

Grafton

Hazard Mitigation

Plan

2018



This Plan integrates the following:

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

October 9, 2018
Final

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

By
The Grafton Planning Team

With assistance from Mapping and Planning Solutions

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

-Dwight D. Eisenhower

HAZARD MITIGATION PLAN DEFINITIONS

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

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

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



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Cover Photo: Grafton Pond

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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 Department of Natural & Cultural Resources (DNCR). The Plan was created through a grant from New Hampshire 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 new Hazard Mitigation Plan; no other plan has been developed prior to this Plan.

Approval Notification Dates for 2018 Plan

Approved Pending Adoption (APA): August 29, 2018
 Jurisdiction Adoption: September 18, 2018
 CWPP Approval: October 3, 2018
 Plan Approval Date (FEMA): October 9, 2018
 Plan Distribution (MAPS): October 25, 2018

Town of Grafton Hazard Mitigation Planning Team

The Town of Grafton 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:

- Rosalie Babiarz..... Grafton Planning Board (former)
- John Babiarz..... Grafton Fire Chief & EMD
- Russell Poitras..... Grafton Police Chief
- Jennie Joyce..... Grafton BOS-Chair
- Brian Reed..... Grafton Firefighter
- Danielle Reed Grafton Citizen
- Robert Basset..... Grafton Road Agent
- Merle Kenyon..... Grafton BOS (former)
- Steve White..... Grafton Citizen
- Susan Smith..... Grafton Administrative Assistant
- Paul Hatch NH HSEM
- Jennifer Gilbert.... NH OSI
- Brad Simpkins..... NH DNCR
- 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 Grafton 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
BOS..... Board of Selectmen
HSEM..... Homeland Security & Emergency Management
OSI NH Office of Strategic Initiatives (formerly OEP)
DNCR..... NH Office of Natural & Cultural Resources (formerly DRED)
MAPS Mapping and Planning Solutions

Two NH Departments have recently changed their names:

- *The NH Office of Energy & Planning (OEP) is now the NH Office of Strategic Initiatives (NH OSI)*
- *The NH Department of Economic Development (DRED) is now the NH Department of Natural & Cultural Resources (DNCR)*

Executive Summary

The Grafton Hazard Mitigation Plan 2018 was compiled to assist the Town of Grafton in reducing and mitigating future losses from natural or human-caused hazardous events. The Plan was developed by participants of the Town of Grafton Hazard Mitigation Planning Team, 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 the Town's first hazard mitigation plan based on the Disaster Mitigation Act of 2000. Several hazard mitigation plans from other communities and the NH State Hazard Mitigation Plan (2013) were used as a base for this Plan in an effort to provide basic knowledge of hazards, processes and mitigation action strategies.



This Plan addresses the following natural hazards and human-caused hazards.

Natural Hazards

- | | |
|---|---------------------------------------|
| 1) Severe Winter Weather & Ice Storms | 6) Hailstorms |
| 2) Flooding (<i>dam flooding, local roads, heavy rain, riverine, beaver dams</i>) | 7) Droughts |
| 3) Tornadoes & Downbursts | 8) Wildfires (<i>1+ acres</i>) |
| 4) High Winds (<i>windstorm</i>) | 9) Hurricanes & Tropical Storms |
| 5) Extreme Temperatures (hot & cold) | 10) Earthquakes |
| | 11) Severe Thunder & Lightning Storms |

Human-Caused Hazards

- | | |
|---|------------------------|
| 1) Extended Power Failure (5+ days) | 4) Terrorism |
| 2) Hazardous Materials - Fixed Location | 5) Epidemic & Pandemic |
| 3) Hazardous Materials - Transport | |

Some hazards that are listed in the 2013 NH Hazard Mitigation Plan were not included in this Plan as the Team felt they were extremely unlikely to occur in Grafton or not applicable. These include: *Coastal Flooding, Radon, Radiological, Landslide, Fire & Hazardous Materials and Snow Avalanche*. The Team does acknowledge that radon exists but felt that mitigation for radon is the responsibility of the individual homeowner. Fire & Hazardous Materials are covered under the hazard categories of Wildfire, Hazardous Material-Transport and Hazardous Material-Fixed Location.

This Plan also provides a list of Critical Infrastructure and Key Resources (CIKR) categorized as follows: Necessary for 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).

This hazard mitigation plan was designed to include a detailed study and analysis of wildfires. The original goal was to produce separate plans but that concept produced excessive overlap and cost. To streamline the process, the Community Wildfire Protection Plan (CWPP) was fully integrated into this hazard mitigation plan as were risks from human-caused hazards.

Mitigation action items are the main focus of this Plan. Some communities, when faced with an array of natural 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 snow storms 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 Grafton Planning Team 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:

Grafton Hazard Mitigation Plan 2018.....	the Plan or this Plan
Grafton	the Town or the Community
Hazard Mitigation Planning Team.....	the Team
Hazard Mitigation Plan	HMP
Emergency Operations Plan	EOP
Community Wildfire Protection Plan	CWPP
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 F: Acronyms

Mission Statement:

To make Grafton 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 community of Grafton 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 Grafton Hazard Mitigation Plan 2018 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 Grafton Hazard Mitigation Planning Team 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 FEMA (Federal Emergency Management Agency); 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 or human-caused events 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 Grafton Hazard Mitigation Plan 2018 is a planning tool to use to reduce future losses from natural 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 new 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 Grafton, 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 and 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 Homeland Security & Emergency Management, the US Forest Service, the Department of Natural & Cultural Resources (DNCR), NH Office of Strategic Initiatives (OSI) as well as routine notification of upcoming meetings to the state and federal entities above. Designation as a CWPP will allow a community to gain access to federal funding for hazardous fuels reduction and other mitigation projects supported by the US Forest Service. 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 Grafton understands that natural hazards do not recognize political boundaries.

There are no schools in Grafton therefore participation from academia was limited. All students attend school in the neighboring town of Canaan and no one from SAU 62 attended the meetings.

The Team 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 Grafton. A Press Release (see below) was posted on the Town's website, at the Post Office, Town Office and Transfer Station. Meeting dates were also posted on the Town's website (see on following page).

*Mapping and Planning Solutions
105 Union Street, Suite 1
Whitefield, NH 03598*

Press Release

FOR IMMEDIATE RELEASE
Updated: November 17, 2016

Contact: June Gameau
603-837-7122

**TOWN OF GRAFTON COMMENCES
HAZARD MITIGATION PLANNING**

The Town of Grafton's Emergency Management Director (EMD) recently met with June Gameau, of Mapping and Planning Solutions and other Team members from Grafton, to begin work on the 2017 Grafton 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; Grafton citizens and any interested stakeholders are invited to participate. All interested parties should contact John Babiarz, Fire Chief and Emergency Management Director at 523-8315 if they wish to be included in the process.

The next meeting is scheduled for **January 30, 2017 @ 10:00 AM** at the Grafton Fire Station. 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 Gameau at Mapping and Planning Solutions, 603-837-7122.

Town of Grafton NH

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Announcements/Meetings

For Scheduling Events/Functions at the
Grafton Town Hall,
Please call 603-523-7700

No Overnight Parking on Town Properties
Unless Authorized by Selectmen

Library Trustees - CANCELED
Thursday, August 17, 2017
Grafton Library

Cemetery Trustees
Thursday, August 17, 2017
6pm
Town Office

Hazard Mitigation Planning
Monday, August 21, 2017
10am
Grafton Fire Station

Town of Grafton Happenings

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
15	16 •Lincolnton •Fire Dept Volunteers - 6:30pm	17 •Library Trustees - 5pm •Board of Selectmen - 6pm	18	19 •Cemetery Trustees - 7pm	20	21
22	23	24 •Supervisors of the Checklist - 7pm	25	26 •Planning Board - 7pm	27	28
29	30 •Hazard Mitigation Planning - 5am	31	1	2 •Ladies Benevolent Society - 12pm	3	4

Town of Grafton Happenings

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
25	26	27	28	29	30	1
2	3	4 •All Town Offices CLOSED - Independence Day	5	6 •Ladies Benevolent Society - 12pm •Supervisors of the Checklist - 7pm	7 •Trustees of the Trust Fund - 6pm	8 •Grafton Independence Day Celebration 8am to Dusk
9	10 •Hazard Mitigation Planning 10am •Grafton Volunteer Fire Dept 6:30pm	11 •Board of Selectmen - 6pm	12	13 •Grafton Library Trustees - 5pm •Fire/Amb Auxiliary - 6pm •Recreation	14 •Town Check/Tax Collector and Selectmen Office CLOSED	15

Town of Grafton Happenings

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
30	1	2 •Board of Selectmen - 6pm	3	4 •Ladies Benevolent Society - 12pm •Selectmen's Office CLOSED	5	6
7	8 •Grafton Volunteer Fire Dept - 6:30pm	9 •Cemetery Trustees - 10am	10	11 •Grafton Library Trustees - 5pm •Fire/Amb Auxiliary - 6pm	12	13
14	15 •Hazard Mitigation Planning 10am	16 •Grafton Library Trustees - 5pm •Board of Selectmen - 6pm	17	18 •Cemetery Trustees - 7pm	19	20

Town of Grafton Happenings

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
26	27	28	29	30	31	1
5	6	7	8	9 •Ladies Benevolent Society - 10pm	10	11
12	13	14	15	16 •Recreation Committee - 7pm	17	18
19	20	21	22	23 •Cemetery Trustees - 7pm	24	25
26	27 •Hazard Mitigation Planning - 10:30am	28 •Board of Selectmen - 6am	29	30 •Grafton Library Trustees - 5pm	31 •Town Check/Tax Collector CLOSED	1 •Rabies Clinic - 1pm

Town of Grafton Happenings

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
13	14 •Grafton Volunteer Fire Dept - 6:30pm	15 •Board of Selectmen - 6pm	16	17 •Library Trustees - 5pm CANCELED •Cemetery Trustees - 6pm	18	19
20	21 •Hazard Mitigation Planning - 10am	22 •Library Trustees - 5pm	23	24 •Planning Board - 7pm	25	26
27	28 •Board of Selectmen - 4 Public Hearings - 6pm	29 •Supervisors of Checklist - 7pm	30	31 •Selectmen Office - CLOSED	1	2

Town of Grafton Happenings

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
28	29	30	31	1	2	3
4	5 •Safety Committee - 6am CANCELED	6 •Board of Selectmen - 6pm	7 •Hazard Mitigation Planning Meeting - 6am	8 •Grafton Library Trustees - 5pm •Fire/Amb Auxiliary - 6pm	9 •Last Day for Candidate Sign-up for 2018 Town Election	10 •Mascoma School District Deliberative Session - 9am •Supervisors of Checklist - 11am

Lastly, the Planner sent a monthly calendar to NH EMD's, Police Chiefs, Fire Chiefs, Rangers and other State, Federal and Private Officials throughout the State, including stake-holders for the Town (example shown below).




Upcoming Emergency Operations & Hazard Mitigation Plan Meetings

(Highlighted by "Counties" as of June 26, 2017)

Day	Date	Time	Town/Location	Plan Type	HSEM Field Rep	County
Tuesday	6/27/17	10:00 AM	Alton Town Hall	EOP	Shawna-Leigh Morton	Belknap
Tuesday	6/27/17	2:00 PM	Madison Fire Station	EOP	Heidi Lawton	Carroll
Friday	7/7/17	1:00 PM	Greenfield Fire Station	EOP	Heather Dunkerley	Hillsborough
Monday	7/10/17	10:00 AM	Grafton Fire Station	HMP	Paul Hatch	Grafton
Tuesday	7/11/17	9:00 AM	Haverhill Town Offices	HMP	Paul Hatch	Grafton
Wednesday	7/12/17	6:00 PM	Dalton Town Offices	HMP	Heidi Lawton	Coos
Tuesday	7/18/17	2:00 PM	Clarksville Town Offices	HMP	Heidi Lawton	Coos
Tuesday	7/18/17	6:00 PM	Stewartstown Town Offices	HMP	Heidi Lawton	Coos
Thursday	7/20/17	1:00 PM	Salem Town Offices	HMP	Alex Marinaccio	Rockingham
Monday	7/31/17	9:00 AM	Orford Fire Station	EOP	Paul Hatch	Grafton
Monday	7/31/17	1:00 PM	Piermont Old Church Building	HMP	Paul Hatch	Grafton
Tuesday	8/8/17	9:00 AM	Haverhill Town Offices	HMP	Paul Hatch	Grafton
Monday	8/21/17	6:30 PM	Orford Fire Station	EOP	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 very small populations, the percent of interested citizens in the rural towns' 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.

Grafton however had good attendance; Emergency Response and the Highway Department were represented at each meeting. Members of the Board of Selectmen and a former Planning Board member were also active participants in meetings. Lastly, two 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

As this is the first hazard mitigation plan developed by the Town of Grafton, the planning process included a review of other hazard mitigation plans for reference and mitigation ideas. Throughout the process, changes in development and consideration of local and regional hazards provided a good base for the development of this Plan. 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:

Grafton Master Plan (1987)	Community Information
Grafton Annual Report (2015-2016)	Fire Report & Development
Area Hazard Mitigation Plans (Whitefield, Orford, Lyme).....	Formats & Mitigation Ideas
The Grafton Subdivision Regulations (1979/2006).....	New Development Regulations
Census 2010 Data	Population Data
The NH DRA Summary of Inventory of Valuation MS-1 2016 for Grafton	Structure Evaluation
The Economic & Labor Market Information Bureau Community Response	Population Trends
The American Community Survey (ACS 2011-2015)	Population Trends
NH Forest Forests & Lands (DNCR)	DNCR Fire Report
NH Office of Strategic Initiatives (OSI)	Flood Losses
The NH Department of Revenue property tax valuation by property type	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.



