Term** (3-5 years: 37-60 months)	**High Cost** ($10,000 or more) (for all ten culverts)
3-3	***Problem Statement:*** *Four culverts on North Groton Road do not effectively handle the flow of stormwater and cause local flooding and road washouts.* ***Action Item #32:*** Improve the flow of stormwater on the North Groton Road by upgrading the four underperforming/aging 18" metal culverts with four 18" plastic culverts. The Road Agent will replace with larger ones where possible (located between Halls Brook and Nedeau Lane) **(F13).**	Inland Flooding	Highway Department & Selectboard	Local & Grants	**Long Term** (3-5 years: 37-60 months)	**Medium Cost** ($1,000 - $10,000)
3-4	***Problem Statement:*** *One large culvert on North Groton Road does not effectively handle the flow of stormwater and cause local flooding and road washouts.* ***Action Item #33:*** Improve the flow of stormwater on North Groton Road by upgrading the 7-foot round metal culvert with a 10-foot box culvert **(F13).**	Inland Flooding	Highway Department & Selectboard	Local & Grants	**Long Term** (3-5 years: 37-60 months)	**High Cost** ($10,000 or more)
3-5	***Problem Statement:*** *The Town of Groton is anticipating the building of a new Groton Town Garage. The current Town Garage has a portable generator but the facility is located in the floodplain. A permanent generator should be included in new building plans for the Town Garage.* **Action Item #34:** Include plans to install a permanent generator for a new Town Garage to ensure functionality at the time of an emergency **(MU13)** **(Tables 6.1 & 7.1).**	All Hazards	Selectboard, Emergency Management Director & Highway Department	Local	**Long Term** (3-5 years: 37-60 months)	**High Cost** ($10,000 or more)
3-6	***Problem Statement:*** *There are areas of Groton with poor or no cell service.* **Action Item #35:** Entice cell companies to come to Groton to provide better cell coverage for the community and to improve the overall communications capabilities of emergency responders **(Table 7.1).**	All Hazards	Selectboard	Local	**Long Term** (3-5 years: 37-60 months)	**Low Cost** ($0 - $1,000 or staff time only)

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 and will incorporate periodic monitoring and evaluation mechanisms to allow for review of successes and failures or even just simple updates.

The Groton Hazard Mitigation Plan Update 2020 is considered a work in progress. There are three situations which will prompt revisiting this plan:

- *First, as a minimum, it will be reviewed annually or after any emergency event to assess whether the existing and suggested mitigation action items were successful. This review will focus on the assessment of the plan's effectiveness, accuracy and completeness in monitoring of the implementation action items. The review will also address recommended improvements to the plan as contained in the FEMA plan review checklist and address any weaknesses the town identified that the plan did not adequately address.*

- *Second, the plan will be thoroughly updated every five years.*

- *Third, if the town adopts any major modifications to its land use planning documents, the jurisdiction will conduct a plan review and make changes as applicable.*

In keeping with the process of adopting this hazard mitigation plan, the public and stakeholders will have the opportunity for future involvement as they will be invited to participate in any and all future reviews or updates of this plan. Public notice before any review or update will be given by such means as: press releases in local papers, using available social media, posting meeting information on the town website and at the Town Offices, sending letters to federal, state and local organizations impacted by the plan and posting notices in public places in the town. This will ensure that all comments and revisions from the public and stakeholders will be considered. The Emergency Management Director is responsible for initiating plan reviews and will consult with members of the hazard mitigation planning team identified in this plan.

Concurrence forms to be used for post-hazard or annual reviews are available in Chapter 11 of this plan. The town is encouraged to use these forms to document any changes and accomplishments since the development of this plan. Forms are available for years 1-4, with expectation that the five-year annual update will be in process during the fifth year.

B. Integration with Other Plans

This plan will only enhance mitigation if balanced with all other town plans. Groton completed its last hazard mitigation plan in 2014 and has completed many of projects from that plan. Examples of these can be found in Table 7.1 and include items such as providing ongoing fire and flood education, improving culverts on Sculptured Rocks Road and becoming NIMS/ICS compliant. The town was able to integrate these actions into other town activities, budgets, plans and mechanisms.

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

GROTON MASTER PLAN

Traditionally, Master Plans are updated every 5 to 10 years and detail the use of capital reserves funds and capital improvements within the town. A complete update of the Groton's Master Plan was completed in 2017 and is due for a recommended update in 2027. Future updates of the Master Plan will include a Natural Hazards section and will integrate concepts, ideas and action items from this Hazard Mitigation Plan including a discussion on climate change. **(Action Item #7)**

GROTON EMERGENCY OPERATIONS PLAN 2010 (EOP)

The EOP is designed to allow the town to respond more effectively to disasters as well as mitigate the risk to people and property. EOPs are generally reviewed after each hazardous event and updated on a five-year basis. The last Groton EOP was completed in 2010. An update for the Emergency Operations Plan is expected to be completed in 2020 or 2021. The new EOP will include elements from this hazard mitigation plan. **(Action Items #20)**

TOWN BUDGET & CAPITAL RESERVE FUNDS

The Town of Groton maintains Capital Reserve Funds (CRF) for major expenditures. The Capital Reserve Fund is adjusted annually in coordination with the Selectboard and the town's department heads at budget time. The budget is then voted on at the annual Town Meeting. During the annual budget planning process, specific mitigation actions identified in this plan that require town fiscal support will be reviewed for incorporation into the budget. **Refer to those Action Items that require local money or match money (multiple action items) or address the CRF.**

THE GROTON ORDINANCES & SUBDIVISION REGULATIONS

As time goes by and the needs of the town change, the town's planning mechanisms will be reviewed and updated. In coordination with these actions, the Planning Board will review this plan and incorporate any changes that help mitigate the susceptibility of the community and its citizens 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 Items #22, #26, #27 & #28)**

The local governments will modify other plans and actions as necessary to incorporate hazard and/or wildfire issues. The Selectboard ensures this process will be followed in the future. In addition, the town will review and make note of instances when this has been done and include it as part of their annual review of the plan.

C. PLAN APPROVAL & ADOPTION

This plan was completed in a series of open meetings beginning on December 26, 2018. The plan was presented to the town for review, submitted to HSEM for Conditional Approval *(APA, Approved Pending Adoption)*, formally adopted by the Selectboard and resubmitted to HSEM for Final Approval. Once Final Approval from HSEM was met, copies of the plan were distributed to the town, HESM, FEMA, DNCR and the USDA-FS; the plan was then distributed as these entities saw fit. Copies of the plan remain on file at Mapping and Planning Solutions (MAPS) in both digital and paper format.

Chapter 11: Signed Community Documents and Approval Letters

A. Planning Scope of Work & Agreement

Planning Scope of Work & Agreement

Hazard Mitigation Plan

PARTIES TO THE AGREEMENT
Mapping and Planning Solutions
Town of Groton, NH

Current Plan Expiration: 6/16/19
PDM Grant Expiration: 1/30/2021

This Agreement between the Town of Groton (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 in order to produce the 2019 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 that are the result of 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 is received from FEMA. When adopted, the Plan provides guidance to the Town, commissions, and departments; adopted plans serve as a guide and do not include any financial commitments by the Town. Additionally, all adopted plans should address mitigation strategies for reducing the risk of natural, man-made, 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 from community members.
- With the assistance of the Team, MAPS will coordinate and facilitate meetings and provide any materials, handouts and maps necessary to provide a full understanding of each step in the planning process.

- MAPS will assist the Team in the development of goals, objectives and implementation strategies and clearly define the processes needed for future 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 prior to submitting the Plan to FEMA for conditional approval. Upon conditional approval by FEMA, MAPS will assist the planning team as needed with presentation of the Plan to the Groton Selectboard and/or Planning Board and continue to work with the Town until final approval and distribution of the Plan is complete, unless extraordinary circumstances prevail.

- MAPS shall provide, at its office, all supplies and space necessary to complete the Groton Hazard Mitigation Plan.

- After final approval is received from FEMA, MAPS will provide the Town with a two copies of the Plan containing all signed documents, approvals and GIS maps along with 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. CD copies of the Plan will be distributed by MAPS to collaborating agencies including, but not limited to, NH Homeland Security (HSEM) and FEMA.

- MAPS will provide Plan maintenance reminders and assistance on an annual basis leading up to the next five-year plan update at no cost to the Town, if requested by the Town.

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

- The Town shall insure that the Planning Team includes members who are able to support the planning process by identifying available Town resources including people who will have access to and can 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 Selectboard 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 lead 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 flyers, and placement of meeting announcements. In addition, this contact shall 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.

- The proposed Plan shall be submitted to the Selectboard and/or Planning Board for consideration and adoption.

- After adoption and final approval from FEMA 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 insure citizen awareness.*
  - *Urge the Planning Board to incorporate 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 $6,999.75; an invoice will be sent to the Town for each payment as outlined below.

  - 1. Initial payment upon signing of this contract and receipt of first invoice $3,500.00
  - 2. Second payment upon Plan submittal to FEMA for Conditional Approval.....$3,300.00
  - 3. Final payment upon project completion and receipt of final Plan copy $199.75

  Total Fees.....$6,999.75

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

  - MAPS will invoice the Town
  - 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.

- **Required Matching Funds:** The Town of Groton will be responsible to provide and document any and all resources to be used to meet the FEMA required matching funds in the amount of $2,333.25. Matching funds are the responsibility of the Town of Groton, not MAPS. Mapping and Planning Solutions will however 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 project's end for the Town to use in its match fulfillment.

- **Project Period:** This project shall begin upon signing this Agreement by both parties 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 is dependent upon timely adoptions and approvals which may be outside of the control of MAPS and the Town. It is anticipated that five or six two-hour meetings will be required to gather the necessary information to create the updated the Plan.

  The grant provided for this project is funded through PDM17; per the grant agreement between the Town and HSEM, all work must be completed by January 30, 2021. It is expected that this project will be completed long before the grant expiration date of January 30, 2021.

- **Ownership of Material:** All maps, reports, documents and other materials produced during the project period shall be owned by the Town; 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 in a diligent and efficient manner according to the terms of this Agreement. MAPS' responsibilities under this Agreement depend upon the cooperation of the Town of Groton. 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 FEMA, relieve MAPS of content liability. Mapping and Planning Solutions carries annual general liability insurance.

- **Amendments**: Changes, alterations or additions to this Agreement may be made if agreed to in writing between both the Town of Groton 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 forty Hazard Mitigation Plans, more than forty five 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

- **Contacts:**

<u>**For Mapping & Planning Solutions**</u>

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

<u>**For the Town**</u>

Sara Moores
Administrative Assistant
Town of Groton
754 North Groton Road
Groton, NH 03241
selectmen@grotonnh.org
(603)744-9190

Signature below indicates acceptance of and Agreement to details outlined in this Agreement

FOR THE TOWN OF GROTON, NH

Signature

John Rosciano, Selectman; Ron Madan; Kyle Andrews
Printed Name/Title

12/04/2018
Date

FOR MAPPING AND PLANNING SOLUTIONS

June E. Garneau
Signature
June Garneau, Owner
December 3, 2018

Signatures are scanned facsimiles, original signatures are on file.