Ruggles Mine, Grafton, NH
Photo Credit: <http://uppervalleynhvt.com/grafon-new-hampshire/>

G. 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 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 and Orientation, Goal Identification

Step 02: Formulate Hazards List, Hazards Description and Threat Matrix

Table 3.1 – Hazard Threat Analysis

Step 03: Profile, List and Map Historic and Potential Hazards, Wildfire, Natural and Human-Caused

Table 3.2 – Historic and Potential Hazards

Step 04: Profile, List and Map Critical Infrastructure and Key Resources

Tables 4.1 to 4.4 – Critical Infrastructure & Key Resources

Step 05: Assess Community's Participation in National Flood Insurance Program

Chapter 3, Section C

Step 06: Prepare an Introduction to the Community, discuss Emergency Service Capabilities, discuss Development Trends and review the Town Statistics

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

Step 07: List Existing Mitigation Strategies & Brainstorm to Identify Potential Mitigation Strategies

Table 6.1 – Current Plans, Policies and Mutual Aid

Step 08: Examine the Mitigation Strategies from the Prior Plan

Table 7.1 – Accomplishments since the Prior Plan (not applicable in Grafton)

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 Action Plan

Table 9.1 – The Mitigation Action Plan

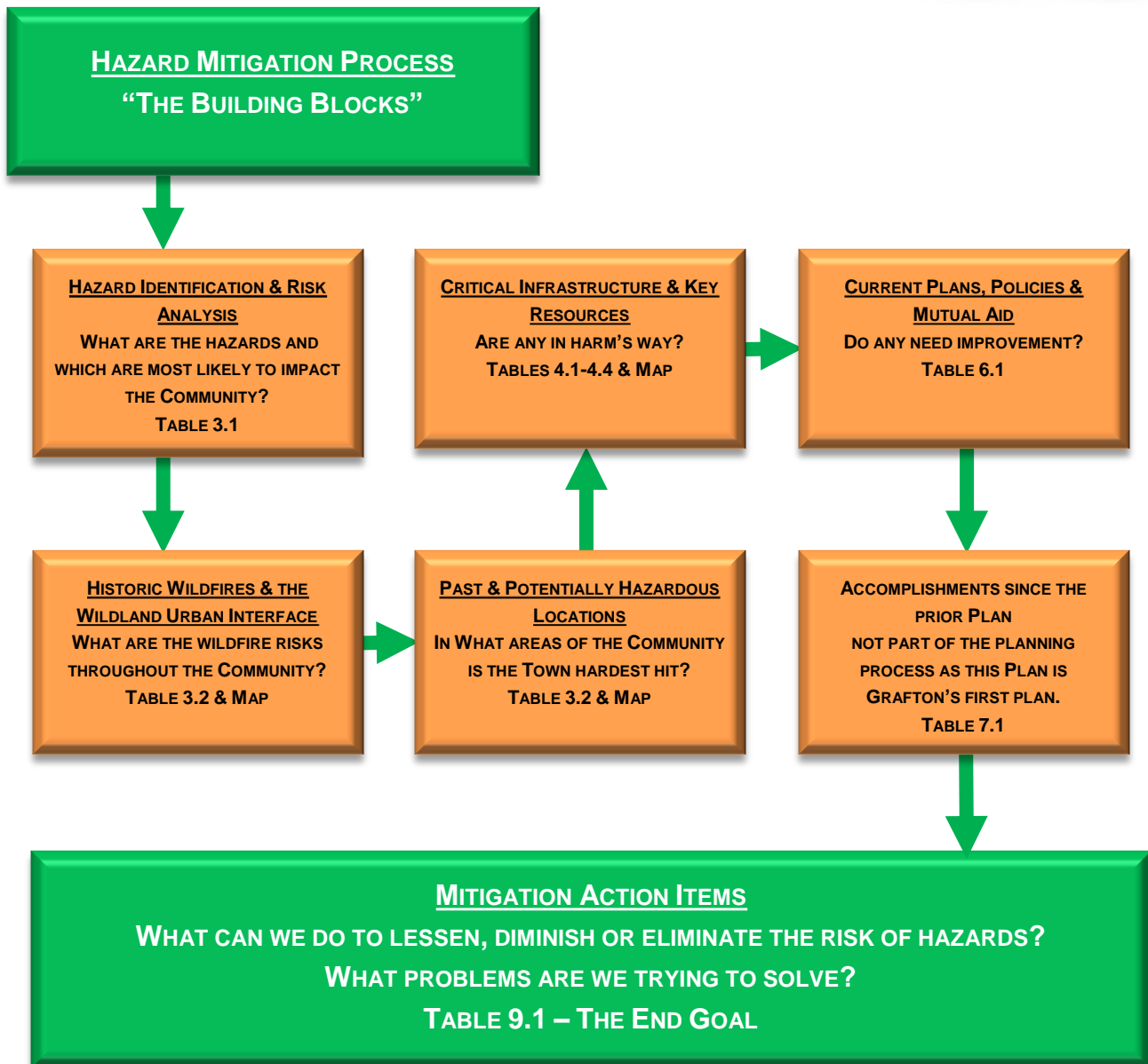
Step 11: Team Review of Plan Contents for Submission to HSEM/FEMA

Step 12: Adopt and Monitor the Plan

H. Hazard Mitigation Building Blocks & Tables

Using a “building block” approach, the base or foundation for this mitigation plan was other community’s plans. Each table that was completed had its starting point with the last hazard mitigation plan completed by the Community.

Ultimately, the “building blocks” lead 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.



I. Hazard Mitigation Goals

Before identifying new mitigation actions, the Team established and adopted the following broad hazard mitigation goals. The goals that are in the 2013 State of New Hampshire Multi-Hazard Mitigation Plan were reviewed. After discussing these goals, the current Grafton Hazard Mitigation Team agreed to the following goals for this Plan.

Community & Resource Protection

- To improve upon the protection of the general population, the citizens of Grafton and visitors, from all natural and human-caused hazards.
- To reduce Grafton's potential exposure to risk with respect to natural and human-caused hazards.
- To minimize the damage and public expense which might be caused to public and private buildings and infrastructure due to natural and human-caused hazards.

Coordination & Communication

- To improve the Town of Grafton's:
 - *Emergency preparedness and communication network.*
 - *Disaster response and recovery capability.*
- To identify, introduce and implement improvements to establish and maintain a reliable communication system.
- To improve communication capabilities so that the citizens of Grafton can be notified in the most efficient manner as possible.
- To ensure that regular communication occurs between various departments and with local, regional and state officials and to have up-to-date plans in place to address various emergency situations and ensure that those involved are aware of their responsibilities.

Outreach & Education

- To build an awareness of public responsibility for hazard mitigation.
- To raise the awareness and acceptance of hazard mitigation opportunities through public education and outreach programs.
- To increase public awareness of the fire risk and the Town's potential liability with respect to wildfires.

Damage Prevention & Reduction

- To reduce the potential impact of natural and human-caused disasters on the Town of Grafton's:
 - *Emergency Response Capability*
 - *Critical Infrastructure & Key Resources*
 - *Private property*
 - *Economy*
 - *Natural environment*
 - *Historic treasures and interests, as well as other tangible and intangible characteristics that add to the quality of life of the citizens and visitors to Grafton.*
- To identify, introduce and implement cost effective hazard mitigation measures so as to accomplish the Town's goals and objectives.
- To reduce the occurrence of road closures and road erosion due to localized flooding within the Town of Grafton.

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.

As this was Grafton's first Hazard Mitigation Plan, the planning process included a review of hazard mitigation plans from other communities and the NH State Hazard Mitigation Plan (2013) as the "base" for this hazard mitigation plan. Using these plans, each element of those plans was examined and considered for this Plan.

The following narrative explains how the 2018 Grafton Hazard Mitigation Plan was developed while considering changes in the Community and other factors that would affect hazards.

Meeting 1, November 16, 2016

The first full meeting of the Grafton Hazard Mitigation Team was held. Meeting attendance included Rosalie Babiarz (Planning Board – former), John Babiarz (Fire Chief), Russell Poitras (Police Chief), Jennie Joyce (Board of Selectmen), Robert Bassett (Road Agent), Brian Reed (Firefighter), Danielle Reed (Citizen), Sue Smith (Administrative Assistant), Ken Bean (Firefighter), Mike Pecararo (Firefighter), Paul Hatch (NH HSEM), Olin Garneau (Mapping & Planning Solutions) and June Garneau (Mapping & 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. In addition, June provided the Team with a sample email that would be sent to "stakeholders" to invite them to take part in the planning process; the Team reviewed the email and suggested additional stakeholders to be added to the invitation list.

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 weekend population change in Grafton; it was felt that any population increase during the winter months would be minimal but that the population during the summer months is likely to double.

HAZARDS MITIGATION POTENTIAL TEAM MEMBERS

FEDERAL

US Forest Service

STATE

Department of
Transportation (DOT)
Department of Cultural &
Natural Resources (DNCR)
RC&D (Non-Profit)

LOCAL

Selectmen (Past/Present)
Town Manager/Administrator
Town Planner
Police Chief
Fire Chief
EMD

Emergency 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 Threat Analysis*. 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; eleven natural hazards and five human-caused hazards were identified. After analyzing these hazards using Table 3.1, Severe Winter Weather & Ice Storms, Flooding (dam flooding, local roads, heavy rain, riverine, beaver dams) and Tornadoes & Downbursts were designated as the primary concerns.

Having completed Table 3.1, the Team started working on descriptions of each hazard and how they could, or do, impact the Town of Grafton specifically. In order to gain more knowledge of the impact of these hazards, June asked the Team to describe each hazard as it relates to Grafton. 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 strategies can we take to eliminate the hazard or diminish its impact?

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.

Time ran out before all of the hazard descriptions were complete, but before adjourning the meeting, June thanked the Team for their work and assigned “homework” to the Team members. June also asked the Team to think about the other hazardous events that have taken place in the past and to begin thinking about Critical Infrastructure and Key Resources (CIKR).

The next meeting was scheduled for January 30, 2017.

Meeting 1 – November 16, 2016

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
- 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) _____

Meeting 2, January 30, 2017

Meeting attendance included John Babiarz, Russell Poitras, Jennie Joyce, Robert Bassett, Merle Kenyon (Board of Selectmen), Steve White (Citizen), Brian Reed, Danielle Reed, Ken Bean, Mike Pecararo, Paul Hatch 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 and Table 3.1, Hazard Threat Analysis* to be certain the Team felt they were accurate. A few minor changes were made to Table 3.1.

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

Next on the agenda were *Tables 4.1–4.4, Critical Infrastructure and Key Resources (CIKR)*. The Emergency Response Facilities, the Non-Emergency Response Facilities, the Facilities & Populations to Protect and the Potential Resources were added to the tables according to the Team. In addition, the evacuation routes, helicopter landing zones and bridges on the evacuation routes were defined. Lastly, each of the Critical Infrastructure and Key Resources were analyzed for their “Hazard Risk”.

Tables 4.1-4.4 were not finished, but with time running out June reviewed what would take place at the next meeting and thanked the Team. The next meeting was set for March 27, 2017.

Meeting 3, March 27, 2017

Meeting attendance included John Babiarz, Jennie Joyce, Robert Bassett, Brian Reed, Danielle Reed, Ken Bean, Mike Pecararo, Paul Hatch and June Garneau.

First on the agenda was to finish *Tables 4.1-4.1, Critical Infrastructure & Key Resources (CIKR)* that was not finished at the previous meeting.

The Team then began work on *Table 3.2, Historic Hazard Identification*, a list of past and potentially hazardous locations and/or events. The Team examined the record of Presidential Disaster Declarations that have taken place in recent years, a record that shows substantial increase over past decades. At this point, the Team assisted June in mapping the hazards that were identified in *Table 3.2* for inclusion in *Map 3, Past & Potential Areas of Concern*.

Meeting 2 – January 30, 2017**1) Last Meeting**

- a) Discussed the process, community and stakeholder involvement, our overall goal to establish mitigation action items and the collaboration of other agencies.
- b) Completed Table 2.1
- c) Completed Table 3.1
- d) Worked on Hazard Descriptions

2) Today's Topics

- a) Review loose ends in Table 2.1
- b) Review Table 3.1 to see if order of hazards should remain as it is
- c) Finish Hazard Descriptions
- d) Table 3.2, Historic Hazard Identification & Mitigation Ideas
- e) Tables 4.1-4.4, Critical Infrastructure & Key Resources

3) Next Meeting

- a) Table 7.1, Accomplishments since the last Plan
- b) Table 6.1, Current Plans, Policies & Mutual Aid

4) Future Meetings

- a) _____

Meeting 3 – March 27, 2017**1) Last Meeting**

- a) Reviewed loose ends in Table 2.1
- b) Reviewed Table 3.1 to see if order of hazards should remain as it is
- c) Finished Hazard Descriptions
- d) Tables 4.1-4.4, Critical Infrastructure & Key Resources (partially complete)

2) Today's Topics

- a) Tables 4.1-4.4, Critical Infrastructure & Key Resources
 - i) Hazard Risk
 - ii) Mapping
- b) Table 3.2, Historic Hazard Identification
 - i) Mapping of hazardous areas
 - ii) Mitigation Ideas
- c) Table 6.1, Current Plans, Policies & Mutual Aid

3) Next Meeting

- a) Begin work on Mitigation Action Items & the STAPLEE

4) Future Meetings

- a) _____

June next explained the Wildland Urban Interface (WUI) and the Base Risk Analysis. Using GIS projection, June showed the Team *Map 1, Wildfire Base Risk Analysis*, and explained the process that was used to develop the map. June explained that slope, type of fuel (i.e., softwood or hardwood) and exposure (southwest being the most susceptible) were analyzed in GIS to determine where the high, medium and low risk areas of the Town were. It was obvious in *Map 1, Fire Base Risk Analysis* that there are many areas that are susceptible to wildfires, particularly the west-facing side of Isinglass Mountain.

Staying on the subject of wildfires, June discussed the Wildland Urban Interface (WUI) and projected a map of the WUI over the Grafton base layer and topography. The WUI was determined using GIS analysis to create a 300 foot buffer from the center line of all Class V roads and then an additional 1320 foot buffer from the first buffer (see *Map 2, Historic Wildfires & 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. Using GIS analysis and 1-foot aerial imagery (2015), June explained how she would determine the number of CIKR in the defined WUI. It should be noted that although the "WUI" was defined for the purpose of this Plan, many rangers and firefighters believe that towns with substantial wooded land, such as Grafton, are almost entirely within the Wildland Urban Interface.

Mitigation strategies were discussed to protect structures and to educate the Town's citizens about the risk in the high risk and WUI areas. It was determined that the Town would acquire Firewise materials to have available at the Town Offices, continue fire education at the local schools and continue education of State Fire Codes.

With time running out June set the next meeting date for May 15, 2017 and adjourned the meeting.

Meeting 4 – May 15, 2017

Meeting attendance included John Babiarz, Jennie Joyce, Robert Bassett, Ken Bean, Mike Pecararo, Paul Hatch, Olin Garneau and June Garneau.

First on the agenda was to review *Tables 4.1-4.4, Critical Infrastructure & Key Resources* and *Table 3.2, Historic Hazard Identification*. The Team made some minor adjustments and completed these two tables.

Next, the Team then began working on *Table 6.1, Current Plans, Policies & Mutual Aid*. Looking closely at current mechanisms that are in place the Team was able to determine whether the existing policies were effective or in "Need of Improvement". It was explained to the Team that those items that needed improvement would become new

Meeting 4 – May 15, 2017**1) Last Meeting**

- a) Tables 4.1-4.4, Critical Infrastructure & Key Resources
 - i) Hazard Risk
 - ii) Mapping
- b) Table 3.2, Historic Hazard Identification
 - i) Mapping of hazardous areas
 - ii) Mitigation Ideas

2) Today's Topics

- a) Table 6.1, Current Plans, Policies & Mutual Aid
- b) Begin to discuss mitigation action items (handout)

3) Next Meeting

- a) Work on Mitigation Action Items & the STAPLEE

4) Future Meetings

- a) _____

“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*.

For Table 6.1, the Team determined if each plan, policy or mutual aid system should be designated as “No Improvements Needed” or “Improvements Needed” based on the following “Key to Effectiveness”:

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.

The completion of *Table 6.1* resulted in several potential items that were designated as “Improvements Needed”. June explained how the “Improvements Needed” items would become new “Action Items” for this hazard mitigation plan.

To end the meeting, June provide the Team with handouts detailing a comprehensive list of possible mitigation action items (see Chapter 8, Section A & B and Appendix E). 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 Grafton.

Link to explore – FEMA Mitigation Ideas:

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

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 July 10, 2017.

Meeting 5 – July 10, 2017

Meeting attendance included Rosalie Babiarz, John Babiarz, Robert Bassett, Sue Smith, Ken Bean, Mike Pecararo, Olin Garneau and June Garneau.

The meeting began with 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 Threat Analysis*
- *Table 3.2 – Historic Hazard Identification*
- *Tables 4.1-4.4 – Critical Infrastructure & Key Resources*
- *Table 6.1 – Current Plans, Policies & Mutual Aid*

Meeting 5 – July 10, 2017

1) Last Meeting

- a) Reviewed....
 - i) Tables 4.1-4.4, Critical Infrastructure & Key Resources
 - ii) Table 3.2, Historic Hazard Identification
- b) Worked on....
 - i) Table 6.1, Current Plans, Policies & Mutual Aid

2) Today’s Topics

- a) Begin to discuss mitigation action items (handout)
- b) Table 9.1, Mitigation Action Plan & STAPLEE

3) Future Meetings

- a) _____

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

In addition to the action items identified in Table 6.1, 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 and Appendix E).

Next the Team began work on *Table 8.1, Potential Mitigation Action Items & the STAPLEE* and *Table 9.1, The Mitigation Action 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 Table 9.1 with the action items that had been deferred from Tables 6.1, 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.

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** Less than 1 year (0-12 months)
- **Medium Term** 2-3 years (13-36 months)
- **Long Term:** 4-5 years (37-60 months)

Work on this table included the STAPLEE process. Using the handouts provided by the Planner, the Team was able to go through the STAPLEE process for the action items that had been identified. It was explained that the STAPLEE process is a systematic method used to gauge the quality of each of the action items. The Social (S), Technical (T), Administrative (A), Political (P), Legal (L), Economic (E) and Environmental (E) impact for each action item would be discussed; this 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 9.1 and 8.1 were complete, there were a few action items to discuss at the next meeting as well as the “ranking” and “prioritizing” of each action item. June provided the Team with two handouts that would be used during the next meeting: an explanation of the STAPLEE process (Chapter 8) and an explanation of the Ranking/Prioritizing (Chapter 9) method.

The next meeting was scheduled for August 21, 2017.

Meeting 6 – August 21, 2017

Meeting attendance included Rosalie Babiarz, Robert Bassett, Ken Bean, Mike Pecararo, 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 Table 6.1, 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 twenty-four “Mitigation Action Items” that they felt were achievable and that would help to diminish the impact of natural hazards in the future; the average score for these mitigation action items is 19.79.

This meeting included a review of the events of July 1, 2017, when an unexpected and unusually heavy rain storm struck Grafton County. Fortunately, Grafton did not suffer significant damage during this storm.

Once 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. June organized the action items roughly by ongoing, short term, medium term and long term and made a handout for the Team. Using this handout the Team was able to see all of the action items clearly and to determine the correct ranking and priority.

The “ranking” of the action items was done based on the time frame, the Town’s authority to get the strategy accomplished and the STAPLEE score. This enabled the action items to be placed in four categories as shown below and in Chapter 9, Section A.

- **Category 0** was to include those items which are being done and will continue to be done in the future.
- **Category 1** was to include 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** was to include those items that the Town did 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** was to include those items that would take a major funding effort, those that the Town had little control over the final decision and those that would take in excess of 37 months to complete.

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 (see explanation in Chapter 9). 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.

Although no additional meetings were scheduled at this time, the Planner called for an additional meeting to discuss the Presidential Disaster Declaration (DR-4355) and any damage that occurred in October 2017.

Meeting 6 – August 21, 2017**1) Last Meeting**

- a) Reviewed....
 - i) Table 6.1, Current Plans, Policies & Mutual Aid
- b) Began to discuss mitigation action items (handout)
- c) Worked on Table 9.1, Mitigation Action Plan & STAPLEE

2) Today’s Topics

- a) Complete work on Table 9.1, Mitigation Action Plan & STAPLEE
- b) Discuss culverts and ditching
- c) Rank and Prioritize Action Items
- d) Collect any “additional” hours for the “match”
- e) Discuss procedure going forward

Meeting 7 – February 7, 2018

Meeting attendance included John Babiarz, Sherry Bean, Ken Bean, and June Garneau.

As some time had passed since our last meeting, the Planner felt the need to meet once again with the Town, in particular to discuss the impact of the unexpected and unusually heavy rain storm that struck New Hampshire in October 2017. Grafton was among many communities in five counties that suffered significant damage during this storm; the estimate of costs incurred in Grafton was thought to be approximately \$140,000.

It was determined that several areas of Grafton received damage during this storm including wind damage to the Fire Station, flooding and erosion on Prescott Hill Road, Wild Meadow Road, Riddle Hill Road and other smaller roads. We also reviewed the July 1, 2017 storm (DR-4329) to reconfirm that no significant damage occurred.

With these questions considered and 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.

Meeting 7 – February 7, 2018

1) Last Meeting

- a) Completed work on Table 9.1, Mitigation Action Plan & STAPLEE

2) Today's Topics

- a) Complete work on Table 9.1, Mitigation Action Plan & STAPLEE
- b) Discuss the July and October 2017 Disaster Declarations
 - i) For Table 3.2
 - ii) For Chapter 5
 - iii) Discuss additional culverts and ditching that may be needed
- c) Rank and Prioritize Action Items
- d) Tie up loose ends
- e) Discuss the "match"
- f) Discuss procedure going forward

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Chapter 2: Community Profile

A. Introduction

Grafton is located in Grafton County in the Dartmouth-Lake Sunapee Tourist Region in the mid-western part of New Hampshire. The Town is bordered by Orange and Alexandria to the north, Danbury to the east, Springfield to the south and Enfield to the west.

TOWN GOVERNMENT

A three-member Board of Selectmen governs the Town of Grafton. The Town's departments include, but are not limited to Fire, Police, Highway, Planning, Budget, Recreation, Trust Funds, Library, Treasurer, Tax Collector, and Cemetery.



Incorporated: 1778

Origin: This town was named for Augustus Henry Fitzroy, Duke of Grafton, Earl of Arlington and Euston, Viscount Thetford, and Baron Sudbury. The Duke was a pro-American member of English government prior to the Revolution, and related to Governor Benning Wentworth. Grafton County and Thetford, Vermont, were also named in honor of the Duke. Grantees of the initial 1761 charter voted to surrender their grant in 1762. The land was regranted in 1769 to new colonists, including John Hancock and James Otis, well-known Boston patriots.

Villages and Place Names: East Grafton, Grafton Center, Robinson Corner, Cardigan Station

Population, Year of the First Census Taken: 403 residents in 1790

Population Trends: Population change for Grafton totaled 844 over 55 years, from 348 in 1960 to 1,192 in 2015. The largest decennial percent change was 100 percent between 1970 and 1980, nearly doubling the population over those ten years. The 2015 Census estimate for Grafton was 1,192 residents, which ranked 175th among New Hampshire's incorporated cities and towns.

Population Density and Land Area, 2015 (US Census Bureau): 28.7 persons per square mile of land area. Grafton contains 41.6 square miles of land area and 0.8 square miles of inland water area.

Source: NH Community Profiles; October 2017
<https://www.nhes.nh.gov/elmi/products/cp/profiles-pdf/grafon.pdf>

DEMOGRAPHICS & HOUSING

Over the last 30 years, the population of Grafton has increased drastically; the population change from 1980 (739) to 2010 (1340) showed an increase of 601 according to US Census 2010. This represents a growth rate of approximately 81.3%. Grafton's population in 2015 was estimated to be 1,192.⁴

The American Community Survey (2011-2015) estimates a total of 829 housing units, most of which are single family (672). Multiple-family structures total 21 and mobile homes and other housing units number 136. The median household income is estimated to be \$48,750 and the median age is 47.5 years.⁵ Census 2010 estimates that of the 275 vacant housing units, 220 are used for recreational, seasonal or occasional use thus confirming the presence of second home and seasonal residents.

EDUCATION & CHILD CARE

Grafton student's grades K-12 are part of Mascoma Valley Regional along with Canaan, Dorchester, Enfield and Orange children. There are no licensed child care facilities in Grafton according to the Economic & Labor Market Information Bureau, Community Response, 2017.

NATURAL FEATURES

The Town of Grafton covers approximately 41.6 square miles of land area located in the scenic Dartmouth-Lake Sunapee Region tourism region of New Hampshire. Vegetation is typical of northern New England including both deciduous and conifer forests, open fields,

⁴ Economic & Labor Market Information Bureau, NH Employment Security, October 2017. Community Response 5/11/16

⁵ American Community Survey, 2011-2015; the Census Bureau

swamp and riverine areas. Grafton's terrain lends itself to an abundance of lakes, ponds, streams and rivers, most notably, Grafton Pond, Kilton Pond and Tewksbury Pond. The largest peak is Melvin Mountain at 2,177' above sea level. The lowest elevation in Town is approximately 870' above sea level in the center of town; much of the Community is over 1,000 feet above sea level which leaves it vulnerable to ice storms.

TRANSPORTATION

There are two major roadways running through Grafton. US Route 4 runs from Danbury in the east to Orange in the North. NH Route 4A goes through the lower south-west corner of the Community, travelling from Springfield to Enfield. Other smaller less traveled roads lend access to other areas of Grafton. All roadways in Grafton are susceptible to hazards such as road flooding and high winds leading to downed trees in the roadways and potential hazardous materials spills.

B. Emergency Services

EMERGENCY OPERATIONS CENTER & EMERGENCY MANAGEMENT DIRECTOR

The Emergency Management Director (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 Grafton the designated EOC is at the Fire Station. The Town Offices are the designated secondary EOC.

GRAFTON FIRE RESCUE & EMS

The Grafton Fire Department is a volunteer fire department providing quality fire services and emergency medical services to the residents and visitors of Grafton 24 hours a day, 365 days a year. The Department staffs a volunteer Chief, ten volunteer firefighters and operates one station within the Community. The Grafton Fire Department participates in Upper Valley Regional Emergency Services (UVRESA) along with area departments. Emergency medical services are provided by the Grafton Fire Department and Grafton Volunteer Ambulance, with medical transport provided by Grafton Volunteer Ambulance.

GRAFTON POLICE DEPARTMENT

The Police Department staffs a full-time Chief and one part-time officer. Grafton Police Officers are well-trained in the delivery of police services in an atmosphere of regional cooperation and have found value in working with other town and regional agencies, sharing resources, training and experience to provide a superior quality of life for the residents and visitors of Grafton. The Grafton Police Department has mutual aid agreements with bordering towns and the NH State Police and is dispatched by Grafton County Dispatch.

GRAFTON HIGHWAY DEPARTMENT

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

CODERED

The entire town is serviced by the CodeRED emergency alert system. Emergency response is dispatched through Hanover Dispatch.

MEDICAL FACILITIES

Dartmouth Hitchcock Medical Center (DHMC), Lebanon (25 miles, 417 beds) is the primary medical facility for Grafton. Other medical facilities that may be used are Alice Peck Day Memorial Hospital, Lebanon (23 miles, 25 beds) and New London Hospital, New London (22 miles, 25 beds)

EMERGENCY SHELTER(S)

The primary shelter is the location to which evacuees are directed at the time of an emergency. In Grafton, the designated primary shelter is the Grafton Fire Station which offers a sleeping area, bathrooms and kitchen facilities; the Fire Station is also equipped with a permanent generator. The secondary shelter for the Town is the Town Hall.

C. Grafton's Current & Future Development Trends

Over the last 10 years development in Grafton has been consistent with development trends in the rest of New Hampshire. Nearly every community in New Hampshire experienced a significant drop in new home construction since 2005; this trend is only now beginning to change as is evidenced by the chart to the right from City-Data.com which shows a slight uptick in building since 2011.⁶

The Team stated that no major development and no new subdivisions are currently under review, although it is not unlikely to have 1-2 small subdivision requests yearly. It was also noted that the Town has a 2-acre minimum lot size, but this is not "enforceable". There is no zoning or building permit requirement in Grafton, however building notifications are required to ensure septic system compatibility. The 2016 Annual Report does not include a report by the Planning Board which further signifies the lack of development.

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

- 2006: 69 buildings, average cost: \$171,000
- 2007: 8 buildings, average cost: \$181,200
- 2010: 7 buildings, average cost: \$165,900
- 2011: 1 building, cost: \$150,000
- 2012: 3 buildings, average cost: \$66,700
- 2013: 6 buildings, average cost: \$108,300
- 2014: 3 buildings, average cost: \$116,700

No large-scale development is anticipated in the near future. It was also noted that no development has recently occurred in hazard prone areas and no development has impacted the Town's hazard vulnerability. The Planning Board and the Board of Selectmen will monitor growth in Grafton using existing regulatory documents such as the Subdivision Regulations and the Grafton Master Plan. As a small community, Planning Board and Board of Selectmen 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.

⁶ <http://www.city-data.com/city/Grafton-New-Hampshire.html>

TABLE 2.1: TOWN STATISTICS

Table 2.1 - Town Statistics				
Census Population Data	2010	2000	1990	1980
Grafton, NH - Census Population Data	1,340	1,138	924	739
Grafton County	89,118	81,826	74,998	65,806
Population (*ACS 2011-2015)	1,192			
Elderly Population-% over 65 (*ACS 2011-2015)	18.6%			
Median Age (*ACS 2011-2015)	47.5			
Median Household Income (*ACS 2011-2015)	\$48,750			
Individuals below the poverty level (*ACS 2011-2015)	13.0%			
Change in Population - Winter %	0%			
Change in Population - Summer %	100%			
Housing Statistics (2010 Census)				
Total Housing Units	839			
Occupied Housing Units	564			
Owner Occupied Units	482			
Renter Occupied	82			
Vacant Housing Units	275			
Units for Seasonal, Recreational, Occasional Use	220			
Assessed Structure Value (2016-MS1)	Value		1% Damage	5% Damage
Residential Buildings	\$62,265,050		\$622,651	\$3,113,253
Manufactured Housing	\$5,095,000		\$50,950	\$254,750
Commercial Buildings	\$1,563,900		\$15,639	\$78,195
Other Utilities	\$0		\$0	\$0
Tax Exempt Buildings	\$311,100		\$3,111	\$15,555
Utilities	\$3,527,400		\$35,274	\$176,370
Total	\$72,762,450		\$727,625	\$3,638,123
Regional Coordination				
County	Grafton			
Tourism Region	Dartmouth-Lake Sunapee			
Municipal Services & Government				
Town Manager	No			
Board of Selectmen	Yes; elected			
Planning Board	Yes; elected			
School Board	Yes; elected for Mascoma School District			
Zoning Board of Adjustment	No			
Conservation Committee	No			

Table 2.1 - Town Statistics

<i>Master Plan</i>	1987
<i>Emergency Operations Plan (EOP)</i>	2009
<i>Hazard Mitigation Plan (HMP)</i>	No
<i>Zoning Ordinances</i>	No
<i>Subdivisions Regulations</i>	Yes; Adopted 1979; Amended 2006
<i>Capital Improvement Plan</i>	No
<i>Capital Reserve Funds</i>	Yes
<i>Building Permits Required</i>	Building Notification Only
<i>City Web Site</i>	Yes; www.townofgrafftonnh.com
<i>Floodplain Ordinance</i>	No
<i>Member of NFIP</i>	No
<i>Flood Insurance Rate Maps (DFIRMS)</i>	20-Feb-08
<i>Flood Insurance Rate Study (FIS)</i>	20-Feb-08
Percent of Local Assessed Valuation by Property Type (NH Department of Revenue-2016)	
<i>Residential Buildings</i>	94.1%
<i>Commercial Land & Buildings</i>	1.7%
<i>Other</i>	4.2%
Emergency Services	
<i>Town Emergency Warning System(s)</i>	CodeRED; Siren on fire station (only tested)
<i>School Emergency Warning System(s)</i>	Connect Five (school reverse 911 system)
<i>Emergency Page</i>	No
<i>Facebook Page</i>	Police Department
<i>ListServ</i>	No
<i>Local Newspapers</i>	Valley News; Concord Monitor
<i>Local TV Stations</i>	WMUR (9), WCAX (3), PBS (31)
<i>Local Radio</i>	WNTK, 99.7 FM; NPR 89.1 FM
<i>Police Department</i>	Yes full-time; full-time Chief, 1 part-time officer
<i>Police Dispatch</i>	Grafton County Dispatch
<i>Police Mutual Aid</i>	Danbury, Wilmot, Alexandria, Enfield & Canaan
<i>Animal Control Officer</i>	Police Department
<i>Fire Department</i>	Yes volunteer; volunteer Chief, ten volunteers firefighters
<i>Fire Dispatch</i>	Hanover Dispatch
<i>Fire Mutual Aid</i>	Upper Valley Regional Emergency Services Association (UVRESA)
<i>Fire Stations</i>	One
<i>Fire Warden</i>	Yes
<i>Emergency Medical Services</i>	Yes volunteer; 1 volunteer Captain, 4 volunteer EMTs
<i>EMS Dispatch</i>	Hanover Dispatch