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B. Approved Pending Adoption (APA) & Formal Approval Emails from HSEM

APA from HSEM

Groton, NH - Approvable Pending Adoption

Hazard Mitigation Planning <HazardMitigationPlanning@dos.nh.gov>

Sent: Thu 2/6/2020 9:57 AM
To: June Garneau; 'johnrescigno1@gmail.com'; 'w6oaks@live.com'
Cc: Hatch, Paul; Welch, Whitney

Good morning,

The Department of Safety, Division of Homeland Security & Emergency Management (HSEM) has completed its review of the Groton, NH Hazard Mitigation Plan and found it approvable pending adoption. Congratulations on a job well done!

With this approval, the jurisdiction meets the local mitigation planning requirements under 44 CFR 201 **pending HSEM's receipt of electronic copies of the adoption documentation and the final plan**.

Acceptable electronic formats include Word or PDF files and must be submitted to us via email at HazardMitigationPlanning@dos.nh.gov. Upon HSEM's receipt of these documents, notification of formal approval will be issued, along with the final Checklist and Assessment.

The approved plan will be submitted to FEMA on the same day the community receives the formal approval notification from HSEM. FEMA will then issue a Letter of Formal Approval to HSEM for dissemination that will confirm the jurisdiction's eligibility to apply for mitigation grants administered by FEMA and identify related issues affecting eligibility, if any. If the plan is not adopted within one calendar year of HSEM's Approval Pending Adoption, the jurisdiction must update the entire plan and resubmit it for HSEM review. If you have questions or wish to discuss this determination further, please contact me at Kayla.Henderson@dos.nh.gov or 603-223-3650.

Thank you for submitting the Groton, NH Hazard Mitigation Plan and again, congratulations on your successful community planning efforts.

Sincerely,

Kayla J. Henderson
NH Department of Safety – Division of Homeland Security & Emergency Management
Hazard Mitigation Planning

Hazard Mitigation Staff:
Kayla Henderson, State Hazard Mitigation Planner / Kayla.Henderson@dos.nh.gov / (603) 223 3650

Formal Approval from HSEM

Groton, NH - Local Hazard Mitigation Plan - Formal Approval

Hazard Mitigation Planning <HazardMitigationPlanning@dos.nh.gov>

Sent: Fri 2/28/2020 11:36 AM
To: June Garneau; 'johnrescigno1@gmail.com'; 'w6oaks@live.com'
Cc: Welch, Whitney; Hatch, Paul

Message | Groton NH Final Local Mitigation Plan Review Tool.pdf (726 KB)

Good morning,

Congratulations! The Town of Groton's Local Hazard Mitigation Plan has received **Formal Approval** as of today, **February 28, 2020**. This State Formal Approval is based upon the New Hampshire Department of Safety, Division of Homeland Security & Emergency Management's (HSEM) determination that the community's Local Hazard Mitigation Plan successfully met the requirements of 44 C.F.R Pt. 201. A copy of the adopted plan has been submitted to the Federal Emergency Management Agency (FEMA) for their records.

Please find the Final Local Mitigation Plan Review Tool attached. The Town of Groton will receive a copy of FEMA's Formal Approval Letter reflecting the approval date identified above within the next few weeks.

Thank you for your continued dedication to hazard mitigation!

Kayla J. Henderson
NH Department of Safety – Division of Homeland Security & Emergency Management
Hazard Mitigation Planning

The above images are "snips" of emails

C. SIGNED CERTIFICATE OF ADOPTION

CERTIFICATE OF ADOPTION

GROTON, NH

SELECTBOARD

A RESOLUTION ADOPTING THE TOWN OF GROTON HAZARD MITIGATION PLAN UPDATE 2020

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

WHEREAS, the Town of Groton has developed and received conditional approval from the Homeland Security & Emergency Management (HSEM) for its Hazard Mitigation Plan Update 2020 under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held between December 4, 2018 and July 2, 2019 regarding the development and review of the Hazard Mitigation Plan Update 2020 and

WHEREAS, the plan specifically addresses hazard mitigation strategies and plan maintenance procedure for the Town of Groton; and

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

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

RESOLVED by the Selectboard:

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

Groton, 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 a period of five (5) years from the date of this resolution;

4. An annual report on the progress of the implementation elements of the plan shall be presented to the Selectboard by the Emergency Management Director.

Adopted this day, the 18 **of** Feb **, 2020**

Chairman of the Selectboard

Signature

John Rosenquist

Print Name

Member of the Selectboard

Signature

Ronald A MacMillan

Print Name

Member of the Selectboard

Signature

Tony Albert

Print Name

Emergency Management Director

Signature

William H. Oakley

Print Name

IN WITNESS WHEREOF, the undersigned has affixed his/her signature and the corporate seal of the Town of Groton on this day, 18th, 2020

Notary

RUTH E. MILLETT, Notary Public
State of New Hampshire
My Commission Expires May 4, 2021

Expiration

02-18-2020

Date

Signatures are scanned facsimile, original signatures are on file.

D. Formal Approval Letter FEMA

U.S. Department of Homeland Security
FEMA Region I
99 High Street, Sixth Floor
Boston, MA 02110-2132

FEMA

MAR 1 1 2020

Kayla Henderson, State Hazard Mitigation Planner
New Hampshire Department of Safety, Homeland Security and Emergency Management
33 Hazen Drive
Concord, New Hampshire 03303

Dear Ms. Henderson:

As outlined in the FEMA-State Agreement for FEMA-DR-4457, your office has been delegated the authority to review and approve local mitigation plans under the Program Administration by States Pilot Program. Our Agency has been notified that your office completed its review of the Groton Hazard Mitigation Plan Update 2020 and approved it effective **February 28, 2020** through **February 27, 2025** in accordance with the planning requirements of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended, the National Flood Insurance Act of 1968, as amended, and Title 44 Code of Federal Regulations (CFR) Part 201.

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

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

Thank you for your continued commitment and dedication to risk reduction demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please contact Melissa Surette at (617) 956-7559 or Melissa.Surette@fema.dhs.gov.

Sincerely,

Captain W. Russ Webster, USCG (Ret.), CEM
Regional Administrator
FEMA Region I

WRW:ms

cc: Fallon Reed, Chief of Planning, New Hampshire

Signatures are scanned facsimile, original signatures are on file.

E. CWPP Approval Letter from DNCR

Groton, NH
A Resolution Approving the
Groton Hazard Mitigation Plan Update 2020
As a Community Wildfire Protection Plan

Several public meetings and committee meetings were held between December 4, 2018 and July 2, 2019 regarding the development and review of the Groton Hazard Mitigation Plan Update 2020. The Groton Hazard Mitigation Plan Update 2020 contains potential future projects to mitigate hazard and wildfire damage in the Town of Groton.

The Hebron Fire Chief along with the Groton Selectboard and the Groton Emergency Management Director desire that this plan and 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 Groton Selectboard, the Groton Emergency Management Director and the Hebron Fire Chief approve the Groton Hazard Mitigation Plan Update 2020 and understand that with approval by DNCR, this plan will also serve as a Community Wildfire Protection Plan.

For the Town of Groton

APPROVED and SIGNED this day, 03/18/, 2020.

Chairman of the Selectboard — John Rescigno, Printed Name

Fire Chief (Hebron) — Fischer, John M., Printed Name

Emergency Management Director — William H. Oakley, Printed Name

For the Department of Natural & Cultural Resources (DNCR)

APPROVED and SIGNED this day, March 3rd, 2020.

Forest Ranger – NH Division of Forest and Lands, DNCR

APPROVED and SIGNED this day, March 5th, 2020.

Director – NH Division of Forest and Lands, DNCR

Signatures are scanned facsimile, original signatures are on file.

F. ANNUAL REVIEW OR POST HAZARD CONCURRENCE FORMS

YEAR ONE

CHECK ALL THAT APPLY

☐ Annual Review & Concurrence - **Year One**: _____ (Date)

☐ Annual Review & Concurrence – Post Hazardous Event: _____ (Event/Date)

☐ Annual Review & Concurrence – Post Hazardous Event: _____ (Event/Date)

The Town of Groton, NH shall execute this page annually by the members of the town's governing body and the town's designated Emergency Management Director after inviting the public to attend any and all hearings that pertain to this annual and/or post hazard review and/or update by means such as press releases in local papers, posting meeting information on the town website and at the Town Offices, sending letters to federal, state local organizations impacted by the plan posting notices in public places in the town.

Groton, NH
Hazard Mitigation Plan Update

REVIEWED AND APPROVED

DATE: _____

SIGNATURE: _____

PRINTED NAME: _____

Emergency Management Director

CONCURRENCE OF APPROVAL

SIGNATURE: _____

PRINTED NAME: _____

Chairman of the Selectboard

Changes and notes regarding the 2020 Hazard Mitigation Plan Update

_____

_____

_____

_____

Please use reverse side for additional notes ➡

Additional Notes – Year One:

YEAR TWO

CHECK ALL THAT APPLY

☐ Annual Review & Concurrence - **Year Two**: _____ (Date)

☐ Annual Review & Concurrence – Post Hazardous Event: _____ (Event/Date)

☐ Annual Review & Concurrence – Post Hazardous Event: _____ (Event/Date)

The Town of Groton, NH shall execute this page annually by the members of the town's governing body and the town's designated Emergency Management Director after inviting the public to attend any and all hearings that pertain to this annual and/or post hazard review and/or update by means such as press releases in local papers, posting meeting information on the town website and at the Town Offices, sending letters to federal, state local organizations impacted by the plan posting notices in public places in the town.

Groton, NH
Hazard Mitigation Plan Update

REVIEWED AND APPROVED

DATE: _____

SIGNATURE: _____

PRINTED NAME: _____

Emergency Management Director

CONCURRENCE OF APPROVAL

SIGNATURE: _____

PRINTED NAME: _____

Chairman of the Selectboard

Changes and notes regarding the 2020 Hazard Mitigation Plan Update

_____

_____

_____

_____

_____

_____

Please use reverse side for additional notes ➡

Additional Notes – Year Two:

YEAR THREE

CHECK ALL THAT APPLY

☐ Annual Review & Concurrence - **Year Three**: _____ (Date)

☐ Annual Review & Concurrence – Post Hazardous Event: _____ (Event/Date)

☐ Annual Review & Concurrence – Post Hazardous Event: _____ (Event/Date)

The Town of Groton, NH shall execute this page annually by the members of the town's governing body and the town's designated Emergency Management Director after inviting the public to attend any and all hearings that pertain to this annual and/or post hazard review and/or update by means such as press releases in local papers, posting meeting information on the town website and at the Town Offices, sending letters to federal, state local organizations impacted by the plan posting notices in public places in the town.