Table 2.1 - Town Statistics

<i>Emergency Medical Transportation</i>	Grafton Volunteer Ambulance
<i>HazMat Team</i>	Central NH HazMat Team
<i>Established EMD</i>	Yes
<i>Established Deputy EMD</i>	No
<i>Public Health Network</i>	Upper Valley Regional Public Health Network
<i>Health Officer</i>	Yes (Police Chief)
<i>Building Inspector</i>	No
<i>Established Public Information Officer (PIO)</i>	No
<i>Primary Hospital</i>	Dartmouth-Hitchcock Medical Center, Lebanon (25 miles, 417)
<i>Alternative Hospitals</i>	Alice Peck Day Memorial, Lebanon (23 miles, 25 beds)
	New London Hospital, New London (22 miles, 25 beds)
<i>Local Humane Society or Veterinarians</i>	Upper Valley Humane Society (Enfield); Cardigan Veterinary Clinic (Canaan); Bristol Veterinary Hospital (Bristol)
<i>Primary EOC</i>	Fire Station
<i>Secondary EOC</i>	Town Offices (Town Hall as fallback)
<i>Primary Shelter</i>	Fire Station
<i>Secondary Shelter</i>	Town Hall (no generator)
Utilities	
<i>Town Sewer</i>	Private septic
<i>Highway Department</i>	Yes; Full-time Road Agent, two full-time; 1 part-time
<i>Public Works Mutual Aid</i>	Yes
<i>Water Supply</i>	Private wells
<i>Waste Water Treatment Plant</i>	No
<i>Electric Supplier</i>	Eversource Energy; NH Electric Coop
<i>Natural Gas Supplier</i>	None
<i>Cellular Telephone Access</i>	Limited
<i>High Speed Internet</i>	Limited; DSL with limited locations
<i>Telephone Company</i>	Consolidated Communications
Transportation	
<i>Primary Evacuation Routes</i>	US Route 4 & NH Route 4A
<i>Secondary Evacuation Routes</i>	Dean Road to Slab City Road to Prescott Hill Road; Wild Meadow Road to Lower Meadow Road; Orange Pond Road to Razor Hill Road to Turnpike Road; Kinsman Road to Grafton Pond Road
<i>Nearest Interstate</i>	I-89, Exit 17 & I-93, Exit 23 (each about 20 miles)
<i>Nearest Airstrip</i>	Newfound Valley, Bristol (1,900 ft. asphalt runway)

Table 2.1 - Town Statistics

Nearest Commercial Airport(s)	Lebanon Municipal (26.6 miles)	
	Manchester-Boston Regional (60.6 miles)	
	Boston Logan International Airport (107 miles)	
	Portland (ME) International (108 miles)	
Public Transportation	No	
Railroad	No	
Education & Childcare		
Elementary School	Grades PK-4 - Canaan Elementary School	
Middle School	Grades 5-8 - Indian River School (Canaan)	
High School	Grades 9-12 - Mascoma Valley Regional High School	
School Administrative Unit	SAU 62 (Canaan, Dorchester, Enfield, Grafton & Orange)	
Licensed Childcare Facilities	0 facilities, 0 capacity	
Conserved Land as a Percent of Land in the Community (GIS Analysis)		
	Square Miles	Percent of Town Land
Approximate Square Miles (including water)	42.4	100.00%
Approximate Total Un-Conserved Land	39.1	92.21%
Approximate Total Conserved Land (%)	3.3	7.79%
Approximate Federal Owned land (%)	0.0	0.00%
Approximate State Owned Land (%)	0.3	0.77%
Approximate Municipal/County Land (%)	0.5	1.29%
Approximate Private Land (%)	2.4	5.73%
Fire Statistics (NH Forests & Lands Report & the Town of Grafton)		
Wildfire Fire Calls (2015-16)	None more than 1 acre	
Grafton County Fire Statistics 2016	61 fires; 48.35 acres	
State Forest Fires FY 2016	395 fires; 723 acres	
*ACS: American Community Survey, US Census Bureau; a five year average of random long form surveys		
Information found in Table 2.1, unless otherwise noted, was derived from the Economic & Labor Market Information Bureau, NH Employment Security, October 2017. Community Response Received 5/11/2016; http://www.nh.gov/nhes/elmi/htmlprofiles/pdfs/grafon.pdf and from the Town of Grafton		

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Chapter 3: Hazard Identification

A. Description of the Hazards

The first step in hazard mitigation is to identify hazards; the Team determined that eleven natural hazards have potential to affect the Community. The hazards listed to the right and in Table 3.1 were classified based upon their relative threat score (as calculated in Column F in Table 3.1) and separated into three categories using Jenks' Optimization, which is also known as natural breaks classification. *"The natural breaks classification process is a method of manual data classification that seeks to partition data into classes based upon natural groups within the data distribution."*⁷

By using this grouping process, the Plan demonstrates each hazard's likelihood of occurrence in combination with its potential effect on the Town of Grafton. This process illustrates a comprehensive hazard statement and assists the Town with understanding which hazards should receive the most attention. Determination of the probability of occurrence is contained within Column D in Table 3.1; hazards are assessed based upon the likelihood of the hazard's manifestation within a 25 year period.

THE NATURAL HAZARDS

The natural hazards which are **MOST LIKELY** to affect Grafton include:

- Severe Winter Weather & Ice Storms
- Flooding (dam flooding, local roads, heavy rain, riverine, beaver dams)
- Tornadoes & Downbursts

The natural hazards which **MAY AFFECT** Grafton include:

- High Winds (windstorms)
- Extreme Temperatures (hot & cold)
- Hailstorms
- Drought

The natural hazards which are **LESS LIKELY** TO AFFECT Grafton include:

- Wildfire (1+ acre)
- Hurricanes & Tropical Storms
- Earthquakes
- Severe Thunder & Lightning Storms

Table 3.1 provides estimates of the level of impact 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.

Based on this analysis, the most likely natural disaster threat to Grafton is Severe Winter Weather & Ice Storms. The second most likely threat is Flooding (dam flooding, local roads, heavy rain, riverine, beaver dams) and the third is Tornadoes & Downbursts. Five human-caused hazards were also discussed by the Team and are included in the Hazard Threat Analysis and in Chapter 5. Human-caused hazards include Extended Power Failure (5+ days), Hazardous Materials – Fixed, Hazardous Materials – Transport, Terrorism and Epidemic/Pandemic.

In light of recent events (Tropical Storms Irene and Sandy), it should be noted that hurricanes and/or tropical storms have the potential to cause significant damage in Grafton as a result of both wind strength and flash flooding creating road closures and damage. Tropical Storm Irene impacted several of Grafton's roads; Tropical Storm Sandy had little or no impact. The Team noted that Category 1 or greater hurricanes would have a low probability of affecting Grafton; however there is a high probability that tropical rains could cause damage.

⁷ ESRI, <http://support.esri.com/en/knowledgebase/GISDictionary/term/natural%20breaks%20classification>

TABLE 3.1: HAZARD THREAT ANALYSIS

Table 3.1 - Hazard Threat Analysis						
Hazards which are most likely to affect the Community			A natural hazard is a source of harm or difficulty created by a meteorological, environmental or geological event.			
Hazards which may affect the Community						
Hazards which are less likely to affect the Community						
Scoring for Probability (Columns A, B, C & D)	Column A	Column B	Column C	Column D	Columns A+B+C/3	Columns D x E
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?	Probability of this occurring within 25 years	Average of Human, Property & Business Impact	Relative Threat
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) Severe Winter Weather & Ice Storms	1.0	3.0	1.0	5.0	1.7	8.3
2) Flooding (dam flooding, local roads, heavy rain, riverine, beaver dams)	1.0	3.0	1.0	5.0	1.7	8.3
3) Tornadoes & Downbursts	1.0	3.0	1.0	4.0	1.7	6.7
4) High Winds (windstorm)	1.0	3.0	1.0	4.0	1.7	6.7
5) Extreme Temperatures (hot & cold)	1.0	2.0	1.0	4.5	1.3	6.0
6) Hailstorms	1.0	2.0	1.0	3.0	1.3	4.0
7) Droughts	1.0	2.0	1.0	3.0	1.3	4.0
8) Wildfires (1+ acres)	1.0	3.0	1.0	2.0	1.7	3.3
9) Hurricanes & Tropical Storms	1.0	2.0	1.0	2.0	1.3	2.7
10) Earthquakes	1.0	2.0	1.0	2.0	1.3	2.7
11) Severe Thunder & Lightning Storms	1.0	1.0	1.0	2.0	1.0	2.0
Human-Caused Hazards						
1) Extended Power Failure (5+ days)	1.0	3.0	1.0	4.0	1.7	6.7
2) Hazardous Materials - Fixed Location	2.0	3.0	3.0	2.0	2.7	5.3
3) Hazardous Materials - Transport	2.0	3.0	1.0	2.0	2.0	4.0
4) Terrorism	4.0	4.0	1.0	1.0	3.0	3.0
5) Epidemic & Pandemic	4.0	1.0	2.0	1.0	2.3	2.3

B. Risk Assessment

The next step in hazard mitigation planning was to identify the location of past hazard events and if possible, what facilities or areas were impacted. The Team used *Table 3.1, Hazard Threat Analysis*, to identify potential threats and prioritize their threat potential. The Team then used a base map that included the 100-year floodplain, political boundaries, water bodies, the road network and aerial photos to locate many of the past hazard events on the base map. This step in the planning process serves as a stepping stone for predicting where future hazards could potentially occur. The Team identified past events in Grafton, Grafton County and the State and listed them in *Table 3.2, Historic Hazard Identification*.

To assess the fire base risk, a formula based on the following criteria was used:

- **Ignitability** – Using the 2001 NH Land Cover Assessment GIS Layer - A value between 0 and 9 was assigned based on ignitability to 23 land cover categories from open water to pitch pine forest.
- **Slope** - A value of 1-10 was assigned to various gradients of slope.
- **Aspect** - A value of 0-8 was assigned to various aspects from flat to southwest facing slopes.

These criteria were combined using GIS analysis and weighted equally to determine risk levels throughout the Town. Once the analysis and mapping was complete in GIS, a matrix was created showing varying risk levels: low, medium and high. Each risk level was assigned a color and was mapped over a base-map of the Town, see *Appendix G: Map Documents, Map 1: Base Risk Analysis*.

C. Grafton National Flood Insurance Program (NFIP) Status

Grafton is not a member of the National Flood Insurance Program. A small FEMA floodplain in Grafton exists along the Smith River, however, it was reported that flooding along the Smith River is rare and that few if any structures are susceptible to flooding. The Town has decided to not join the NFIP at this time but has agreed to review the need to join in the near future (*Action Item #20*). An email from NH OSI in January 2017 showed Grafton as a “non-member” and therefore shows that there are no repetitive loss properties.

As a small and close-knit community, the Grafton Board of Selectmen and the Hazard Mitigation Planning Team are most always aware of new construction and/or substantial improvements that take place in town. The Grafton Board of Selectmen has agreed to provide public outreach to notify the Town’s residents of flood mitigation techniques that can be used to diminish the impact of flooding (*Action Item #10*).

The latest Flood Insurance Rate Studies (FIRS) and DIFRMS are dated February 20, 2008.



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

D. Profile of Past, Present & Potential Wildfire Events in Grafton

Historic fires can serve to help residents determine where future fires may occur, understand how the landscape and land use may have changed over time and assist with determining priorities for future mitigation strategies.

The Grafton Planning Team noted that no significant wildfires have occurred in Grafton in the recent past, but that most of the Community's residences are located in the Wildland Urban Interface (WUI). It was noted that if the right conditions were in place, a large wildfire could occur. Grafton's forested lands include many of the factors associated with potential wildfire including steep terrain, a significant softwood forest and large areas where clear cuts and blow downs have occurred. In addition, there is no municipal water supply in Grafton so the fire department must rely on static water sources to fight fires in some areas.

E. Probability of Future Potential Disasters

Overall, the Town of Grafton is fairly safe from the effects of natural hazards. However, due to Grafton's geographic location, forested lands, steep hills, heavy snow pack and topography, there is always a possibility of future disasters in Grafton. The Town of Grafton has been impacted in the past by natural disasters, including flooding, lightning, severe winter storms and severe wind. Fortunately, many residents have generators and/or heat with wood stoves.

The top three hazards that are most likely to occur in Grafton, based on analysis done in *Table 3.1, Hazard Threat Analysis*, are described below.

SEVERE WINTER WEATHER & ICE STORMS

Severe winter weather events, particularly ice storms, are felt to pose a risk to the people of Grafton. Fortunately with a severe winter weather occurrence, so comes a vast knowledge of how to deal with the situation. In fact, even large single-storm accumulations of snow can generally be handled by the Town's Highway Department.

Ice storms on the other hand pose a serious threat as they are unpredictable and can create a mass amount of damage and long-lasting power outages. Areas above 1,000 feet are more susceptible to severe ice storms. Elevations in Grafton range from 870 feet at the Smith River to the summit of Melvin Mountain with an elevation of 2,177' above sea level⁸, therefore ice storms have a high probability of occurring in Grafton.

The probability that severe winter weather and ice storms will occur in Grafton is good. See Chapter 5 for more information on severe winter weather and ice storms in Grafton.

FLOODING (DAM FLOODING, LOCAL ROADS, HEAVY RAIN, RIVERINE, BEAVER DAMS)

Road flooding, washouts and closures can be significant in Grafton. With increased intensity of storms and logging operations that have affected the rate of stormwater flow down the mountains, it is expected that future road flooding will occur. As stormwater flows into ditches, debris that is picked up along the way often jams up culverts thus causing the stormwater to find other routes, going around culverts and across roads. It is hoped that with the most recent flood event on October 29, 2017, FEMA funding will be available through Presidential Disaster Declaration DR-4355, to mitigate road flooding for the future.

⁸ https://en.wikipedia.org/wiki/Grafton,_New_Hampshire

In addition to road flooding, other flooding issues also exist in Grafton including flooding from beaver dams, heavy rain and rapid snowmelt. There is a high probability that future flooding will occur in Grafton. However, the Town hopes that as a result of the damage done on October 29-November 1, 2017, most of the primary culvert issues can be mitigated with disaster funding. For more information on local road flooding, refer to Chapter 5.

TORNADOES & DOWNBURSTS

Although tornadoes and downbursts are not as common in New Hampshire as they are in the Midwest United States, an increase in the occurrence of tornadoes is expected as a result of climate change. Small tornadoes have been reported in recent years throughout the State.

A tornado generally covers a large area whereas a downburst generally covers a much smaller area. The Team reported a gustnado, "... a small, whirlwind which forms as an eddy in thunderstorm outflows"⁹ in 2014, which downed large trees, damaged several roofs and left a large amount of debris.

The probability of tornadoes and especially downbursts occurring in Grafton in the future is good, particularly with climate change. See Chapter 5 for more information on tornadoes and downbursts in Grafton.

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 Guide¹⁰. By including climate change in the new hazard mitigation guide for state planners, FEMA is recognizing the reality of climate change. Communities in New Hampshire, such as Grafton, should become increasingly aware of the effects of climate change on the natural hazards that are already being experienced.