Groton, NH
Hazard Mitigation Plan Update

REVIEWED AND APPROVED

DATE: _____

SIGNATURE: _____

PRINTED NAME: _____

Emergency Management Director

CONCURRENCE OF APPROVAL

SIGNATURE: _____

PRINTED NAME: _____

Chairman of the Selectboard

Changes and notes regarding the 2020 Hazard Mitigation Plan Update

_____

_____

_____

_____

_____

_____

Please use reverse side for additional notes ➡

Additional Notes – Year Three:

YEAR FOUR

CHECK ALL THAT APPLY

☐ Annual Review & Concurrence - **Year Four**: _____ (Date)

☐ Annual Review & Concurrence – Post Hazardous Event: _____ (Event/Date)

☐ Annual Review & Concurrence – Post Hazardous Event: _____ (Event/Date)

The Town of Groton, NH shall execute this page annually by the members of the town's governing body and the town's designated Emergency Management Director after inviting the public to attend any and all hearings that pertain to this annual and/or post hazard review and/or update by means such as press releases in local papers, posting meeting information on the town website and at the Town Offices, sending letters to federal, state local organizations impacted by the plan posting notices in public places in the town.

Groton, NH
Hazard Mitigation Plan Update

REVIEWED AND APPROVED

DATE: _____

SIGNATURE: _____

PRINTED NAME: _____

Emergency Management Director

CONCURRENCE OF APPROVAL

SIGNATURE: _____

PRINTED NAME: _____

Chairman of the Selectboard

Changes and notes regarding the 2020 Hazard Mitigation Plan Update

_____

_____

_____

_____

_____

_____

Please use reverse side for additional notes ➡

Additional Notes – Year Four:

Chapter 12: Appendices

- APPENDIX A: BIBLIOGRAPHY
- APPENDIX B: TECHNICAL AND FINANCIAL ASSISTANCE FOR HAZARD MITIGATION
  - *Hazard Mitigation Grant Program (HMGP)*
  - *Pre-Disaster Mitigation (PDM)*
  - *Flood Mitigation Assistance (FMA)*
  - *Repetitive Flood Claims (RFC)*
  - *Severe Repetitive Loss (SRL)*
- 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**
    - Groton Hazard Mitigation Plan, 2014
    - Franconia Hazard Mitigation Plan, 2019
    - Ashland Hazard Mitigation Plan, 2019
    - Bath Hazard Mitigation Plan, 2019
- **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*
- **NH Division of Forests and Lands Quarterly Update**
    - *http://www.nhdfl.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, July 2019; Community Response for Groton, Received, 6/13/17, Census 2000 and Revenue Information derived from this site;
    - *http://www.nhes.nh.gov/elmi/products/cp/profiles-htm/Groton.htm*

Photos

- Photos taken by MAPS unless otherwise noted.

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*
- Wildfire Preparedness Guide to Forest Wardens; *www.quickseries.com*
- Ready Set Go; *www.wildlandfires.org*
- Fire education for children; *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*
- 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*
- Center for Disease Control; *https://www.cdc.gov/disasters/winter/index.html*
- Slate; *http://www.slate.com/id/2092969/*
- NH Office Strategic Initiatives; *http://www.nh.gov/osi/*
- 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*
- Federal Aviation Administration; *http://faa.custhelp.com*
- US Legal, Inc.; *http://definitions.uslegal.com/v/violent-crimes/*

APPENDIX B: TECHNICAL & FINANCIAL ASSISTANCE FOR HAZARD MITIGATION

FEMA's Hazard Mitigation Assistance (HMA) grant programs provide funding FEMA's Hazard Mitigation Assistance (HMA) grant programs provide funding for eligible mitigation activities that reduce disaster losses and protect life and property from future disaster damages. Currently, FEMA administers the following HMA grant programs[26]:

- Hazard Mitigation Grant Program (HMGP)
- Pre-Disaster Mitigation (PDM)
- Flood Mitigation Assistance (FMA)
- Repetitive Flood Claims (RFC)
- Severe Repetitive Loss (SRL)

FEMA's HMA grants are provided to eligible applicants (states/tribes/territories) that, in turn, provide sub-grants to local governments and communities. The applicant selects and prioritizes subapplications developed and submitted to them by subapplicants. These subapplications are submitted to FEMA for consideration of funding.

Prospective subapplicants should consult the office designated as their applicant for further information regarding specific program and application requirements. Contact information for the FEMA Regional Offices and State Hazard Mitigation Officers is available on the FEMA website, www.fema.gov.

HMA Grant Programs

The HMA grant programs provide funding opportunities for pre- and post-disaster mitigation. While the statutory origins of the programs differ, all share the common goal of reducing the risk of loss of life and property due to natural hazards. Brief descriptions of the HMA grant programs can be found below.

A. Hazard Mitigation Grant Program (HMGP)

HMGP assists in implementing long-term hazard mitigation measures following Major Disaster Declarations. Funding is available to implement projects in accordance with state, tribal and local priorities.

Table 3: Eligible Activities by Program

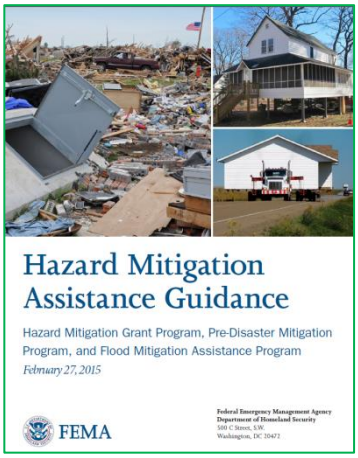
Eligible Activities	HMGP	PDM	FMA
1. Mitigation Projects	✓	✓	✓
Property Acquisition and Structure Demolition	✓	✓	✓
Property Acquisition and Structure Relocation	✓	✓	✓
Structure Elevation	✓	✓	✓
Mitigation Reconstruction	✓	✓	✓
Dry Floodproofing of Historic Residential Structures	✓	✓	✓
Dry Floodproofing of Non-residential Structures	✓	✓	✓
Generators	✓	✓	
Localized Flood Risk Reduction Projects	✓	✓	✓
Non-localized Flood Risk Reduction Projects	✓	✓	
Structural Retrofitting of Existing Buildings	✓	✓	✓
Non-structural Retrofitting of Existing Buildings and Facilities	✓	✓	✓
Safe Room Construction	✓	✓	
Wind Retrofit for One- and Two-Family Residences	✓	✓	
Infrastructure Retrofit	✓	✓	✓
Soil Stabilization	✓	✓	✓
Wildfire Mitigation	✓	✓	
Post-Disaster Code Enforcement	✓		
Advance Assistance	✓		
5 Percent Initiative Projects	✓		
Miscellaneous/Other[1]	✓	✓	✓
2. Hazard Mitigation Planning	✓	✓	✓
Planning Related Activities	✓		
3. Technical Assistance			✓
4. Management Cost	✓	✓	✓

[1] Miscellaneous/Other indicates that any proposed action will be evaluated on its own merit against program requirements. Eligible projects will be approved provided funding is available.

Eligibility Chart taken from Hazard Mitigation Assistance Guidance, February 27, 2015

[26] Information in Appendix B is taken from the following website and links to specific programs unless otherwise noted http://www.fema.gov/media-library-data/1424983165449-38f5dfc69c0bd4ea8a161e8bb7b79553/HMA_Guidance_022715_508.pdf

What is the Hazard Mitigation Grant Program?



The Hazard Mitigation Grant Program (HMGP) provides grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration. Authorized under Section 404 of the Stafford Act and administered by FEMA, HMGP was created to reduce the loss of life and property due to natural disasters. The program enables mitigation measures to be implemented during the immediate recovery from a disaster.

Who is eligible to apply?

Hazard Mitigation Grant Program funding is only available to applicants that reside within a presidentially declared disaster area. Eligible applicants are

- State and local governments
- Indian tribes or other tribal organizations
- Certain non-profit organizations

Individual homeowners and businesses may not apply directly to the program; however a community may apply on their behalf.

How are potential projects selected and identified?

The state's administrative plan governs how projects are selected for funding. However, proposed projects must meet certain minimum criteria. These criteria are designed to ensure that the most cost-effective and appropriate projects are selected for funding. Both the law and the regulations require that the projects are part of an overall mitigation strategy for the disaster area.

The state prioritizes and selects project applications developed and submitted by local jurisdictions. The state forwards applications consistent with state mitigation planning objectives to FEMA for eligibility review. Funding for this grant program is limited and states and local communities must make difficult decisions as to the most effective use of grant funds.

B. Pre-Disaster Mitigation (PDM)

PDM provides funds on an annual basis for hazard mitigation planning and the implementation of mitigation projects prior to a disaster. The goal of the PDM program is to reduce overall risk to the population and structures, while at the same time, also reducing reliance on federal funding from actual disaster declarations.

Program Overview

The Pre-Disaster Mitigation (PDM) program provides funds to states, territories, Indian tribal governments, communities and universities for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event.

Funding these plans and projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations. PDM grants are to be awarded on a competitive basis and without reference to state allocations, quotas, or other formula-based allocation of funds.

C. Flood Mitigation Assistance (FMA)

FMA provides funds on an annual basis so that measures can be taken to reduce or eliminate risk of flood damage to buildings insured under the National Flood Insurance Program.

Program Overview

The FMA program was created as part of the National Flood Insurance Reform Act (NFIRA) of 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP).

FEMA provides FMA funds to assist states and communities implement measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes and other structures insurable under the National Flood Insurance Program.

Types of FMA Grants

Three types of FMA grants are available to states and communities:

Planning Grants to prepare Flood Mitigation Plans. Only NFIP-participating communities with approved Flood Mitigation Plans can apply for FMA Project grants.

Project Grants to implement measures to reduce flood losses, such as elevation, acquisition, or relocation of NFIP-insured structures. States are encouraged to prioritize FMA funds for applications that include repetitive loss properties; these include structures with 2 or more losses each with a claim of at least $1,000 within any ten-year period since 1978.

Technical Assistance Grants for the state to help administer the FMA program and activities. Up to ten percent (10%) of project grants may be awarded to states for Technical Assistance Grants

D. Repetitive Flood Claims (RFC)

RFC provides funds on an annual basis to reduce the risk of flood damage to individual properties insured under the NFIP that have had one or more claim payments for flood damages. RFC provides up to 100% federal funding for projects in communities that meet the reduced capacity requirements.

Program Overview

The Repetitive Flood Claims (RFC) grant program was authorized by the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004 (P.L. 108–264), which amended the National Flood Insurance Act (NFIA) of 1968 (42 U.S.C. 4001, et al).

Up to $10 million is available annually for FEMA to provide RFC funds to assist states and communities reduce flood damages to insured properties that have had one or more claims to the National Flood Insurance Program (NFIP).

Federal / Non-Federal Cost Share

FEMA may contribute up to 100 percent of the total amount approved under the RFC grant award to implement approved activities, if the applicant has demonstrated that the proposed activities cannot be funded under the Flood Mitigation Assistance (FMA) program.

E. Severe Repetitive Loss (SRL)

SRL provides funds on an annual basis to reduce the risk of flood damage to residential structures insured under the NFIP that are qualified as severe repetitive loss structures. SRL provides up to 90% federal funding for eligible projects.

Program Overview

The Severe Repetitive Loss (SRL) grant program was authorized by the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004, which amended the National Flood Insurance Act of 1968 to provide funding to reduce or eliminate the long-term risk of flood damage to severe repetitive loss (SRL) structures insured under the National Flood Insurance Program (NFIP).