STATE HAZARD MITIGATION PLAN

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

<u>State Hazard</u>	<u>Reason for exclusion from Grafton's Plan</u>
Coastal Flooding	Distance away from the sea
Radon	Felt to be an individual homeowner's responsibility
Landslide	No significant areas of mudslide, landslide or erosion
Radiological	Distance away from a nuclear power plant
Fire & Hazardous Materials	Addressed with "Wildfire" and "Hazard Materials Transport & Fixed"
Snow Avalanche	No known areas of avalanche that would impact people or structures

⁹ NOAA, <http://forecast.weather.gov/glossary.php?word=GUSTNADO>

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

HAZARD PROBABILITY COMBINED WITH POWER FAILURE

Any potential disaster in Grafton is particularly impactful if combined with power failure, 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 citizens. In addition, winter in New England commonly brings very low temperatures, while high temperatures can be experienced in the summer.

HAZARD PROBABILITY COMBINED TRANSPORTATION

US Route 4 serves as the major north-south roadway for those travelling from I-93 in the Concord area to I-91 (VT) in the Hanover area. NH Route 4A travels from Springfield, through the most southwest corner of Grafton into Enfield. The two highways carry a considerable amount of vehicular traffic and are major routes between many communities.

Grafton's roads are often travelled by trucks and busses carrying goods and people from southern NH and/or Vermont to other parts of the State. Many of Grafton's roads are narrow and winding and subject to severe winter weather; these roads are beautiful in the spring, fall and summer months, but 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.

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

TABLE 3.2: HISTORIC HAZARD IDENTIFICATION**2018 HMPT = 2018 Hazard Mitigation Planning Team****DR Presidential Disaster Declarations (DR) since 1953****EM Emergency Declarations (EM) since 1953****Table 3.2 - Historic Hazard Identification - Chronological Order, earliest to latest**

Type of Event	Date	Location	Impact	Source
Past Flooding Hazards including Riverine, Heavy Rainfall, Rapid Snowmelt, Ice Jam Flooding & 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. Areas prone to flooding and road erosion were mapped can be seen on Map 3, Past & Potential Areas of Concern ; flood events have the potential to impact the Community on a town-wide basis.				
Severe Storms & Flooding	July 11, 1973	Wild Meadows Road & Others	Presidential Disaster Declaration DR-399: Grafton was hit with a severe summer storm that washed out Wild Meadows Road; worse flooding seen in Grafton in many years; 1/2 or the roads in town were impassable. (Map 3, ID #1)	FEMA & 2018 HMPT
Severe Storms & Flooding	October 7-18, 2005	Belknap, Cheshire, Grafton, Hillsborough, Merrimack & Sullivan	Presidential 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; no significant impact in the Town of Grafton.	FEMA & 2018 HMPT
Severe Storms & Flooding	May 12-23, 2006	Belknap, Carroll, Grafton, Hillsborough, Merrimack, Rockingham & Strafford	Presidential Disaster Declaration DR-1643: Flooding in most of southern NH, May 12-23, 2006. (Aka: Mother's Day Storm); Grafton Fire Department went to Andover to pump out Proctor Academy; problem has been mitigated; some minor flooding on Route 4 near Grafton/Danbury line.	FEMA & 2018 HMPT
Nor'easter, Severe Storms & Flooding	April 15-23, 2007	All Ten NH Counties	Presidential Disaster Declaration DR-1695: Flood damages; FEMA & SBA obligated more than \$27.9 million in disaster aid following the April nor'easter. (Aka: Tax Day Storm); Grafton had more than 40" of snow; Road Agent spent three days cleaning up after this storm.	FEMA & 2018 HMPT
Severe Storms & Flooding	July 24-August 14, 2008	Belknap, Carroll & Grafton & Coos	Presidential Declaration DR-1787: Severe storms, tornado and flooding on July 24, 2008; no significant impact in the Town of Grafton; a tornado touched down in Carroll County but did not reach the town of Grafton.	FEMA & 2018 HMPT
Severe Storms & Flooding	May 26-30, 2011	Coos & Grafton County	Presidential Disaster Declaration DR-4006: May Flooding Event, May 26th-30th 2011 Coos & Grafton County. (aka: Memorial Day Weekend Storm); no significant impact in the Town of Grafton.	FEMA & 2018 HMPT

Table 3.2 - Historic Hazard Identification - Chronological Order, earliest to latest

Severe Storms, Flooding	July 9-10, 2013	Cheshire, Sullivan & Grafton	Emergency 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; no significant impact in the Town of Grafton.	FEMA & 2018 HMPT
Severe Storms, Flooding	July 1-2, 2017	Grafton County	Presidential 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; no significant impact in Grafton from this storm.	FEMA & 2018 HMPT
Severe Storms, Flooding	October 29-November 1, 2017	Sullivan, Grafton, Coos, Carroll & Belknap	Presidential 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; flooding and wind damage occurred; wind damage to Fire Station; multiple roads experienced flooding and erosion; Prescott Hill Road flooded; an approximate 1/2 miles of Wild Meadow Road flooded destroying several culverts; other roads were also affected by this storm; logging operations may have exasperated the situation; Riddle Hill Road also experienced road flooding and erosion; the Smith River overflowed its banks but did not cause building damage; Town will be submitting approximately \$140,000 worth of storm damages to FEMA under this Presidential Disaster Declaration.	FEMA & 2018 HMPT
Severe Storms, Flooding	Past & Potential Flooding	Spectacle Pond Road Turnpike Road Prescott Hill Road	Several areas of town known to have experienced flooding in the past and that would likely experience flooding in the future. (Map 3, ID #s 2, 3, 4)	2018 HMPT
Past Wildfire Hazards: 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 were not mapped in Map 2, Historic Wildfires & the Wildland Urban Interface , however, the Wildland Urban Interface is shown on this map; wildfires have the potential to impact the Community on a town-wide basis.				
Wildfire	2-Jul-53	NA	Presidential Disaster Declaration DR-11: Happened in another part of the state; no impact in Grafton.	FEMA & 2018 HMPT
Wildfire	Potential	Isinglass Mountain & Spectacle Pond	Area of wildfire potential in a very inaccessible location. (Map 3, ID #5)	2018 HMPT
No significant wildfires (1+acres) have occurred in Grafton in the past 5-10 years				

Table 3.2 - Historic Hazard Identification - Chronological Order, earliest to latest

Past High Wind Hazards including Hurricanes, Tropical Storms, 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. These hazards were not mapped although several areas where flooding has occurred are shown on **Map 3, Past & Potential Areas of Concern**; tornadoes and other wind events have the potential to impact the Community on a town-wide basis. There have not been any historical occurrences of hurricanes since 2012 in Grafton.

1938 Hurricane	September 21, 1938	Region Wide	The Great New England Hurricane: Statewide there were 12 (or 13) deaths; damages in NH were about \$12.3 million dollars in 1938 dollars (about \$200 million now); in New England, 20,000 structures were damaged, 26,000 automobiles lost, 6,000 boats, 325, 000 sugar maples were lost and 80% of the people lost power (<i>Source</i> http://nhpr.org/post/75th-anniversary-new-englands-greatest-hurricane); as with the rest of NH, the 1938 Hurricane brought heavy rains to Grafton but there was no recollection of significant wind damage or flooding although one team member stated that her mother use to talk about this hurricane.	2018 HMPT
Hurricanes Carol & Edna	August 31, 1954	Region Wide	Hurricane Carol: Hurricane Carol resulted in an extensive amount of trees blown down and property damage; large crop loss; localized flooding; winds measured at over 100 mph; followed by Hurricane Edna just 12 days later, which caused already weakened trees to fall. (<i>Source:</i> http://www.wmur.com/Timeline-History-Of-NH-Hurricanes/11861310); Grafton experienced high winds and heavy rain but no damage was recalled by the 2017 HMPT.	2018 HMPT
Hurricane Bob, Severe Storm	August 18-20, 1991	Region Wide	Presidential Disaster Declaration DR-917: Although Hurricane Bob brought heavy rains to Grafton; there was no significant wind damage or flooding.	FEMA & 2018 HMPT
Tropical Storm Floyd	September 16-18, 1999	Belknap, Cheshire & Grafton	Presidential 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; Tropical Storm Floyd brought heavy rains to Grafton, significant wind damage and flooding, lost almost all of Wild Meadows Road and a number of other roads as well.	FEMA & 2018 HMPT
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; no evacuees or pets came to Grafton as a result of Hurricane Katrina.	FEMA & 2018 HMPT

Table 3.2 - Historic Hazard Identification - Chronological Order, earliest to latest

Hurricane & Tropical Storm Irene	August 26-September 6, 2011	EM 3333: All Ten NH Counties DR-4026: Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, & Sullivan	Emergency Declaration EM-3333 & Presidential Disaster Declaration DR-4026: Tropical Storm Irene Aug 26th- Sept 6, 2011 Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, & Sullivan Counties; Emergency Declaration for all ten counties; several areas of Grafton experienced flooding during Tropical Storm Irene when 5.5" of rain fell in one hour; Millbrook Road washed out; Spectacle Pond Road, Wild Meadow and Riddle Hill Road washed out as well; one home had water in basement but it has since been mitigated; Route 4 flooded near Bullocks Crossing due to volume of rain; FEMA funding was received for Tropical Storm Irene, roughly 1.2 million dollars.	FEMA & 2018 HMPT
Hurricane & Tropical Storm Sandy	October 26-November 8, 2012	EM 3660: All Ten NH Counties DR-4095: Belknap, Carroll, Coos, Grafton & Sullivan	Emergency Declaration EM-3660 & Presidential 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; although Tropical Storm Sandy brought heavy rains to Grafton, there was no significant wind damage or flooding.	FEMA & 2018 HMPT
Microburst (Downburst)	July 3, 2014	Slab City Road & Prescott Hill Road	A "gustnado" (wind leading edge of severe thunderstorm) was reported by the Team; the winds came down from mountains taking down large trees and damaging several roofs; one tree fell into a bedroom but no one was hurt; the gustnado was of short duration, very sporadic and localized, lots of trees taken down in the vicinity of Wild Meadow Road, Slab City Road and Prescott Hill Road; in some places trees were down but paper plates on a table were not affected; some roads were closed but open by the next morning; sounded like a freight train; it took 22 10-wheel loads to remove the large amount of debris. (<i>Map 3, ID #5</i>)	2018 HMPT
Past Severe Winter Weather Hazards 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. These hazards were not mapped; severe winter weather and ice storms have the potential to impact the Community on a town-wide basis. There have not been any historical occurrences of significant winter weather since 2013 in Grafton.				
Snowstorms	Winter of 1968-69	Region Wide	The winter of 1968-69 brought record amounts of snow to all of NH; 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; all of NH experienced difficulty with snow removal because of the great depths that had fallen from December 1968 to April 1969; no significant recollection in Grafton other than heavy snow that was handled by the Road Agent.	2018 HMPT
High Winds, Tidal Surge, Coastal Flooding & Snow	February 6, 1978	Region Wide	Presidential Disaster Declaration DR-549: Blizzard of '78; region-wide Blizzard severely affecting southern New England and leaving high accumulations throughout all of New England and New Hampshire; events accumulations to 28" in northeast New Hampshire, 25" in west central New Hampshire and 33" along coastal New Hampshire; hurricane-force winds and record-breaking snowfall made this storm one of the more intense to occur this century across parts of the northeastern United States; heavy snow accumulations handled by the Road Agent.	FEMA & 2018 HMPT

Table 3.2 - Historic Hazard Identification - Chronological Order, earliest to latest

Ice Storm	January 7-25, 1998	Grafton (town)	Presidential Disaster Declaration DR-1199: Grafton experienced trees down on Kinsman Highway and Dean Hill Road as well as in many other places all over town; worse at elevations over 900'; some people out of power for about ten days; tree damage along roads and in forest which created future wildfire risk; used heavy equipment to move trees and ice.	FEMA & 2018 HMPT
Snowstorm	March 5-7, 2001	Cheshire, Coos, Grafton, Hillsborough, Merrimack, & Strafford	Emergency Declaration EM-3166: Declaration covers jurisdictions with record and near-record snowfall from the late winter storm that occurred March 2001; heavy snow accumulation in Grafton handled by the Road Agent.	FEMA & 2018 HMPT
Snowstorm	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; heavy snow accumulation in Grafton handled by the Road Agent.	FEMA & 2018 HMPT
Snowstorms	March 11-12, 2005 January 22-23, 2005 February 10-11, 2005	EM-3207 (Jan): Belknap, Carroll, Cheshire, Grafton, Hillsborough, Rockingham, Merrimack, Strafford & Sullivan EM-3208 (Feb): Carroll, Cheshire, Coos, Grafton & Sullivan EM-3201 (Mar): Carroll, Cheshire, Hillsborough, Rockingham & Sullivan	Emergency Declaration EM-3207: January storm; more than \$3.5 million had been approved to help pay for costs of the heavy snow and high winds; total aid for the January storm was \$3,658,114.66 (Grafton: \$137,118.71); Emergency Declaration EM-3208: February storm; total aid for the February storm was \$1,121,727.20 (Grafton: \$213,539.52) 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 earlier this year, according to disaster recovery officials. 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); Grafton County received aid for one of these storms; some trees down from weight of snow but otherwise only minor damage; heavy snow accumulation in Grafton handled by the Road Agent.	FEMA & 2018 HMPT
Severe Winter Storm & Ice Storm	December 11-23, 2008	All Ten NH Counties	Presidential Disaster Declaration DR-1812 & Emergency Declaration EM-3297: Damaging ice storms to entire state including all 10 NH counties; fallen trees and large scale power outages; nearly \$15 million in federal aid had been obligated by May 2009; this ice storm although bad in more southern parts of the state, did not have a significant impact in Grafton.	FEMA & 2018 HMPT

Table 3.2 - Historic Hazard Identification - Chronological Order, earliest to latest

Severe Winter Storm, Rain & Flooding	February 23 - March 3, 2010	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan	Presidential 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; no significant impact in Grafton.	FEMA & 2018 HMPT
Severe Snow Storm	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. (Aka: Snowtober); no significant impact in Grafton.	FEMA & 2018 HMPT
Severe Winter Storm	February 8, 2013	All Ten NH Counties	Emergency Declaration DR-4105: Nemo; heavy snow in February 2013; no significant impact in Grafton.	FEMA & 2018 HMPT
Past Earthquake Hazards: 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 result in little or no damage and have not exceeded a magnitude of 5.5 since 1940. These hazards were not mapped; earthquakes have the potential to impact the Community on a town-wide basis.				
Earthquake	12/20/40	Ossipee, NH	Magnitude 5.5	State Hazard Mitigation Plan 2013
Earthquake	12/24/40	Ossipee, NH	Magnitude 5.5	
Earthquake	12/28/47	Dover NH-Foxcroft, ME	Magnitude 4.5	
Earthquake	06/10/51	Kingston, RI	Magnitude 4.6	
Earthquake	04/26/57	Portland, ME	Magnitude 4.7	
Earthquake	04/10/62	Middlebury, VT	Magnitude 4.2	
Earthquake	06/15/73	Quebec Border / NH	Magnitude 4.8	
Earthquake	01/19/82	West of Laconia, NH	Magnitude 4.5	
Earthquake	06/23/10	Ontario-Quebec Border	Magnitude 5.0	
Earthquake	06/26/10	Boscawen, NH	Magnitude 3.1	
Earthquake	08/23/11	Virginia	Magnitude 5.8	
Earthquake	09/18/12	Concord, NH	Magnitude 1.2	
Earthquake	10/16/12	Waterboro, ME	Magnitude 4.0 (not felt in Grafton)	
Earthquake	2/15/15	East Kingston, NH	Magnitude 2.7 (not felt in Grafton)	USGS
Earthquake	3/21/16	Contoocook, NH	Magnitude 2.8 (not felt in Grafton)	

Table 3.2 - Historic Hazard Identification - Chronological Order, earliest to latest

Past Drought Hazards: 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. These hazards were not mapped; however droughts have the potential to impact the Community on a town-wide basis.