Definition

The definition of severe repetitive loss as applied to this program was established in section 1361A of the National Flood Insurance Act, as amended (NFIA), 42 U.S.C. 4102a. An SRL property is defined as a **residential property** that is covered under an NFIP flood insurance policy and:

(a) That has at least four NFIP claim payments (including building and contents) over $5,000 each and the cumulative amount of such claims payments exceeds $20,000; or

(b) For which at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building.

For both (a) and (b) above, at least two of the referenced claims must have occurred within any ten-year period and must be greater than 10 days apart.

Purpose

To reduce or eliminate claims under the NFIP through project activities that will result in the greatest savings to the National Flood Insurance Fund (NFIF).

Federal / Non-Federal cost share

75/25%; up to 90% federal cost-share funding for projects approved in states, territories and federally-recognized Indian tribes with FEMA-approved Standard or Enhanced Mitigation Plans or Indian tribal plans that include a strategy for mitigating existing and future SRL properties.

For further information all of these programs, please refer to the new FEMA Hazard Mitigation Assistance Guidance:

http://www.fema.gov/media-library-data/1424983165449-38f5dfc69c0bd4ea8a161e8bb7b79553/HMA_Guidance_022715_508.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 the winter months and can cause loss of life, property damage and tree damage.

Snowstorms

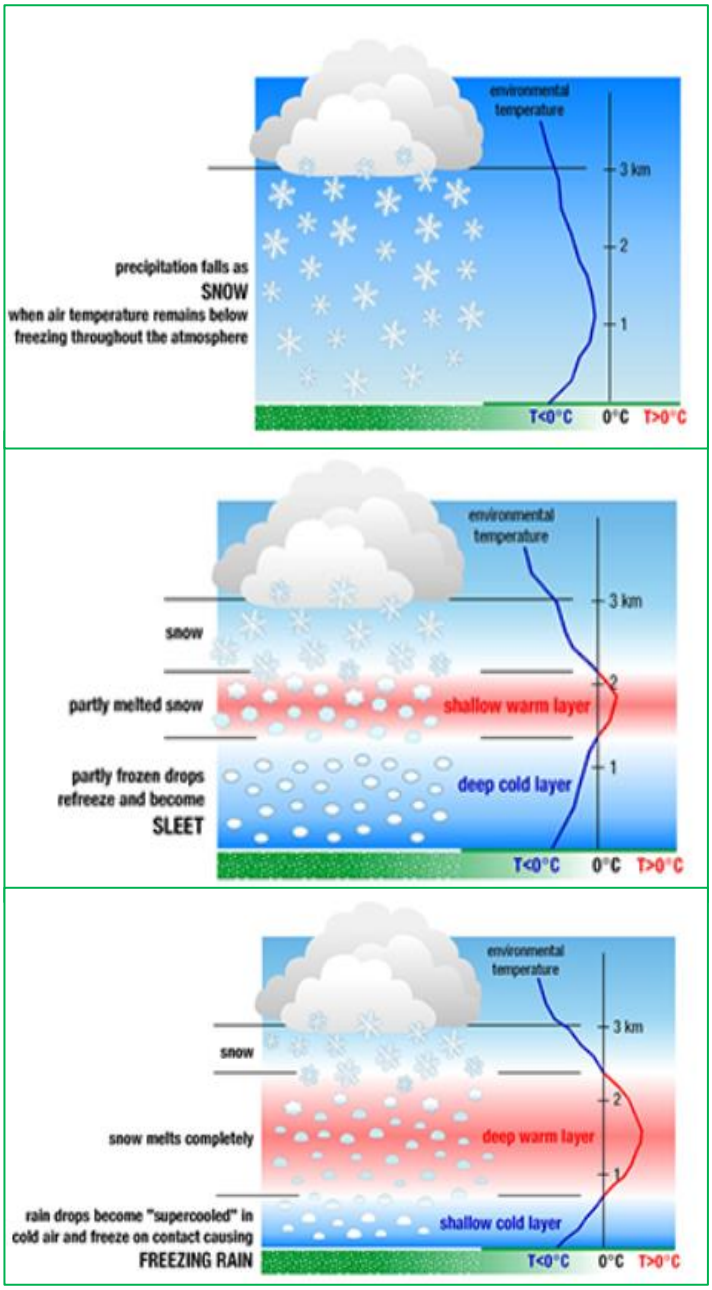
A winter storm can range from moderate snow to blizzard conditions. Blizzard conditions are considered blinding wind-driven snow over 35 mph that lasts several days. A severe winter storm deposits four or more inches of snow during a 12-hour period or six inches of snow during a 24-hour period.

Sleet

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

Freezing Rain & Ice Storms

Snowflakes melt completely as they fall through a warm band of air 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 that is below 32 degrees Fahrenheit. This freezing creates accumulations of ice on roads, trees, utility lines and other objects resulting in what we think of as an “ice storm”. “Ice coating at least one-fourth inch in thickness is heavy enough to damage trees, overhead wires and similar objects.”[27]



Types of Severe Winter Weather
NOAA – National Severe Storms Laboratory

[27] 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.[28]

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

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

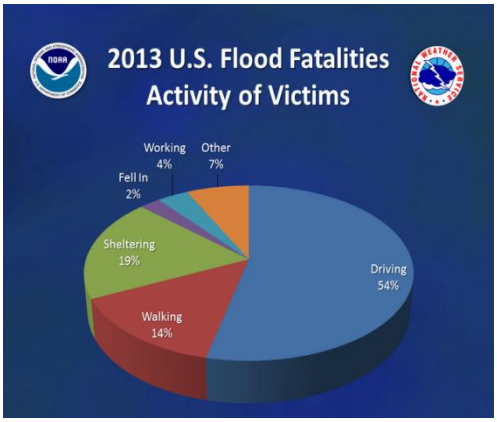
(Categories of damage are based upon combinations of precipitation totals, temperatures and wind speeds/directions.)

*INLAND FLOODING

General Flooding Conditions

Floods are defined as a temporary overflow of water onto lands that are not normally covered by water. Flooding results from the overflow of major rivers and tributaries, storm surges and/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 the increase in rainfall and melting of snow; however, floods can occur at any time of the year. 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 conditions for flooding. In addition, rising waters in early spring often breaks ice into chunks that float downstream and pile up, causing flooding behind them. Small rivers and streams pose special flooding risks because they are easily blocked by jams. Ice in riverbeds and against structures presents a significant flooding threat to bridges, roads and the surrounding lands.



[28] The Weather Channel, http://www.weather.com/news/weather-winter/rating-ice-storms-damage-sperry-piltz-20131202

Flooding (Dam Failure)

Flooding as a result of dam failure can be small enough to only affect the immediate area of the dam, or large enough to cause catastrophic results to cities, towns and human life that is below the dam. The extent of flooding depends largely on the size of the dam, the amount of water that is being held by the dam, the size of the breach, the amount of water flow from the dam and the amount of human habitation that is downstream.

A "Dam" means any artificial barrier, including appurtenant works, which impounds or diverts water, and which has a height of 4 feet or more, or a storage capacity of 2 acre-feet or more, or is located at the outlet of a great pond[1]. A dam failure occurs when water overtops the dam, or there is structural failure of the dam which causes there to be a breech and an unintentional release of water. Dams are classified in the following manner[29]:

Classification	Description	Inspection Intervals
Non-Menace	A dam that is not a menace because it is in a location and of a size that failure or misoperation of the dam would not result in probable loss of life or loss to property 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 6 years
Low Hazard	A dam that has a low hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in no possible loss of life, low economic loss to structures or property, structural damage to a town or city road or private road accessing property other than the dam owner's that could render the road impassable or otherwise interrupt public safety services, the release of liquid industrial, agricultural, or commercial wastes, septage, or contained sediment if the storage capacity is less two-acre-feet and is located more than 250 feet from a water body or water course, and/or reversible environmental losses to environmentally-sensitive sites.	Every 6 years
Significant Hazard	A dam that has a significant hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in no probable loss of lives; however, there would be 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 2 acre-feet or more; or damage to an environmentally-sensitive site that does not meet the definition of reversible environmental losses.	Every 4 years
High Hazard	A dam that has a high hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in probable loss of human life as well as a result of; water levels and velocities causing the structural failure of a foundation of a habitable residential structure or commercial or industrial structure which is occupied under normal conditions; water levels rising above the first floor elevation of a habitable residential structure or a commercial or industrial structure, which is occupied under normal conditions when the rise due to a dam failure is greater than one foot; structural damage to an interstate highway, which could render the roadway impassable or otherwise interrupt public safety services; the release of a quantity and concentration of material, which qualify as "hazardous waste" as defined by RSA 147-A:2 VII; or any other circumstance that would more likely than not cause one or more deaths.	Every 2 years

Flooding (local, road erosion)

[1] NH DES http://des.nh.gov/organization/divisions/water/dwgb/wrpp/documents/primer_chapter11.pdf
[29] http://des.nh.gov/organization/commissioner/pip/factsheets/db/documents/db-15.pdf

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

Flooding (Riverine)

Floodplains are usually located in lowlands near rivers and flood on a regular basis. The term 100-year flood does not mean that flood 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. It is more accurate to use the phrase "1% annual chance flood". Flooding is often associated with hurricanes, heavy rains, ice jams and rapid snowmelt in the spring.

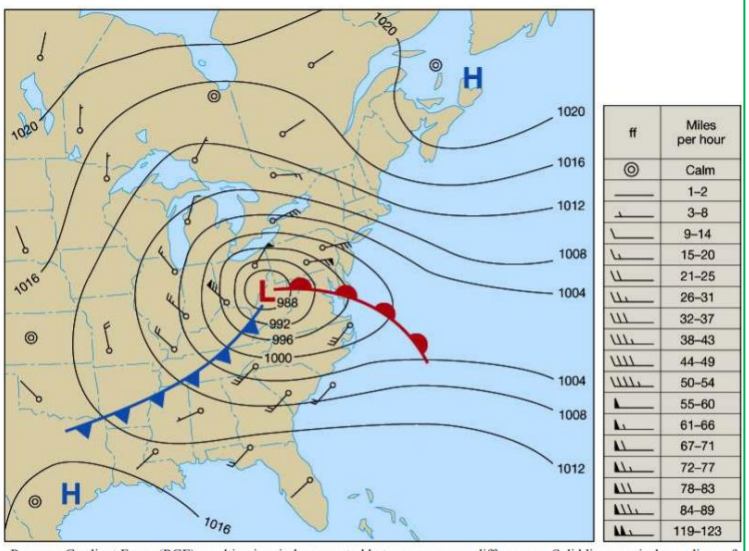
*HIGH WIND EVENTS

Windstorm

As stated by NOAA (National Oceanic & Atmospheric Administration), wind is defined as **"**The horizontal motion of the air past a given point. Winds begin with differences in air pressures. Those pressures which are higher at one place than another place set up a force pushing from the high pressure toward the low pressure; the greater the difference in pressures, the stronger the force. The distance between the area of high pressure and the area of 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. There's no set number that divides high and low pressure. Wind is used to describe the prevailing direction from which the wind is blowing with the speed given usually in miles per hour or knots." In addition, NOAA's issuance of a Wind Advisory takes place when sustained winds reach 25 to 39 mph and/or gusts to 57 mph.[30] [31]

Pressure Gradient Force, PGF

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



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

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

[30] NOAA; *http://www.nws.noaa.gov/glossary/index.php?letter=w*

[31] Pressure Gradient Force Chart "snipped" from Air Pressure and Wind; https://www.weather.gov/media/zhu/ZHU_Training_Page/winds/pressure_winds/pressure_winds.pdf

Tornado

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

Tornadoes produce the most violent winds on earth, at speeds of 280 mph or more. In addition, tornadoes can travel at a forward speed of up to 70 mph. Damage paths can be in excess of 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. In comparison to a hurricane, a tornado covers a much smaller area 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 the introduction of the Fujita Scale in 1971. The new scale identifies 28 different free standing structures most affected by tornadoes taking into account 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."[32] The chart (right), adapted from wunderground.com, shows a comparison of the Fujita Scale to the Enhanced Fujita Scale.