Drought	1929-1936	Statewide	Regional	NH Drought Historical Event - NH DES
Drought	1939-1944	Statewide	Severe in southeast and moderate elsewhere	
Drought	1947-1950	Statewide	Moderate	
Drought	1960-1969	Statewide	Regional longest recorded continuous spell of less than normal precipitation	
Drought	2001-2002	Statewide	Third worst drought on record;	
Drought	Summer 2016	Statewide	Several dug and drilled wells dried up in Grafton during this period; several small fires resulted but nothing significant.	2018 HMPT

Other Past or Potential Hazards: Human-caused hazards and other unusual hazardous events have been noted throughout NH. Among others, one concern is the transport of hazardous material through communities by rail and tractor-trailer. No other past or potential hazards were identified by the 2017 HMPT; however, other natural or human-caused hazards have the potential to impact the Community on a town-wide basis.

High Winds (windstorm)	<p>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 town wide basis.</p> <p>See Table 3.1, Hazard Threat Analysis and Chapter 5 for more details on these hazards.</p>
Extreme Temperatures (hot & cold)	
Hailstorm	
Severe Thunder & Lightning Storms	
Extended Power Failure (5+ days)	
Hazardous Materials - Fixed Location	
Hazardous Materials - Transport	
Terrorism	
Epidemic & Pandemic	

*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.tornadopproject.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 Presidential Disaster and Emergency Declaration, Appendix D, NH Presidential & Emergency Declarations.

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Chapter 4: Critical Infrastructure & Key Resources (CIKR)

With Team discussion and brainstorming, Critical Infrastructure and Key Resources (CIKR) within Grafton were identified and mapped for this Plan. The “ID” number in the following lists is also represented as a CIKR in *Appendix G: Map Documents, Map 4: Critical Infrastructure and Key Resources*. Facilities located in adjacent towns were not mapped (NM). 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)				
ERFs are primary facilities and resources that may be immediately needed during an emergency response.				
Map ID	Facility	Expected use of the Facility	Hazard Risk	
1	Fire Station	Primary EOC Primary Shelter; Fire Response	All Hazards	1
2	Town Office/Police Station	Secondary EOC Town Government Records Law Enforcement	All Hazards	1
3	Highway Garage	Heavy Equipment Sand & Gravel	All Hazards	1
NM	Mascoma Regional High School	Regional Shelter	All Hazards & Flooding (for entrance road only)	1
Helicopter Landing Zones (shown in Map #4 with labels)				
4	Recreation Field	Heli Landing Zone	All Hazards	1
5	Sergeant Field	Heli Landing Zone	All Hazards	1
6	Deerfield Farm	Heli Landing Zone	All Hazards	1
7	Ed Edstrom Field	Heli Landing Zone	All Hazards	1
Major Bridges on the Evacuation Routes (shown in Map #4 without labels)				
8	Route 4 @ Smith River (1)	Major Bridges on Evacuation Routes (smaller bridges and culverts were not mapped)		
9	Route 4 @ Smith River (2)			
10	Route 4 @ Mill Brook			
11	Route 4A @ Bog Brook			
12	Kinsman Road @ Smith Brook			
13	Slab City Road @ Smith Brook			
14	Turnpike Road & Mill Brook			
15	Wild Meadow Road @ Mill Brook			

Emergency Response Facilities (ERF)				
Dams (shown in Map #4 with labels)				
16	Grafton Pond Dam (could flood Enfield)	Dam	All Hazards & Flooding	1
17	Kilton Dam (Route 4) (wide dispersal area)	Dam	All Hazards & Flooding	1
18	Grant's Pond Dam (no effect)	Dam	All Hazards	1
Evacuation Routes (shown in Map #4 without labels)				
US Route 4		Evacuation Route	All Hazards & Flooding	1
NH Route 4A		Evacuation Route	All Hazards & Flooding	1
Dean Road to Slab City Road to Prescott Hill Road		Evacuation Route	All Hazards & Flooding	1
Wild Meadow Road to Lower Meadow Road		Evacuation Route	All Hazards & Flooding	2
Orange Pond Road to Razor Hill Road to Turnpike Road		Evacuation Route	All Hazards & Flooding	2
Kinsman Road to Grafton Pond Road		Evacuation Route	All Hazards & Flooding	1

TABLE 4.2 – NON- EMERGENCY RESPONSE FACILITIES (NERF)

Non-Emergency Response Facilities (NERF)			
NERFs are facilities, that although they are critical, they are not necessary for the immediate emergency response efforts; this includes facilities to protect public health and safety, utilities, and provide backup to emergency facilities.			
Map ID	Facility	Expected use of the Facility	Hazard Risk
No Non-Emergency Response Facilities (NERF) were identified			

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 hazard event.				
Map ID	Facility	Expected use of the Facility	Hazard Risk	
19	Eastern Propane (Route 4)	Place to protect	All Hazards & Hazmit Fixed	2
20	Propane Depot (Route 4A)	Place to protect	All Hazards & Hazmit Fixed	3
21	Carding Mill	Historic	All Hazards & Flooding	1
22	Millbrook Christian Church	Possible Secondary Shelter - Gathering of People	All Hazards	1
23	Town Hall	Gathering of People	All Hazards	1
24	Historical Society	Historic Records	All Hazards	1
25	Pine School (Cherry Hill)	Historic	All Hazards	1
26	Christian Union Church	Gathering of People	All Hazards	1
27	Half Moon Pond	Collection of summer camps	All Hazards & Wildfire	2

TABLE 4.4 – POTENTIAL RESOURCES (PR)

Potential Resources (PRs)				
PRs are potential resources that could be helpful for emergency response in the case of a hazard event.				
Map ID	Facility	Expected use of the Facility	Hazard Risk	
28	State NH DOT Shed	Sand	All Hazards	1
29	Grafton Country Store	Food & Water	All Hazards	1
30	Razer Hill Construction	Contractor	All Hazards	1
NM	Franks Services	Contractor & Towing	All Hazards	1
NM	SG Reed (Claremont)	Towing (large vehicles)	All Hazards	1
NM	Sable & Sons (White River Junction, VT)	Towing (large vehicles)	All Hazards	1
NM	Canaan Hardware (Canaan)	Hardware, etc.	All Hazards & Flooding	2
NM	Enfield Pharmacy (Enfield)	Pharmacy	All Hazards	1
NM	Mascoma Health (Canaan)	Clinic/Pharmacy	All Hazards	1
For additional resources, please refer to the Town's Emergency Operations Plan (EOP)				

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Chapter 5: Hazard Effects in Grafton

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 GIS analysis and aerial imagery, at-risk CIKR were identified throughout the Town.

All CIKR in Grafton were identified in GIS; this list was then narrowed by those CIKR that were located in the FEMA floodplain. Using GIS analysis, no CIKR that were listed in Tables 4.1-4.4 were found to be in the FEMA floodplain, including bridges and dams. As noted elsewhere in this Plan, the FEMA floodplain is limited to a small area along the Smith River. Although no CIKR were found to be in the designated FEMA floodplain, it is noted that a few non-CIKR structures are within the FEMA floodplain. Town officials should keep 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 and Key Resources are most vulnerable to wildfires.

Many structures were found to be in the traditional WUI, however, only two CIKR were found in the WUI: Ed Edstrom Field (Map ID #7, Heli LZ) and the Millbrook Christian Church (ID #22, possible shelter) as seen in *Map #2, Historic Wildfires & the Wildland Urban Interface*. An analysis of these CIKR reveals a good deal of defensible space around each.

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 Grafton, 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.



The Grafton Town Hall
Photo Credit: MAPS

Table 3.1, The Hazard Threat Analysis, 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 a natural or human-caused hazard 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 Grafton's structures, depending on the nature of the hazard and whether or not the hazard is localized.

MS-1 Assessed Value of All Structures			
2016 MS1	Value	1% Damage	5% Damage
Residential	\$62,265,050	\$622,651	\$3,113,253
Manufactured Housing	\$5,095,000	\$50,950	\$254,750
Commercial	\$1,563,900	\$15,639	\$78,195
Other Utilities	\$0	\$0	\$0
Tax Exempt	\$3,111,100	\$31,111	\$155,555
Utilities	\$3,527,400	\$35,274	\$176,370
Total	\$75,562,450	\$755,625	\$3,778,123
Provided by the Town, 1/27/17			

Based on this assumption, the potential loss from any of the identified hazards would range from **\$0 to \$755,625** or **\$755,625 to \$3,778,123** based on the 2016 Grafton town valuations which lists the assessed value of all structures in Grafton to be **\$75,562,450** (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.

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 Threat Analysis*.

1) Severe Winter Weather & Ice Storms \$755,625 to \$3,778,123



Heavy snowstorms typically occur from December through April. New England usually experiences at least one or two heavy snow storms 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 Grafton in the past. The ability to get in and out of town and emergency service access can be hindered.

All of these impacts are a risk to the Community, including isolation, particularly of the elderly and increased traffic accidents. 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. Storms with accumulation of three or more feet have occurred; blizzards of this type could diminish food supplies within two days. Heavy snow such as this can also cause roof collapse, heart attacks due to over work from shoveling and carbon monoxide issues within homes. One winter storm brought 42" of snow to Grafton in a 12 hour period; the Road Agent had to use the loader and grader to move snow and some roads were not passable for three days.

Of more concern in Grafton than 2-4' snow storms 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.

Several ice storms have affected the Community in the past. The 1998 Ice Storm caused significant damage in Grafton. Tree and power lines were damaged creating power outages for up to 10 days. The Team noted there were no structure damages during the storm, but they had some problems with power surges. In Grafton, no significant damage occurred during the 2008 Ice Storm. It was also noted that rain storms in the winter are fairly common in Grafton and create a lot of ice which leads to traffic accidents.

Winter snow and ice storms often cause trees to fall, creating widespread power outages by downing power lines. They can also cause widespread damage to forested areas. Future ice storms in Grafton could be expected to cause damage ranging from a few thousand dollars to several million, depending on the severity of the storm. Due to the widespread nature of severe winter storms, particularly ice storms, the potential loss value is estimated to be between 1% and 5% of the total assessed value of all structures in town.

2) Flooding (dam failure, local roads, heavy rain, riverine, beaver dams) \$755,625 to \$3,778,123

Heavy rain, rapid snowmelt and stream flooding can 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. Grafton is located within two major New Hampshire watersheds, with the Smith River flowing to the Merrimack River watershed and the Mascoma River flowing to the Connecticut River watershed. Flooding is also often associated with tropical storms, thunder and lightning storms and hurricanes.



Dam Failure Flooding: Flooding as a result of overwhelmed or failed dams has the potential to occur in two locations in Grafton, the Grafton Pond Dam and Kilton Pond Dam. It was noted that failure of these dams is unlikely to place any structures in harm's way, but damage to bridges, roads and the dams themselves is possible. There is no current history of dam failure in Grafton, although there is potential under the right circumstances.

Local Road Flooding & Heavy Rain Events: It is estimated that the Town experiences some sort of stormwater problem whenever there are two or more inches of rain in a short period of time. Many of the roads in Grafton are long and winding and subject to some of the most severe weather in the State. Flooding from spring rains general creates road flooding in multiple places in Grafton.

While producing substantial damage in parts of New Hampshire and in Vermont, Tropical Storm Irene resulted in approximately 1.2 million dollars in damage in Grafton. 5.5" of rain fell in one hour leaving Millbrook Road, Spectacle Pond Road, Wild Meadow Road, Height of the Land Road and Riddle Hill Road with partial and in some cases full washouts. NH Route 4 near Bullocks Crossing was also flooded thus hampering emergency response. The Town received FEMA funding to help repair the damage caused by Tropical Storm Irene.

Fortunately, the July 2017 storm (DR-4329) did not cause significant damage in Grafton; however, the October 2017 storm (DR-4355) did. Not only was there wind damage to the Grafton Fire Station, but multiple roads experienced flooding and erosion including Prescott Hill Road and Wild Meadow Road where approximately one-half mile of the road was washed out destroying several culverts. Riddle Hill Road and other smaller roadways also experienced flooding and erosion. Overall, the estimated damage from the October 2017 storm was expected to be \$140,000.

The continuous erosion of roads makes for a daunting task of “up-keep” for the Highway Department. Fortunately, two of the Town’s major thoroughfares, NH Routes 4 and 4A are the responsibility of the State. The Highway Department maintains approximately 65 miles of Class V roads, only 11 of which are paved. The Town estimates a total of 5,000 culverts and although many are old and in need of replacement, the Highway Department endeavors to be proactive and to replace aging and/or underperforming culverts annually. Several mitigation action items in this Plan deal with the improvement of culverts in Grafton.

With changes in climate the expectation is that although storms may be less frequent, they are likely to be more intense.

Riverine Flooding: Grafton is subject to minor riverine flooding. Based on the Grafton County Floodplain Map, Grafton has a small 100-year floodplain which follows along the banks of Smith River. It was noted that although riverine flooding has not been significant in the past and has not affected any homes, flooding is possible near Mill Brook Road. It was also noted that the structures that are within the floodplain are primarily sheds and/or garages.

Beaver Dams: Beaver dams can also cause flooding; vigilance on the part of the highway department is required to keep these beaver dams away from culverts and low-lying areas. Many of Grafton’s streams follow alongside the towns many gravel roads; beaver dams can cause blockages in the Town’s drainage and culvert systems thus leading to road washouts and damage, a particular problem during the spring snowmelt and heavy rains. Beaver dams are felt to exasperate the overall problem of road flooding and culvert failure.

As road damage is the most concerning flood-related issue, the expected loss value from flooding would be based primarily on the economic impact on the Community, the loss of accessibility and the time and cost of road repair. Therefore, the estimated loss value due to road flooding was determined to be between 1% and 5% of the total structure.

3) Tornadoes & Downbursts \$0 to \$755,625

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.



A tornado touched down in Carroll County in July 2008, but it did not reach Grafton or Grafton County. Additionally, in recent years a tornado was spotted in Berlin, but there has been no reported tornado activity in Grafton in the past. More common in Grafton would be a downburst event; these are becoming more and more common in the North Country and could result in damage.

Due to the rareness of these events in New Hampshire, the likelihood of a tornado or downburst is low and the affects would be localized. Therefore, the potential loss value was determined to be between 0% and 1% for both downbursts and tornadoes.

4) High Winds (windstorm) \$0 to \$755,625

Due to the location of Grafton, the Town's proximity to some of New Hampshire's high peaks and the effect of wind in the river valleys, isolated high winds and down drafts often occur. These wind events are unpredictable; winds of this magnitude could fall timber, which in turn could block roadways, down power lines and impair emergency response.



On July 4, 2013 a windstorm that was later called a "gustnado" took down trees and power lines on Slab City Road and Prescott Hill Road. It was noted that many trees were impacted and taken down, however in the same location not even paper plates blew off of a table, creating the effect of a tornado and its ability to change directions suddenly. It took twenty-two 10-wheel dump truck loads to clear the debris, but both roads were open by the next morning.

The effect of isolated high winds would most likely be localized in nature; therefore, the potential loss value due to hazards of this type was determined to be between 0% and 1% of the total assessed structure value.

5) Extreme Temperatures (hot & cold)..... Structure loss value was not estimated



For those who are familiar with Northern New England weather, it is obvious that temperature extremes are very common. Winter temperatures can fall below -30°F and summer temperatures, laden with high humidity can soar to nearly 100°F; it is not unusual for the temperature to be below zero for as many as 30 days in a single winter season. 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.