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

[32] Enhance Fujita Scale, http://www.wunderground.com/resources/severe/fujita_scale.asp

Downburst

A downburst is a strong downdraft which causes damaging winds on or near the ground according to NOAA. Not to be confused with downburst, the term "microburst" describes the size of the downburst. A comparison of 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 lasting 5 to 30 minutes. Damaging winds, causing widespread, tornado-like damage, could be as high as 134 MPH.[33]

Below is the Beaufort Wind Scale, showing expected damage based on wind (knots), developed in 1805 by Sir Francis Beaufort of England and posted on NOAA's Storm Prediction Center website.[34]

Force	Wind (Knots)	WMO Classification	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 bring 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 wind
8	34-40	Gale	Moderately high (13-20 ft.) waves of greater length, edges of crests begin to break into spindrift, forum blown in streaks	Whole trees in motion, resistance felt walking against wind
9	41-47	Strong Gale	High waves (20 ft.), sea begins to roll, dense streaks of foam, 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 sea, visibility more reduced	
12	64+	Hurricane	Air filled with foam, waves over 45 ft., sea completely white with driving spray, visibility greatly reduced	

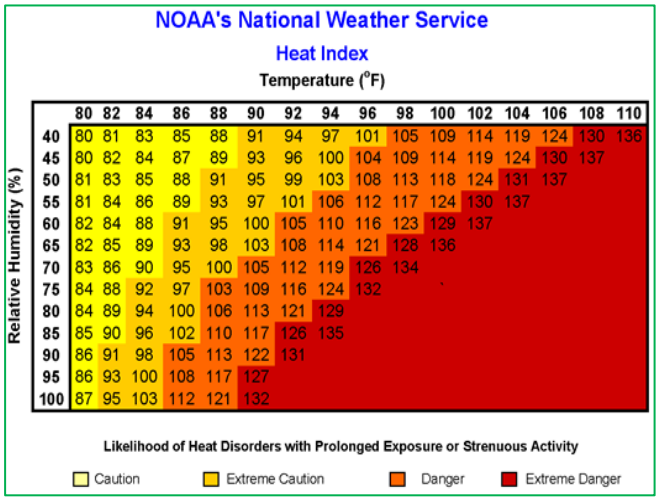
[33] NOAA - http://www.srh.noaa.gov/jetstream/tstorms/wind.html
[34] NOAA, Storm Prediction Center, *http://www.spc.noaa.gov/faq/tornado/beaufort.html*

*EXTREME TEMPERATURES

Extreme Heat

A heat wave 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.

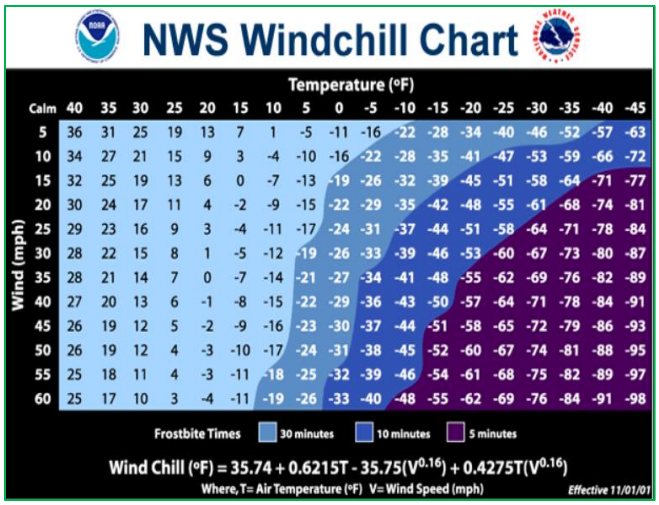
Most heat disorders occur because the victim has been overexposed to heat or has over-exercised for his or her age and physical condition. Older adults, young children and those who are sick or overweight are more likely to succumb to extreme heat.



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 the effects of a prolonged heat wave than those living in rural areas. Also, asphalt and concrete store heat longer and gradually release heat at night, which can produce higher nighttime temperatures known as the "urban heat island effect.”[35] The chart above explains the likelihood of heat disorders that may result from high heat.[36]

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 normal and as wind speed increases, heat can leave your body more rapidly; these weather related conditions may lead to serious health problems. Extreme cold is a dangerous situation that can bring on health emergencies in susceptible people without shelter or who are stranded, or who live in a home that is poorly insulated or without heat.[37] The National Weather Service Chart (to the right) shows windchill as a result of wind and temperature.[38]

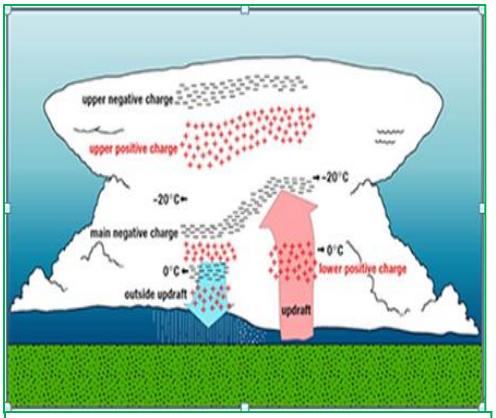


[35] NOAA, Index/Heat Disorders; http://www.srh.noaa.gov/ssd/html/heatwv.htm
[36] NOAA; http://www.nws.noaa.gov/os/heat/index.shtml
[37] CDC; http://www.bt.cdc.gov/disasters/winter/guide.asp f
[38] National Weather Service; http://www.nws.noaa.gov/om/windchill/

*LIGHTNING

Lightning

As stated by the NOAA National Severe Storms Laboratory (NSSL) "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."[39]



"A conceptual model shows the electrical charge distribution inside deep convention (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

Thunder, a result of lightning, is created when the "lightning channel heats the air to around 18,000 degrees Fahrenheit..."[40] thus causing the rapid expansion of the air and the sounds we hear as thunder. Although thunder that is heard during a storm cannot hurt you, the lightning that is associated with the thunder can not only strike people but also strike homes, out-buildings, grass and trees sparking disaster. Wildfires and structure loss are at a high risk during severe lightning events.

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

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

In general, lightning decreases across the U.S. mainland toward the northwest. Over the entire year, the highest frequency of cloud-to-ground lightning is in Florida between Tampa and Orlando. This is due to the presence, on many days during the year, of a large moisture content in the atmosphere at low levels (below 5,000 feet), as well as high surface temperatures that produce strong sea breezes along the Florida coasts. The western mountains of the U.S. also produce strong upward motions and contribute to frequent cloud-to-ground lightning. There are also high frequencies along the Gulf of Mexico coast, the Atlantic coast and in the southeast United States. US Regions along the Pacific west coast have the least cloud-to-ground lightning."[41]

[39] NOAA National Severe Storms Laboratory, https://www.nssl.noaa.gov/education/svrwx101/lightning
[40] Ibid
[41] Ibid

Lightning Activity Level (LAL) Grid		
The lightning activity level is a common parameter that is part of 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.	

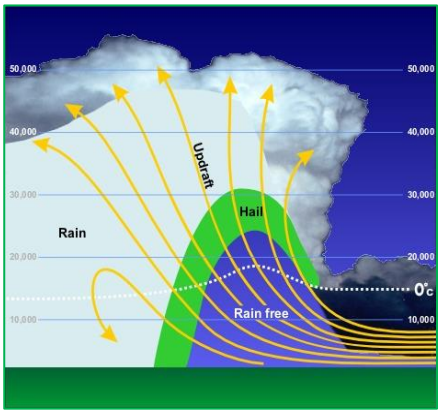
http://www.prh.noaa.gov/hnl/pages/LAL.php

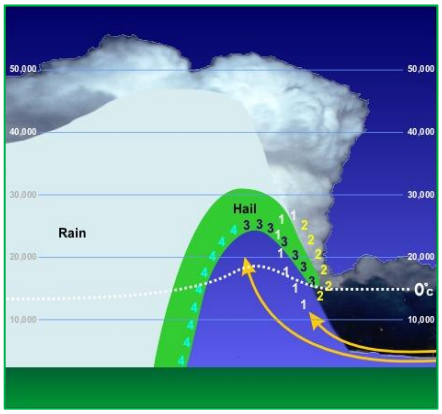
Hailstorm

Hailstones are balls of ice that grow as they're 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 balls of ice 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 includes. It weighed 1 lb. 15 oz."[42]

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

Details of how hailstones grow are 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.[43] The charts to the right show how hail is formed.[44]





[42] NOAA National Severe Storms Laboratory; https://www.nssl.noaa.gov/education/svrwx101/hail/
[43] http://www.pinterest.com/pin/126171227030590678/
[44] http://oceanservice.noaa.gov/education/yos/resource/JetStream/tstorms/hail.htm#hail

*WILDFIRES

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

As stated by the National Wildfire Coordinating Group (NWCG), wildfires are designated in seven categories as seen in the top chart to the right:[45] For the purpose of statistical analysis, the US Forest Service recognizes the cause of fires according to the bottom chart to the right:[46]

The definition according to the International Wildland-Urban Interface Code of wildfire is “an uncontrolled fire spreading through vegetative fuels exposing and possibly consuming structures”. In addition, the IWUIC goes on to define the wildland urban interface area as “that geographical area where structures and other human development meets or intermingles with wildland or vegetative fuels.[47]

There are two main potential losses with a wildfire: the forest itself and the threat to the built-up human environment (the structures within the WUI). 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 in which winds reach speeds of 74 miles per hour or more and blow in a large spiral around a relatively calm center. The eye of the storm 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[48]) 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.”[49]

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

Post-Tropical Cyclones

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

[45] http://www.nwcg.gov/pms/pubs/glossary/s.htm
[46] https://www.fs.fed.us/cgi-bin/Directives/get_dirs/fsh?5109.14
[47] International Wildland-Urban Interface Code, 2012, International Code Council, Inc.
[48] National Hurricane Center; http://www.nhc.noaa.gov/aboutsshws.php
[49] National Hurricane Center, NOAA; http://www.nhc.noaa.gov/aboutsshws.php

Rainfall from tropical storms has been reported at rates of up to 6 inches per hour; 43 inches of rain in a 24 hour period was reported in Alvin, TX as a result of Tropical Storm Claudette.[50]

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

*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. Larger 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. The underground point of origin of an earthquake is called its focus; the point on the surface directly above the focus is the epicenter. The magnitude and intensity of an earthquake is widely determined by the use of two scales, the more commonly used Richter scale (measures strength or magnitude) and the Mercalli Scale (measures intensity or severity). The chart to the right shows the two scales relative to one another. The Richter Scale measures earthquakes starting at 1 as the lowest with each successive unit being about 10 times stronger and more severe than the previous one.[51]

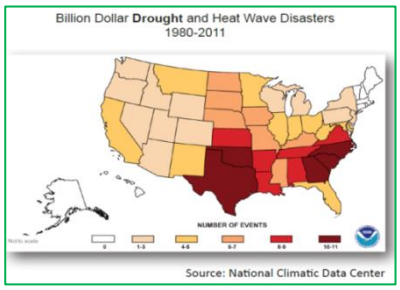
Modified Mercalli Scale		Richter Magnitude Scale
I	Detected only by sensitive instruments	1.5
II	Felt by few persons at rest, especially on upper floors; delicately suspended objects may swing	2
III	Felt noticeably indoors, but not always recognized as earthquake; standing autos rock slightly, vibration 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 4
VI	Felt by all, many frightened and run outdoors; falling plaster and chimneys, damage small	4.5
VII	Everybody runs outdoors; damage to buildings varies depending on quality of construction; noticed by drivers of autos	5
VIII	Panel walls thrown out of frames; fall of walls, monuments, chimneys; sand and mud ejected; drivers of autos disturbed	5.5
IX	Buildings shifted off foundations, cracked, thrown out of plumb; ground cracked; underground pipes broken	6
X	Most masonry and frame structures destroyed; ground cracked, rails bent, landslides	6.5 7
XI	Few structures remain standing; bridges destroyed, fissures in ground, pipes broken, landslides, rails bent	7.5
XII	Damage total; waves seen on ground surface, lines of sight and level distorted, objects thrown up in air	8

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

[50] http://www.wpc.ncep.noaa.gov/research/mcs_web_test_test_files/Page1637.htm

[51] Modified Mercalli Scale/Richter Scale Chart; MO DNR, http://www.dnr.mo.gov/geology/geosrv/geores/richt_mercali_relation.htm

*DROUGHT



A drought is defined as a long period of abnormally low precipitation, especially one that adversely affects the growing season or living conditions of plants and animals. Droughts are rare in New Hampshire. They generally are not as damaging and disruptive as floods and are more difficult to define. The effect of drought is indicated through measurements of soil moisture, groundwater levels and stream flow.

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 stream flow. Low stream flow also correlates with low groundwater levels because groundwater discharge to streams and rivers maintains stream flow during extended dry periods. Low stream flow 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 any given time. During the peak months of the 2016 drought in New Hampshire, the southern part of the start was in Category D3 or Extreme Drought.

			Ranges				
Category	Description	Possible Impacts	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	Going into drought: ▪ short-term dryness slowing planting, growth of crops or pastures Coming out of drought: ▪ some lingering water deficits ▪ pastures or crops not fully recovered	-1.0 to -1.9	21 to 30	21 to 30	-0.5 to -0.7	21 to 30
D1	Moderate Drought	▪ Some damage to crops, pastures ▪ Streams, reservoirs, or wells low, some water shortages developing or imminent ▪ Voluntary water-use restrictions requested	-2.0 to -2.9	11 to 20	11 to 20	-0.8 to -1.2	11 to 20
D2	Severe Drought	▪ Crop or pasture losses likely ▪ Water shortages common ▪ Water restrictions imposed	-3.0 to -3.9	6 to 10	6 to 10	-1.3 to -1.5	6 to 10
D3	Extreme Drought	▪ Major crop/pasture losses ▪ Widespread water shortages or restrictions	-4.0 to -4.9	3 to 5	3 to 5	-1.6 to -1.9	3 to 5
D4	Exceptional Drought	▪ Exceptional and widespread crop/pasture losses ▪ Shortages of water in reservoirs, streams, and wells creating water emergencies	-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 is the wearing a way of land, such as loss of riverbank, 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 surge and windstorms but may be intensified by human activities. Long-term erosion is a result of 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, it can destroy buildings and infrastructure.[52]

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

- Steepness/grade of the Slope (measured as a percent)
- Geographical Area
    - 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 a multitude of measurements is required to determine the severity of the landslide event.[53]

*INFECTIOUS DISEASES

Bacterial & Viral Infections

There are many organisms that live inside our bodies and on our skin. These organisms are generally harmless and sometimes may even be 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. Infectious diseases may be caused by bacteria, viruses, fungi and parasites.[54]

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.[55]

[52] Mitigation Ideas, A Resource for Reducing Risk to Natural Hazards, FEMA, January 2013
[53] State of New Hampshire Multi-Hazard Mitigation Plan Update 2018 & https://oas.org/dsd/publications/Unit/oea66e/ch10.htm
[54] https://www.mayoclinic.org/diseases-conditions/infectious-diseases/symptoms-causes/syc-20351173

[55] https://www.dhhs.nh.gov/dphs/cdcs/index.htm

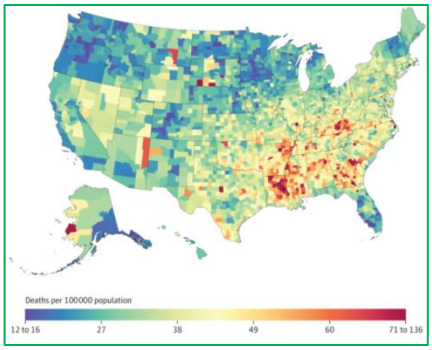
"Throughout history, millions of people have died of diseases such as bubonic plague or the Black Death, which is caused by Yersinia pestis bacteria, and smallpox, which is caused by the variola virus. In recent times, viral infections have been responsible for two major pandemics: the 1918-1919 "Spanish 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."[56]

The extent of infectious diseases is generally described by the level and occurrence of a particular disease as follows[57]:

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 of 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

The map to the right shows the age-standardized mortality rate from all infectious diseases, both sexes, in 2014.[58]

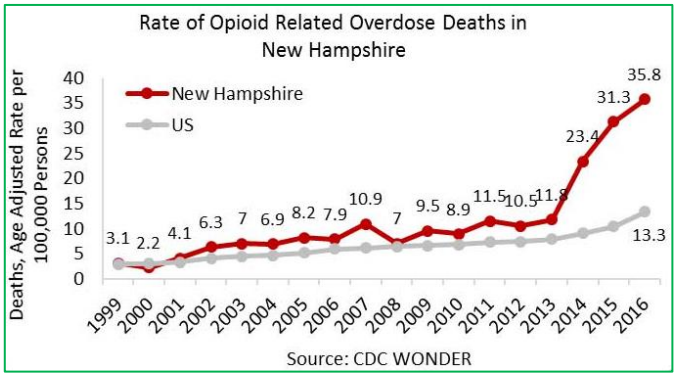


Opioid Crisis

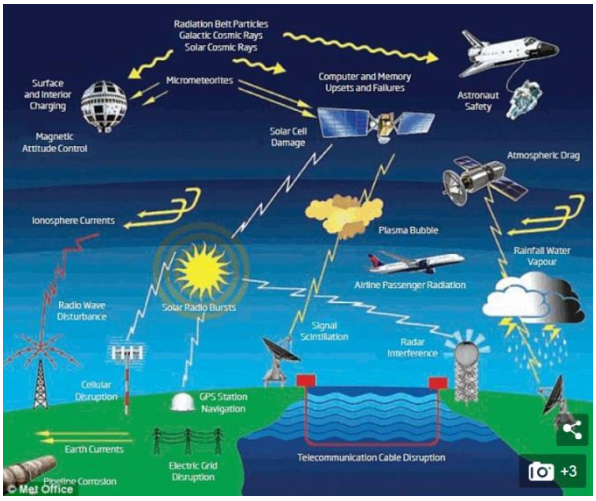
A revised report by the National Institute of Drug Abuse states, *"Every day, more than 130 people in the United States die after overdosing on opioids. The misuse of and addiction to opioids—including prescription pain relievers, heroin, and synthetic opioids such as fentanyl - is a serious national 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."*

[56] https://www.webmd.com/a-to-z-guides/bacterial-and-viral-infections#1
[57] https://www.cdc.gov/ophss/csels/dsepd/ss1978/lesson1/section11.html
[58] https://jamanetwork.com/journals/jama/fullarticle/2676111

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 2013 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."*[59] The chart to the right shows the increase in opioid-related overdose deaths in New Hampshire compared to those in the US overall.[60]



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. At times, this magnetic energy 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 participles can produce their own magnetic field which can disrupt navigation and communication systems and GPS satellites and can potentially produce Geomagnetic Induced Currents (GICs) which can affect the power grid and pipelines. An electromagnetic surge from a solar storm has potential to produce an Electromagnetic Pulse (EMP) which could cause significant damage to infrastructure such as nuclear power plants, banking systems, the electrical grid, sewage treatment facilities, cell phones, landlines and even vehicles. The image above shows the potential impacts from solar storm and space weather.[61]

[59] https://www.drugabuse.gov/drugs-abuse/opioids/opioid-summaries-by-state/new-hampshire-opioid-summary
[60] Ibid
[61] 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[62]

Geomagnetic Storms				
Scale	**Description**	**Effect**	**Physical Measure**	**Average Frequency (1 cycle = 11 years)**
G 5	Extreme	**Power systems:** Widespread voltage control problems and protective system problems can occur; some grid systems may experience complete collapse or blackouts. Transformers may experience damage. **Spacecraft operations**: May experience extensive surface charging, problems with orientation, uplink/downlink and tracking satellites. **Other systems:** Pipeline currents can reach hundreds of amps, HF (high frequency) radio propagation may be impossible in many areas for one to two days, satellite navigation may be degraded for days, low-frequency radio navigation can be out for hours, and aurora has been seen as low as Florida and southern Texas (typically 40° geomagnetic lat.).	Kp = 9	4 per cycle (4 days per cycle)
G 4	Severe	**Power systems:** Possible widespread voltage control problems and some protective systems will mistakenly trip out key assets from the grid. **Spacecraft operations:** May experience surface charging and tracking problems, corrections may be needed for orientation problems. **Other systems:** Induced pipeline currents affect preventive measures, HF radio propagation sporadic, satellite navigation degraded for hours, low-frequency radio navigation disrupted, and aurora has been seen as low as Alabama and northern California (typically 45° geomagnetic lat.).	Kp = 8, including a 9-	100 per cycle (60 days per cycle)
G 3	Strong	**Power systems:** Voltage corrections may be required; false alarms triggered on some protection devices. **Spacecraft operations:** Surface charging may occur on satellite components, drag may increase on low-Earth-orbit satellites, and corrections may be needed for orientation problems. **Other systems:** Intermittent satellite navigation and low-frequency radio navigation problems may occur, HF radio may be intermittent, and aurora has been seen as low as Illinois and Oregon (typically 50° geomagnetic lat.).	Kp = 7	200 per cycle (130 days per cycle)
G 2	Moderate	**Power systems:** High-latitude power systems may experience voltage alarms; long-duration storms may cause transformer damage. **Spacecraft operations**: Corrective actions to orientation may be required by ground control; possible changes in drag affect orbit predictions. **Other systems:** HF radio propagation can fade at higher latitudes, and aurora has been seen as low as New York and Idaho (typically 55° geomagnetic lat.).	Kp = 6	600 per cycle (360 days per cycle)
G 1	Minor	**Power systems:** Weak power grid fluctuations can occur. **Spacecraft operations:** Minor impact on satellite operations possible. **Other systems:** Migratory animals are affected at this and higher levels; aurora is commonly visible at high latitudes (northern Michigan and Maine).	Kp = 5	1700 per cycle (900 days per cycle)