Also of concern today are extreme heat conditions. Few residents, particularly the elderly and vulnerable populations, have air conditioners and are less able to cope with extreme heat. The estimated elderly population is 18.6% of the total population according to the American Community Survey, 2011-2015.

Extreme temperatures when combined with power failure are of the most concern; power failure would result in no water, heat and air conditioning for the Town's vulnerable population. Both 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 on 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.

6) Hailstorms \$0 to \$755,625

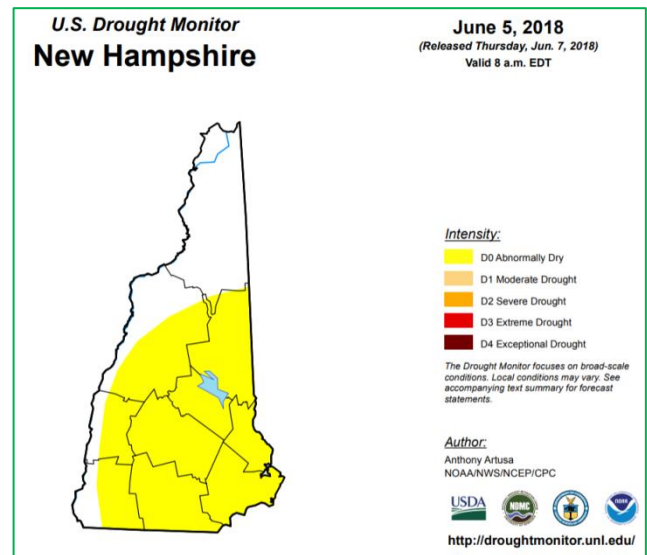
Hailstorm events can occur at any time and cause significant damage. Damage from hail could result in failed crops and structure, roof and vehicular damage, thus creating an economic impact for individual citizens. Overall it was felt that a significant hailstorm event would be unlikely and would cause minimal damage; therefore the potential loss value is estimated at 0% and 1% of the assessed value.



7) Droughts \$0 to \$755,625

The cost of drought in Grafton is difficult to calculate as any cost would primarily result from an associated fire risk, crop loss and diminished water supply which, in Grafton, is supplied by private wells. An extended period without precipitation could elevate the risk for wildfire and blow-downs in the forest and with an extreme drought, the water supply and aquifer levels could be threatened. Grafton, which has a small farming community, could feel an extra burden during a drought; crops could be damaged and lack of water for livestock could affect the Community's economy.

Fortunately, significant droughts rarely occur in New Hampshire or Grafton. 2016 brought extreme and severe drought conditions to southern New Hampshire, but Grafton remained in the "moderate" category. Extreme droughts in mid and northern New Hampshire are particularly rare and have no significant effect on structures, unless wildfire events occur. According to the NH Department of Environmental Services, five significant droughts have occurred since 1929¹¹, not including the 2016 drought.



Fortunately, the 2016 drought has abated, although recovery is still taking place in some areas of the State. Grafton noted that the water table may not have fully recovered and could possibly increase the wildfire risk. Recent drought monitoring depicts drought conditions in New Hampshire and shows that "Abnormally Dry" conditions are currently present in Grafton (see chart above).¹²

¹¹ NH DES; <http://des.nh.gov/organization/divisions/water/dam/drought/documents/historical.pdf>

¹² <http://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?NH>

If it were to occur, a significant drought in Grafton would not only impact the forested lands of the Town, but also agricultural land. The estimated loss value above, based on a 0-1% risk reflects the potential for not only lost woodlands and the potential for wildfire but also the economic impact to the Community.

8) Wildfires (1+ acres)..... \$755,625 to \$3,778,123



Due to the abundance of slash on the forest floor left by logging operations, blow downs and storms, there is potential for fast burning fuels. 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 Grafton's forested areas. To help combat fire, Grafton maintains and improves firefighting equipment and continuously maintains dry hydrants and fire ponds.

The Team described the forests of Grafton 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.”*¹³ Burn permits are required in Grafton, as they are throughout the State, but often burning takes place without the proper permits. The steep terrain and heavily forested areas of town are difficult to monitor, therefore the occasional unauthorized burn will take place. Currently available documentation on fires in Grafton indicates that the majority of fires are human-caused; however no significant wildfires have occurred in Grafton in many years.

In the mid-2000s, the Wildland Urban Interface (WUI) was determined in collaboration with the NH Division of Forests & Lands and the US Forest Service; the WUI represents the area in which the forest and human habitation intersect. It was defined to be a 1/4 mile buffer located 300 feet off the centerline of Class V roads. All structures within the WUI are generally assumed to be at some level of risk and therefore, vulnerable to wildfire. It should be noted that in communities that are heavily forested, like Grafton, many Rangers feel that the entire community is in the WUI and therefore the extent of a wildfire could potentially be the entire community.

Large wildfires in New Hampshire are uncommon; however, given the right set of conditions (drought, lightning, human interface), the potential for large wildfires is good. Because the Town of Grafton is heavily forested, the potential loss value was determined to be between 1% and 5% of the total assessed structure value.

9) Hurricanes & Tropical Storms..... \$755,625 to \$3,778,123

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

Tropical Storm Irene, the remnants of Hurricane Irene, brought 5.5” of rain to Grafton and several road washouts. Ditch and culvert issues caused flooding on Mill Brook Road, Wild Meadow Road, Spectacle Pond Road and

¹³ <http://www.fs.fed.us/nwacfire/home/terminology.html>

Prescott Hill Road. Since Tropical Storm Irene, the Highway Department has worked diligently to expand ditches and replace underperforming culverts. FEMA money help repair and upgrade damages done on Mill Brook, Prescott Hill and Spectacle Roads, while a new bridge was installed on Lower Wild Meadow Road. Tropical Storm Sandy had no impact in Grafton, with the exception of heavy rain.

The probability that a hurricane would remain a Category 1 or better in this part of the State is low. However, due to the possibility of a significant hurricane or tropical storm and climate changes, the potential loss value due to hurricanes was determined to be between 1% and 5% of the total assessed structure value.

10) Earthquakes \$755,625 to \$3,778,123



Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric and phone lines and are often associated with landslides and flash floods. 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 New Hampshire history.

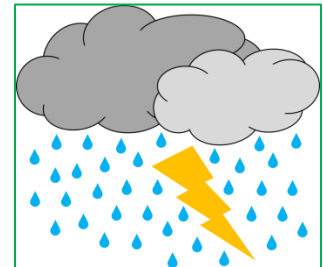
In October 2012, an earthquake with its epicenter in Hollis, ME and a magnitude of 4.6 on the Richter scale occurred. The tremor was felt through much of New Hampshire; however it was not felt in Grafton. The Team did mention a tremor that was felt sometime in 2008 with an epicenter in New York.

Although historically earthquakes have been rare in New Hampshire, the potential does exist and depending on the location, the impact could be significant. The potential structure loss value due to earthquakes was determined to be between 1% and 5% of the total assessed structure value.

11) Severe Thunder & Lightning Storms \$0 to \$755,625

Severe lightning as a result of summer and mountain storms or as a residual effect from hurricanes and tornadoes has occurred in Grafton. Some of the Town's structures are older buildings and many structures are surrounded by forest. Dry timber on the forest floor 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 or injure or kill an individual, but the direct damage would not be widespread.

The Team noted that summer storms are often more damaging than spring snowmelt and that it appears that severe thunder and lightning storms are happening more often with climate change. Lightning is a potential problem, but one who's affects would be localized. Based on the localized nature of lightning strikes, the potential loss value was determined to be 0-1% of the total assessed structure value in Town.



D. 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 none-the-less worth mentioning as real and possible hazards that could occur in Grafton.

1) Extended Power Failure (5+ days)

Extended power failure is a concern, particularly when combined with any of the natural hazards detailed above. Extended power outages of several days have occurred in Grafton, both as a result of local line damage from high winds and storms and problems with the power grid. The Team reported that long term power outages have diminished as a result of continued efforts by Eversource and the NH Electric Coop to trim trees and branches near power lines.

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 or handicapped. The Team felt that many residents were somewhat self-sufficient; many residences are equipped with generators and many others have woodstoves. The biggest impact from an extended power failure would be the inconvenience caused by the inability to pump water for residents who rely on wells.

It was noted by the Team that the 1998 ice storm created significant damage and some were without power for up to 10 days. With this extended loss of power many communication lines were also down and it became tough for the residents to keep food in their homes with no way to refrigerate or freeze it.

It is also noted that Grafton is a somewhat difficult place for senior citizens to live. Driving can be difficult due to weather conditions and steep terrain and all services including pharmacies and major grocers are located out of town.

2) Hazardous Material – Fixed Location

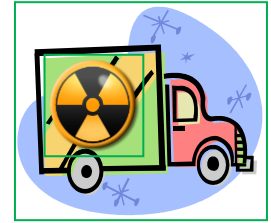
Hazardous Material-Fixed Location is a concern in many of New Hampshire's communities. Manufacturers, gas stations, fuel depots, small businesses and even homes can be found to have hazardous chemicals, explosive materials or poisons on site. Breaches in the storage, use, production or disposal can affect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

Of particular concern in Grafton are fuel depots. There is an above ground propane depot on Route 4A, an underground oil depot on Route 4. The Town Shed also has 1,000 gallons of diesel fuel and 500 gallons of gas stores for the town-owned vehicles. Any of these could cause a significant issue if a rupture were to occur.



3) Hazardous Material - Transport

The possibility of vehicular accidents involving hazardous materials is identified as a serious hazard in Grafton. The Town's major routes, NH Route 4 and 4A, are very heavily travelled both by large and small vehicles; the contents of these vehicles are rarely known. Tractor trailers hauling fuel, propane and other hazardous materials travel through Grafton on a constant basis, travelling north-south from southern New England and the Concord area north to I-91 and Hanover area.



4) Terrorism

Terrorism is a fear throughout our country and although Grafton is not home to any substantial "targets" there is always a potential for a terrorism event. 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.

5) Epidemic & Pandemic

The threat of either an epidemic or a pandemic is a concern for the Town of Grafton. The influx of summer visitors and residents and its substantial elderly population increase this concern. Illnesses may be brought to this small community from other places, and in doing so would place a severe burden on Grafton's already limited resources. In addition, all of Grafton's students are tuitioned to Canaan schools, thus increasing the risk of exposure.



Grafton's unique geography provides hikers and other recreation enthusiasts opportunities to visit the Town. Because of these factors and those described above, the Team decided that an epidemic or pandemic could present a possible threat to Grafton. With the occurrence of world-wide pandemics such as SARS, the Zika Virus, H1N1 and Avian Flu, Grafton could be susceptible to an epidemic and subsequent quarantine.

Chapter 6: Current Policies, Plans & Mutual Aid

After researching historic hazards, identifying CIKR and determining potential hazards, the Team determined what is already being done in Town 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 Grafton 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	Responsible Department	Effectiveness	Improvements Needed or Not Needed
Grafton County Code Red	County-wide warning system using phones and cell phones to notify citizens of pending or actual emergency; individuals automatically notified for emergencies but should sign up to add phones and verify information.	Town Wide	Emergency Management Director	Good (although the Town has no experience to date)	Improvements Needed: CodeRED has been established; 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 it should continue to provide public outreach to encourage all residents to contact CodeRED to add cell numbers, emails, unlisted numbers and to verify information; use the website or a possible brochure or a sign up at Town Meeting. Action Item #13

Current Program or Activity	Description	Area of Town	Responsible Department	Effectiveness	Improvements Needed or Not Needed
Emergency Operations Plan 2009	This plan offers all members of the emergency management team a better understanding of procedures in case of a disaster. Addresses 16 Emergency Support Functions (ESFs).	Town Wide	Emergency Management Director	Good	Improvements Needed: The Grafton Emergency Operations Plan (EOP) was adopted in 2009; added to this Plan to update the EOP according to the HSEM five-year recommendation; update the plan to the 15-ESF format. Action Item #15
Storm Drain / Culvert Maintenance	The Grafton Road Agent and the State DOT clean the drainage basins once a year and after major flooding events. Culverts are repaired as needed.	Town Wide	Highway Department	Good	Improvements Needed: Although the Grafton 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; added for continued maintenance of all drainage systems, the development of a written "Stormwater Maintenance Plan" and the improvements of several culverts in the Community. Action Items #14, #16, #17, #22, #23 & #24
State Fire Codes & National Fire Protection Association (NFPA)	State regulations to insure fire safety in new and existing properties; builders are required to meet national standards for fire safety and to follow the NH and NPFA fire codes in new construction to meet national standards for fire safety.	Town Wide	Fire Chief & Planning Board	Good	Improvements Needed: Education on state fire and building codes is done as needed; deferred to this Plan to continue to educate the Town's residents about the risks associated with fire safety and to use the Town's website to provide general fire mitigation techniques and links to Firewise®. Action Item #9

Current Program or Activity	Description	Area of Town	Responsible Department	Effectiveness	Improvements Needed or Not Needed
National Flood Insurance Program (NFIP)	The Town of Grafton does not currently belong to the National Flood Insurance Program (NFIP); according to GIS analysis, there are two structures in Grafton that are entirely within the FEMA flood zone and three structures that are partially within the flood zone as identified on the FEMA Flood Maps dated February 20, 2008.	Floodplain	Planning Board	Not Applicable	Improvements Needed: Grafton does not belong to the National Flood Insurance Program (NFIP); there is a small floodplain along the banks of the Smith River; added to this Plan for two action items: 1) to review the need to join the NFIP and to review the need to develop a floodplain development ordinance and 2) to educate the public regarding the risks of building in flood prone areas and the steps residents can take to lessen or eliminate the risk from flooding, whether they reside in the floodplain or not. Action Items #10 and #20
Master Plan (1987)	The 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 Ordinances and Subdivision Regulations.	Town Wide	Planning Board	Poor	Improvements Needed: The Grafton Master Plan was updated in 1987 and is past the recommended 10-year update; deferred to this Plan to do a complete update of the Master Plan and to incorporate a Natural Hazards section and mitigation action items from this Plan if warranted. Action Item #25
Public Education & Awareness	The Town of Grafton is well situated to provide public information and outreach to its citizens through a variety of means.	Town Wide	Emergency Management Director & Other Departments	Good	Improvements Needed: The Town has not created an Emergency Webpage which is 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; added to this Plan to develop an emergency webpage and to provide robust information and links Ready.gov to educate the public on general and seasonal mitigation techniques. Action Item #5

Current Program or Activity	Description	Area of Town	Responsible Department	Effectiveness	Improvements Needed or Not Needed
E-911	A system that complies with recommended signage size, location and visibility to insure identification by emergency responders; markers at driveway entrances that identify residence locations in conjunction with the E-911 alerting system.	Town Wide	Emergency Management Director	Good	Improvements Needed: The Town is approximately 75% compliant with E-911 signage at individual homes; deferred to this Plan to continue to address the problem of inadequate 911 signage to assist emergency response; continue to work with the Fire Auxiliary and provide continued public education. Action Item #7
NIMS & ICS Training	Ensure effective command, control, and communications during emergencies; Town officials and emergency responders have undergone NIIMS training.	Town Wide	Emergency Management Director	Good	Improvements Needed: NIMS & ICS training has been done by most first responders; although this is preparedness, this is added to this plan to continue 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 #3
Building Permits & Building Codes	Building notifications are required although there is no Building Inspector to enforce building codes; The Town has not adopted International Building Codes (IBC) and International Residential Codes (IRC) which are adopted by the State of NH; builders are required to follow the IBC/IRC codes for new construction to meet national standards for flood, wind, earthquake, fire and snow load.	Town Wide	Emergency Management Director & Planning Board	Good	Improvements Needed: The Town of Grafton does not have a Building Inspector however, the building notification 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; added to this Plan to continue to educate the Town's residents about the risks associated with inadequate building and perhaps add a link to the Town's website to the State's adopted codes. Action Item #6
Fire Department Training	Fire Department personnel receive yearly.	Town Wide	Fire Chief	Good	No Improvements Needed: Continuous fire training has been and is being done by the Grafton Fire Department in conjunction with the Upper Valley Regional Emergency Services Association (UVRESA), the state Fire Academy and other state agencies.