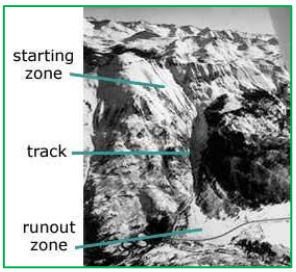
Solar Radiation Storms				
Scale	**Description**	**Effect**	**Physical Measure (Flux level of >=10 MeV particles)**	**Average Frequency (1 cycle = 11 years)**
S 5	Extreme	**Biological:** Unavoidable high radiation hazard to astronauts on EVA (extra- vehicular activity); passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk.**Satellite operations:** Satellites may be rendered useless, memory impacts can cause loss of control, may cause serious noise in image data, star- trackers may be unable to locate sources; permanent damage to solar panels possible.**Other systems:** Complete blackout of HF (high frequency) communications possible through the polar regions, and position errors make navigation operations extremely difficult.	10^{5}	Fewer than 1 per cycle
S 4	Severe	**Biological:** Unavoidable radiation hazard to astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk. **Satellite operations:** May experience memory device problems and noise on imaging systems; star-tracker problems may cause orientation problems, and solar panel efficiency can be degraded. **Other systems:** Blackout of HF radio communications through the polar regions and increased navigation errors over several days are likely.	10^{4}	3 per cycle

[62] Extent charts taken from https://www.weather.gov/akq/SpaceWeather

Solar Radiation Storms				
S 3	Strong	**Biological:** Radiation hazard avoidance recommended for astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk. **Satellite operations:** Single-event upsets, noise in imaging systems, and slight reduction of efficiency in solar panel are likely. **Other systems**: Degraded HF radio propagation through the polar regions and navigation position errors likely.	10^3	10 per cycle
S 2	Moderate	**Biological:** Passengers and crew in high-flying aircraft at high latitudes may be exposed to elevated radiation risk. **Satellite operations:** Infrequent single-event upsets possible. **Other systems:** Small effects on HF propagation through the polar regions and navigation at polar cap locations possibly affected.	10^2	25 per cycle
S 1	Minor	**Biological:** None. **Satellite operations**: None. **Other systems:** Minor impacts on HF radio in the polar regions.	10	50 per cycle

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

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 certain locations are naturally more dangerous than others. Wintertime, particularly from December to April, is when most avalanches tend to happen. However, avalanche fatalities have been recorded for every month of the year."[63]

"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 begin to fail. Skiers and recreationalists usually trigger smaller, but often more deadly avalanches."

North American Public Avalanche Danger Scale

Avalanche danger is determined by the likelihood, size and distribution of avalanches.

Danger Level	Travel Advice	Likelihood of Avalanches	Avalanche Size and Distribution
5 Extreme	Avoid all avalanche terrain.	Natural and human-triggered avalanches certain.	Large to very large avalanches in many areas.
4 High	Very dangerous avalanche conditions. Travel in avalanche terrain not recommended.	Natural avalanches likely; human-triggered avalanches very likely.	Large avalanches in many areas; or very large avalanches in specific areas.
3 Considerable	Dangerous avalanche conditions. Careful snowpack evaluation, cautious route-finding and conservative decision-making essential.	Natural avalanches possible; human-triggered avalanches likely.	Small avalanches in many areas; or large avalanches in specific areas; or very large avalanches in isolated areas.
2 Moderate	Heightened avalanche conditions on specific terrain features. Evaluate snow and terrain carefully; identify features of concern.	Natural avalanches unlikely; human-triggered avalanches possible.	Small avalanches in specific areas; or large avalanches in isolated areas.
1 Low	Generally safe avalanche conditions. Watch for unstable snow on isolated terrain features.	Natural and human-triggered avalanches unlikely.	Small avalanches in isolated areas or extreme terrain.

Safe backcountry travel requires training and experience. You control your own risk by choosing where, when and how you travel.

There are three main parts to an avalanche (see 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."[64]

The second part is the "avalanche track", or the downhill path that the avalanche follows. The avalanche is evident where large swaths of trees are missing or where there are large pile-ups of rock, snow, trees and debris at the bottom of an incline.

The third part of an avalanche is the "runout zone". The runout zone is where the avalanche has come to a stop and left the largest and highest pile of snow and debris.

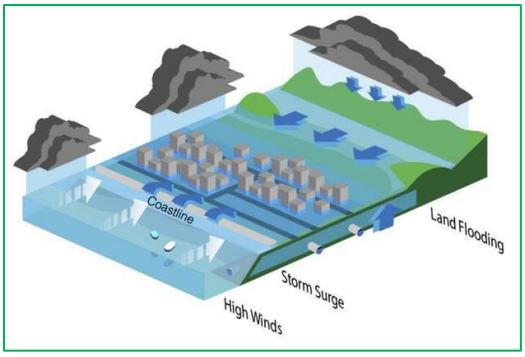
"Several factors may affect the likelihood of an avalanche, including weather, temperature, slope steepness, slope orientation (whether the slope is facing north or south), wind direction, terrain, vegetation and general snowpack conditions. Different combinations of these factors can create low, moderate, or extreme avalanche conditions. Some of these conditions, such as temperature and snowpack, can change on a daily or hourly basis."[65]

[63] Copyright Richard Armstrong, NSIDC, http://nsidc.org/cryosphere/snow/science/avalanches.html
[64] NSIDC, http://nsidc.org/cryosphere/snow/science/avalanches.html; image credit: Betsy Armstrong
[65] Copyright Richard Armstrong, NSIDC, http://nsidc.org/cryosphere/snow/science/avalanches.html

When the possibility of an avalanche is evident, 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 as determined by likelihood, size & distribution.[66]

COASTAL FLOODING

Coastal areas are particularly susceptible to the hazards such as flooding, erosion, storm surge and sea-level rise as a result of tropical and post-tropical cyclones, heavy rain events and 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."*[67]



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."*[68] As shown in the image above, not only storm surge but also inland flooding can affect the severity of flooding along the shore.[69]

[66] http://www.avalanche.org/danger_card.php
[67] NH Multi-hazard Mitigation Plan-2018, page 55
[68] Ibid
[69] 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-4457	Severe Storm & Flooding	July 11-12, 2019	Grafton	**Major Disaster Declaration, DR-4457:** The Federal Emergency Management Agency announced a major disaster declaration for a period of severe storms and flooding from July 11-12, 2019 in one New Hampshire County.
DR-4371	Severe Winter Storm & Snowstorm	March 13-14, 2018	Carroll, Strafford & Rockingham	**Major Disaster Declaration, DR 4371:** The Federal Emergency Management Agency announced a major disaster declaration on June 8, 2018 for a period of a severe winter storm from March 13-14, 2018.
DR-4370	Severe Storm & Flooding	March 2-8, 2018	Rockingham	**Major Disaster Declaration, DR 4370:** The Federal Emergency Management Agency announced a major disaster declaration on June 8, 2018 for a period of severe storms and flooding from March 2-8, 2018.
DR-4355	Severe Storms, Flooding	October 29-November 1, 2017	Sullivan, Grafton, Coos, Carroll, Belknap & Merrimack	**Major Disaster Declaration, DR-4355:** The Federal Emergency Management Agency (FEMA) announced that federal disaster assistance is available to the state of New Hampshire to supplement state and local recovery efforts in the areas affected by severe storms and flooding from October 29-Novermber 1, 2017 in five New Hampshire Counties.
DR-4329	Severe Storms, Flooding	July 1-2, 2017	Grafton & Coos	**Major Disaster Declaration DR-4329:** The Federal Emergency Management Agency (FEMA) announced that federal disaster assistance is available to the state of New Hampshire to supplement state and local recovery efforts in the areas affected by severe storms and flooding from July 1, 2017 to July 2, 2017 in Grafton County
DR-4316	Severe Winter Storm and Snowstorm	March 14-15, 2017	Belknap & Carroll	**Major Disaster Declaration DR-4316:** Severe winter storm and snowstorm in Belknap & Carroll Counties; disaster aid to supplement state and local recovery efforts.
FM-5123	Forest Fire	April 21-23, 2016	Cheshire	**Fire Management Assistance Declaration, FM-5123: Stoddard, NH**
DR-4209	Severe Winter Storm and Snowstorm	January 26-28, 2015	Hillsborough, Rockingham & Stafford	**Major Disaster Declaration DR-4209:** Severe winter storm and snowstorm in Hillsborough, Rockingham and Strafford Counties; disaster aid to supplement state and local recovery efforts.
DR-4139	Severe Storms, Flooding	July 9-10, 2013	Cheshire, Sullivan & Grafton	**Major Disaster Declaration DR-4139:** Severe storms, flooding, and landslides during the period of June 26 to July 3, 2013 in Cheshire, Sullivan and southern Grafton Counties.
DR-4105	Severe Winter Storm	February 8, 2013	All Ten NH Counties	**Major Disaster Declaration DR-4105:** Nemo; heavy snow in February 2013.
DR-4095	Hurricane Sandy	October 26-November 8, 2012	Belknap, Carroll, Coos, Grafton, Rockingham & Sullivan	**Major Disaster Declaration DR-4095:** The declaration covers damage to property from the storm that spawned heavy rains, high winds, high tides and flooding over the period of October 26-November 8, 2012.

Number	Hazard	Date of Event	Counties	Description
EM-3360	Hurricane Sandy	October 26-31, 2012	All Ten NH Counties	**Emergency Declaration EM-3360:** Hurricane Sandy came ashore in NJ and brought high winds, power outages and heavy rain to NH. Declared in all ten counties in the State of New Hampshire.
DR-4065	Severe Storm & Flooding	May 29-31, 2012	Cheshire	**Major Disaster Declaration DR-4065:** Severe Storm and Flood Event May 29-31, 2012 in Cheshire County.
DR-4049	Severe Storm & Snowstorm	October 29-30, 2011	Hillsborough & Rockingham	**Major Disaster Declaration DR-4049:** Severe Storm and Snowstorm Event October 29-30, 2011 in Hillsborough and Rockingham Counties.
EM-3344	Severe Snowstorm	October 29-30, 2011	All Ten NH Counties	**Emergency Declaration EM-3344:** Severe storm during the period of October 29-30, 2011; all ten counties in the State of New Hampshire. (Snowtober)
DR-4026	Tropical Storm Irene	August 26-September 6, 2011	Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, & Sullivan	**Major Disaster Declaration DR-4026:** Tropical Storm Irene Aug 26th- Sept 6, 2011 in Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, & Sullivan Counties.
EM-3333	Tropical Storm Irene	August 26-September 6, 2011	All Ten NH Counties	**Emergency Declaration EM-3333:** Emergency Declaration for Tropical Storm Irene for in all ten counties.
DR-4006	Severe Storm & Flooding	May 26-30, 2011	Coos & Grafton Counties	**Major Disaster Declaration DR-4006:** May Flooding Event, May 26th-30th 2011 in Coos & Grafton County. (Memorial Day Weekend Storm)
DR-1913	Severe Storms & Flooding	March 14-31, 2010	Hillsborough & Rockingham	**Major Disaster Declaration DR-1913:** Flooding to two NH counties including Hillsborough and Rockingham counties.
DR-1892	Severe Winter Storm, Rain & Flooding	February 23 - March 3, 2010	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan	**Major Disaster Declaration: DR-1892:** Flood and wind damage to most of southern NH including six counties; 330,000 homes without power; more than $2 million obligated by June 2010.
DR-1812	Severe Winter Storm & Ice Storm	December 11-23, 2008	All Ten NH Counties	**Major Disaster Declaration DR-1812:** Damaging ice storms to entire state including all ten NH counties; fallen trees and large scale power outages; five months after December's ice storm pummeled the region, nearly $15 million in federal aid had been obligated by May 2009.
EM-3297	Severe Winter Storm	December 11, 2008	All Ten NH Counties	**Emergency Declaration EM-3297:** Severe winter storm beginning on December 11, 2008.
DR-1799	Severe Storms & Flooding	September 6-7, 2008	Hillsborough	**Major Disaster Declaration: DR-1799:** Severe storms and flooding beginning on September 6, 2008.
DR-1787	Severe Storms & Flooding	July 24-August 14, 2008	Belknap, Carroll & Grafton & Coos	**Major Disaster Declaration DR-1787:** Severe storms, tornado, and flooding on July 24, 2008.

Number	Hazard	Date of Event	Counties	Description
DR-1782	Severe Storms, Tornado, & Flooding	July 24, 2008	Belknap, Carroll, Merrimack, Strafford & Rockingham	**Major Disaster Declaration DR-1782:** Tornado damage to several NH counties.
DR-1695	Nor'easter, Severe Storms & Flooding	April 15-23, 2007	All Ten NH Counties	**Major Disaster Declaration DR-1695:** Flood damages; FEMA & SBA obligated more than $27.9 million in disaster aid following the April nor'easter. (Tax Day Storm)
DR-1643	Severe Storms & Flooding	May 12-23, 2006	Belknap, Carroll, Grafton, Hillsborough, Merrimack, Rockingham & Strafford	**Major Disaster Declaration DR-1643:** Flooding in most of southern NH; May 12-23, 2006. (aka: Mother's Day Storm)
DR-1610	Severe Storms & Flooding	October 7-18, 2005	Belknap, Cheshire, Grafton, Hillsborough, Merrimack & Sullivan	**Major Disaster Declaration DR-1610:** To date, state and federal disaster assistance has reached more than $3 million to help residents and business owners in New Hampshire recover from losses resulting from the severe storms and flooding in October 2005.
EM-3258	Hurricane Katrina Evacuation	August 29-October 1, 2005	All Ten NH Counties	**Emergency Declaration EM-3258:** Assistance to evacuees from the area struck by Hurricane Katrina and to provide emergency assistance to those areas beginning on August 29, 2005, and continuing; The President's action makes Federal funding available to the state and all 10 counties of the State of New Hampshire.
EM-3211	Snow	March 11-12, 2005	Carroll, Cheshire, Hillsborough, Rockingham & Sullivan	**Emergency Declaration EM-3211**: March snowstorm; more than $2 million has been approved to help pay for costs of the snow removal; Total aid for the March storm is **$2,112,182.01** (Carroll: $73,964.57; Cheshire: $118,902.51; Hillsborough: $710,836; Rockingham: $445,888.99; Sullivan: $65,088.53; State of NH: $697,501.41)
EM-3208	Snow	February 10-11, 2005	Carroll, Cheshire, Coos, Grafton & Sullivan	**Emergency Declaration EM-3208:** FEMA had obligated more than $1 million by March 2005 to help pay for costs of the heavy snow and high winds; Total aid for the February storm is **$1,121,727.20** (Carroll: $91,832.72; Cheshire: $11,0021.18; 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	**Emergency Declaration EM 3208-002:** The Federal Emergency Management Agency (FEMA) has obligated more than $6.5 million to reimburse state and local governments in New Hampshire for costs incurred in three snowstorms that hit the state earlier this year, according to disaster recovery officials. Total aid for all three storms is $6,892,023.87 (January: $3,658,114.66; February: $1,121,727.20; March: $2,113,182.01)

Number	Hazard	Date of Event	Counties	Description
EM-3207	Snow	January 22-23, 2005	Belknap, Carroll, Cheshire, Grafton, Hillsborough, Rockingham, Merrimack, Strafford & Sullivan	**Emergency Declaration EM-3207:** More than $3.5 million has been approved to help pay for costs of the heavy snow and high winds; Total aid for the January storm is **$3,658,114.66** (Belknap: $125,668.09; Carroll: $52,864.23; Cheshire: $134,830.95; Grafton: $137,118.71; Hillsborough: $848,606.68; Merrimack: $315,936.55; Rockingham: $679,628.10; Strafford: $207,198.96; Sullivan: $48,835.80; State of NH: $1,107,426.59)
EM-3193	Snow	December 6-7, 2003	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack & Sullivan	**Emergency Declaration EM-3193:** The declaration covers jurisdictions with record and near-record snowfall that occurred over the period of December 6-7, 2003
DR-1489	Severe Storms & Flooding	July 21-August 18, 2003	Cheshire & Sullivan	**Major Disaster Declaration DR-1489:** Floods stemming from persistent rainfall and severe storms that caused damage to public property occurring over the period of July 21 through August 18, 2003.
EM-3177	Snowstorm	February 17-18, 2003	Cheshire, Hillsborough, Merrimack, Rockingham & Strafford	**Emergency Declaration EM-3177:** Declaration covers jurisdictions with record and near-record snowfall from the snowstorm that occurred February 17-18, 2003
EM-3166	Snowstorm	March 5-7, 2001	Cheshire, Coos, Grafton, Hillsborough, Merrimack, Rockingham & Strafford	**Emergency Declaration EM-3166:** Declaration covers jurisdictions with record and near-record snowfall from the late winter storm that occurred March 2001
DR-1305	Tropical Storm Floyd	September 16-18,1999	Belknap, Cheshire & Grafton	**Major Disaster Declaration DR-1305:** The declaration covers damage to public property from the storm that spawned heavy rains, high winds and flooding over the period of September 16-18.
DR-1231	Severe Storms & Flooding	June 12-July 2, 1998	Belknap, Carroll Grafton, Hillsborough, Merrimack & Rockingham	**Major Disaster Declaration DR-1231:**
DR-1199	Ice Storm	January 7-25, 1998	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, Strafford & Sullivan	**Major Disaster Declaration DR-1199:**
DR-1144	Severe Storms/Flooding	October 20-23, 1996	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan	**Major Disaster Declaration DR-1144:**
DR-1077	Storms/Floods	October 20-November 15, 1995	Carroll, Cheshire, Coos, Grafton, Merrimack & Sullivan	**Major Disaster Declaration DR-1077:**
EM-3101	High Winds & Record Snowfall	March 13-17, 1994	All Ten NH Counties	**Emergency Declaration EM-3101:**

Number	Hazard	Date of Event	Counties	Description
DR-923	Severe Coastal Storm	October 30-31, 1991	Rockingham	**Major Disaster Declaration DR-923:**
DR-917	Hurricane Bob, Severe Storm	August 18-20, 1991	Carroll, Hillsborough, Rockingham & Strafford	**Major Disaster Declaration DR-917:**
DR-876	Flooding, Severe Storm	August 7-11, 1990	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, & Sullivan	**Major Disaster Declaration DR-876:**
DR-789	Severe Storms & Flooding	March 30-April 11, 1987	Carroll, Cheshire, Grafton, Hillsborough, Merrimack Rockingham, Strafford & Sullivan	**Major Disaster Declaration DR-789**
DR-771	Severe Storms & Flooding	July 29-August 10, 1986	Cheshire, Hillsborough & Sullivan	**Major Disaster Declaration DR-771:**
EM-3073	Flooding	March 15, 1979	Coos	**Emergency Declaration EM-3073:**
DR-549	High Winds, Tidal Surge, Coastal Flooding & Snow	February 16, 1978	All Ten NH Counties	**Major Disaster Declaration DR-549:** Blizzard of 1978
DR-411	Heavy Rains, Flooding	January 21, 1974	Belknap, Carroll, Cheshire & Grafton	**Major Disaster Declaration DR-411:**
DR-399	Severe Storms & Flooding	July 11, 1973	All Ten NH Counties	**Major Disaster Declaration DR-399:**
DR-327	Coastal Storms	March 18, 1972	Rockingham	**Major Disaster Declaration DR-327:**
DR-11	Forest Fire	July 2, 1953	Carroll	**Major Disaster Declaration DR-11:**

Source:
Disaster Declarations for New Hampshire
http://www.fema.gov/disasters/grid/state-tribal-government/33?field_disaster_type_term_tid_1=All

APPENDIX E: ACRONYMS

Hazard Mitigation Planning
List of Acronyms

ACS ..... American Community Survey (Census)
BFE ..... Base Flood Elevation
BOCA ..... Building Officials and Code Administrators International
CIKR..... Critical Infrastructure & Key Resources
CIP ..... Capital Improvements Program
CWPP..... Community Wildfire Protection Plan
EMD ..... Emergency Management Director
EMS..... Emergency Medical Services
EOC..... Emergency Operations Center
ERF ..... Emergency Response Facility
FEMA ..... Federal Emergency Management Agency
FIRM..... Flood Insurance Rate Map
FPP ..... Facilities & Populations to Protect
GIS ..... Geographic Information System
HFRA..... Healthy Forest Restoration Act
HMGP..... Hazard Mitigation Grant Program
ICS ..... Incident Command System
LEOP..... Local Emergency Operations Plan
MOU ..... Memorandum of Understanding
NOAA ..... National Oceanic and Atmospheric Association
NSSL ..... National Severe Storms Laboratory (NOAA)
MAPS ..... Mapping and Planning Solutions
NERF..... Non-Emergency Response Facility
NFIP ..... National Flood Insurance Program
NGVD ..... National Geodetic Vertical Datum of 1929
NH DNCR..... NH Department of Natural & Cultural Resources
NH DOT..... NH Department of Transportation
NH HSEM..... NH Homeland Security & Emergency Management
NH OSI ..... NH Office of Strategic Initiatives (formerly OEP)
NIMS ..... National Incident Management System
PR ..... Potential Resources
SPNHF ..... Society for the Protection of New Hampshire Forests
USDA ..... US Department of Agriculture
USDA-FS..... USDA-Forest Service
USGS ..... United States Geological Society
WMNF ..... White Mountain National Forest
WUI ..... Wildland Urban Interface

APPENDIX F: POTENTIAL MITIGATION IDEAS[70]

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 Colds 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 of Retrofit Structures & Utilities
F16 .... Flood proof 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

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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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Groton Wind Turbines
Photo Credit: Town of Groton

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