Current Program or Activity	Description	Area of Town	Responsible Department	Effectiveness	Improvements Needed or Not Needed
Hazardous Materials Response Training	Hazmat training to ensure proper response to a hazardous materials event.	Town Wide	Fire Chief	Good	No Improvements Needed: Hazardous materials response training has been and is being done by the Grafton Fire Department; training is ongoing as available; emergency response trailers are located in Laconia and Lebanon.
Mutual Aid Agreements (Fire, Police & 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.	Town Wide	Emergency Management Director, Fire, Police, EMS & Highway	Good	No Improvements Needed: The Fire Department has a mutual aid agreement with the Upper Valley Regional Emergency Services Association (UVRESA); the Police Department has agreements with neighboring towns of Danbury, Wilmot, Alexandria, Enfield & Canaan; Grafton Volunteer Ambulance provides EMS and medical transportation and works within a network of EMS providers; the Highway Department is a member of the NH Public Works Mutual Aid Program; all mutual aid systems in Grafton work very well.
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.	Town Wide	DNCR	Good	No Improvements Needed: The Fire Department receives regular notification of the burning index via fax and email from NH Forests & Lands (DNCR); this notification is made daily during the fire danger season.
Subdivision Regulations (2006)	The purpose of Grafton's 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.	Town Wide	Planning Board	Good	No Improvements Needed: The Grafton Subdivision Regulations, most recently updated in 2006 but reviewed annually and as needed, are in good shape; the Subdivision Regulations work as they are intended and address many issues that help eliminate or diminish the impact from natural hazards.

Current Program or Activity	Description	Area of Town	Responsible Department	Effectiveness	Improvements Needed or Not Needed
State Health Department Public Health Plan	State plan, "Influenza, Pandemic, Public Health Preparedness and Response Plan" written by state health department to be prepared for any public health emergency; the Town is part of Upper Valley Regional Public Health Network.	Town Wide	Upper Valley Regional Public Health Network	Good	No Improvements Needed: The Public Health Plan does what it is meant to do; the Town participates in regional public health meetings whenever possible.
Comprehensive Shoreland Protection Act	Establishes minimum standards for the subdivision, use and development of shoreland adjacent to the state's public water bodies.	Shoreland adjacent to NH public waters - Town of Grafton	Planning Board	Good	No Improvements Needed: The Town of Grafton complies with the New Hampshire Comprehensive Shoreland Protection Act which was created to protect the integrity of public waters. This act regulates development within 250 feet of public waterways in the State.
Capital Reserve Fund (CRF)	A type of account on a town's balance sheet that is reserved for long-term capital investment projects or any other large and anticipated expense(s) that will be incurred in the future; reserve funds set aside to ensure adequate funding to at least partially finance future projects, equipment and other expenditures.	Town Wide	Board of Selectmen & Town Departments	Good	No Improvements Needed: The Town's Capital Reserve Funds set funds aside each year at budget time to assist the Town's departments with planned purchases of equipment and supplies or in emergency situations; the Grafton Capital Reserve Funds continue to work well.
Warning Systems	Emergency vehicles are equipped with public address equipment; this is a secondary and often used additional warning system with CodeRED	Town Wide	Emergency Management Director, Fire Chief & Police Chief	Good	No Improvements Needed: Warning systems in emergency vehicles are used to augment CodeRED when an emergency arrives; warning systems work well.

Current Program or Activity	Description	Area of Town	Responsible Department	Effectiveness	Improvements Needed or Not Needed
Emergency Generators	Emergency generators are located at the Town Office & Fire Department (shared). There is no generator at the Highway Garage.	Fire Station, Police	Emergency Management Director	Excellent	No Improvements Needed: Sufficient generators have been established at most facilities in Grafton, the Town Office & Fire Station share a permanent generator and a there is a generator at the Highway Garage.
State Division of Forest and Lands/Fire Permits	NH Forest and Lands (DNCR) requires fire permits for open burning per state regulations.	Town Wide	Local Fire Wardens	Good	No Improvements Needed: The system that is in place with NH Forest and Lands (DNCR) and the local fire warden works well; public is aware of fire permitting requirements.
School Emergency Response Plan	Required plan that Insures preparedness and response for school personnel and town emergency personnel in the instance of a major disaster at the school. Efforts are coordinated with the fire and police departments.	Schools Town Wide	Superintendent of Schools	Good	No Improvements Needed: The School Emergency Plans are updated on an annual basis as required by the State.
Road Design Standards	Grafton Subdivision includes road design standards that control the amount and retention of stormwater runoff.	Town Wide	Planning Board & Department of Public Works	Good	No Improvements Needed: Road design standards are detailed within the Town's planning mechanisms (Subdivision Regulations) and adhere to State standards; new roads cannot be accepted as "town" roads unless approved by the Community at Town Meeting.

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Chapter 7: Prior Mitigation Plan(s)

A. Prior Plans

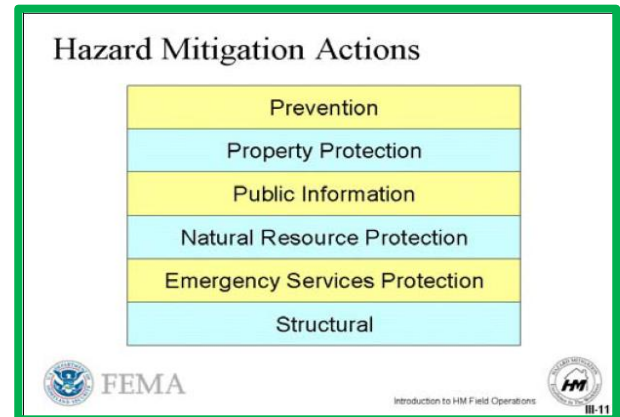
Grafton has not participated in the development of a prior Hazard Mitigation Plan. This Plan, the “Grafton Hazard Mitigation Plan 2018” is the first Hazard Mitigation Plan done by the Town of Grafton based on the Disaster Mitigation Act of 2000. Therefore, there are no “action items” to review from a prior plan.

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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
- 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 flier 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 flier are listed on the following two pages; 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 Grafton 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 EducationPublic Awareness
- Changes to Zoning RegulationsPrevention
- Changes to Subdivision RegulationsPrevention
- Steep Slopes OrdinancePrevention
- Density ControlsPrevention
- Driveway StandardsPrevention
- Emergency Website Creation.....Public Awareness
- Critical Infrastructure & Key ResourcesEmergency Service Protection
- Emergency Training for Town OfficialsEmergency Service Protection
- High Risk Notification to HomeownersProperty Protection
- Master Plan Update or DevelopmentPrevention
- Capital Improvement PlanPrevention

Flood Mitigation Ideas

Type of Project

- Stormwater Management OrdinancesPrevention
- Floodplain OrdinancesPrevention
- Updated Floodplain MappingPrevention
- Watershed Management.....Natural Resource Protection
- Drainage Easements.....Prevention
- Purchase of EasementsPrevention
- Wetland ProtectionNatural Resource Protection
- Structural Flood Control MeasuresPrevention
- Bridge Replacement.....Structural Project
- Dam Removal.....Structural Project
- NFIP CompliancePrevention
- Acquisition, Demolition & RelocationStructural Project
- Structure ElevationStructural Project
- Flood ProofingProperty Protection
- Erosion Control.....Natural Resource Protection
- Floodplain/Coastal Zone ManagementPrevention
- Building Codes Adoption or AmendmentsPrevention
- Culvert & Hydrant MaintenancePrevention
- Culvert & Drainage ImprovementsStructural Protection
- Transfer of Development RightsProperty 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 and wildfires 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**ddministrative, **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:

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

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 Board of Selectmen 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 “Mitigation Action Items” for a town of 200 are not the same as the “Mitigation Action Items” for a town of 30,000. In addition, the “Mitigation Action Items” for a town in the middle of predominantly hardwood forests, are not the same as the “Mitigation Action Items” for a town on the Jersey Shore. Therefore the Town of Grafton 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 comprehensive 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.

TABLE 8.1: POTENTIAL MITIGATION ACTION ITEMS & THE STAPLEE

- Potential mitigation action items in Table 8.1 on the following page 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 E: Potential Mitigation Ideas*, for more information.

Action Items are listed in numerical order.

Proposed Mitigation Action Items	Affected Location	Type of Activity	TTL	S	T	A	P	L	E	E
Action Item #1: In addition to work that is done by and with local utility companies, continue to monitor and maintain brush cutting, drainage and culvert system maintenance and tree removal as part of a tree maintenance program and continue to create defensible space around power lines, oil and gas lines and other infrastructure; continue to work to reduce wildfire risk by clearing dead vegetation, cutting high grass and other fuel loads in the Community. (SW4, WF7, WF9 & F14)	Town Wide	Prevention Property Protection Public Education & Awareness Natural Resource Protection	20	3	3	3	2	3	3	3
<i>Political: Some people in Town may not want dangerous trees removed</i>										

Proposed Mitigation Action Items	Affected Location	Type of Activity	TTL	S	T	A	P	L	E	E
Action Item #2: Routinely inspect the functionality of fire hydrants and continue the maintenance and repair of all hydrants and other water resources in Grafton; consider other areas of the Community that have limited water resources and address these issues by installing new hydrants, fire ponds and/or cisterns. (WF8)	Town Wide	Prevention Property Protection Natural Resource Protection Emergency Services Protection	21	3	3	3	3	3	3	3
				No apparent issues with this Action Item						
Action Item #3: The EMD should encourage all town officials and new hires 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. (Table 6.1)	Town Wide	Prevention Emergency Services Protection	21	3	3	3	3	3	3	3
				No apparent issues with this Action Item						
Action Item #4: Develop and maintained a functional needs population list to serve as an effective tool during an emergency. (ET3 & WW6)	Town Wide	Public Education & Awareness Prevention Emergency Services Protection	21	3	3	3	3	3	3	3
				No apparent issues with this Action Item						
Action Item #5: Provide robust information on an Emergency Webpage on the Town's website 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); continue to develop ways to provide notification to citizens. (Table 6.1)	Town Wide	Public Education & Awareness Prevention Property Protection	21	3	3	3	3	3	3	3
				No apparent issues with this Action Item						

Proposed Mitigation Action Items	Affected Location	Type of Activity	TTL	S	T	A	P	L	E	E
Action Item #6: Continue to educate the Town's residents about the risks associated with building without adherence to International Building Codes (IBC), the International Residential Codes (IRC) and National Fire Protection Association (NFPA) codes; use the Town's website to provide links to help guide builders and homeowners better understand the state codes that serve as a deterrence to the effects of natural hazards. (WF12, MU8 & MU14) (Table 6.1)	Town Wide	Public Education & Awareness Prevention Property Protection	21	3	3	3	3	3	3	3
No apparent issues with this Action Item										
Action Item #7: 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 (already done), strengthening the E-911 ordinance, obtaining signage with building permits and/or through continued public outreach. (MU14) (Table 6.1)	Town Wide	Prevention Property Protection Emergency Services Protection	20	3	3	3	2	3	3	3
Political: Some may not want a sign on their property										
Action Item #8: Provide reminders to residents using multiple sources including a Town Emergency Webpage, to maintain private and Class VI roads to allow for emergency vehicular access; particularly Half Moon Pond. (WF12 & MU15)	Class VI and Private Roads & Half Moon Pond	Prevention Property Protection Public Education & Awareness Natural Resource Protection Emergency Services Protection	20	2	3	3	3	3	3	3
Social: Some may not want to do what is recommended										
Action Item #9: Provide public outreach to the citizens of Grafton regarding fire safety, the Firewise program and mitigation techniques that can be used to protect homes from wildfires using an Emergency Webpage on the Town's website; continue to post important information and notices of red flag burning days through mailings and 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 waste and the removal of dead or dry leaves, needles, twigs, and combustible materials from roofs, decks, eaves, porches and yards. (WF12) (Table 6.1)	Town Wide	Public Education & Awareness Prevention Property Protection Natural Resource Protection Emergency Services Protection	21	3	3	3	3	3	3	3
No apparent issues with this Action Item										

Proposed Mitigation Action Items	Affected Location	Type of Activity	TTL	S	T	A	P	L	E	E
Action Item #10: Through Public Outreach and the Town's website, 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, such as Ready.gov and the NFIP; continue to actively work with residents to ensure they are safe from flooding. (F22 & F23) (Table 6.1)	Town Wide (areas prone to flooding)	Public Education & Awareness Prevention Property Protection	21	3	3	3	3	3	3	3
No apparent issues with this Action Item										
Action Item #11: Provide an annual review of the Grafton Hazard Mitigation Plan 2018 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)	Town Wide	Prevention	21	3	3	3	3	3	3	3
No apparent issues with this Action Item										
Action Item #12: As stated in Grafton's "Letter of Intent", look into potential HMGP funding for affected locations such as Prescott Hill Road, Wild Meadow Road, Riddle Hill Road, and other smaller roads where flooding and wind damage occurred; wind damage also affected the Fire Station (see Table 3.2 for more details). (F13)	Prescott Hill Road, Wild Meadow Road, Riddle Hill Road, and other smaller roads where flooding and wind damage occurred	Prevention Property Protection Natural Resource Protection Emergency Services Protection Structural	17	3	3	3	3	3	1	1
Economic: Could be budget constraints for cost share Environmental: DES permitting will be needed										
Action Item #13: Provide public outreach to encourage all residents to contact CodeRED to add cell numbers, emails, unlisted numbers and to verify information; use the website, a possible brochure or a sign up at Town Meeting. (MU14) (Table 6.1)	Town Wide	Prevention Public Education & Awareness	21	3	3	3	3	3	3	3
No apparent issues with this Action Item										
Action Item #14: Continue maintenance of all drainage systems and the development of a written "Stormwater Maintenance Plan" to ensure continuity of actions and efficient stormwater management. (F5 & F14) (Table 6.1)	Town Wide	Property Protection Natural Resource Protection	20	3	3	2	3	3	3	3
Administrative: It may be difficult to find the time to do the work										

Proposed Mitigation Action Items	Affected Location	Type of Activity	TTL	S	T	A	P	L	E	E
Action Item #15: Update the Grafton Emergency Operations Plan to coincide with the new State 15-ESF format and include "Player Packets" for Lead Agencies. (Table 6.1)	Town Wide	Prevention Public Education & Awareness Emergency Services Protection	21	3	3	3	3	3	3	3
				No apparent issues with this Action Item						
Action Item #16: Improve the flow of stormwater on Wild Meadow Road by upgrading the aging 3' x 5' stone culvert with a 7' round metal culvert. (F13)	Wild Meadow Road	Prevention Property Protection Natural Resource Protection Emergency Services Protection Structural	19	3	3	3	3	3	2	2
				Economic: Budget constraints Environmental: Will need DES approval; wetland permits						
Action Item #17: Upgrade the 4' arch metal pipe culvert on Wild Meadow Road near the Alexandria town line with a 6' concrete box culvert to improve the flow of stormwater and prevent road washouts on this part of Wild Meadow Road. (F13)	Wild Meadow Road	Prevention Property Protection Natural Resource Protection Emergency Services Protection Structural	20	3	3	3	3	3	2	3
				Economic: Budget constraints						
Action Item #18: Obtain funding to repair/upgrade the Wild Meadow Road bridge which is the only red-listed bridge in Town. (MU13)	Wild Meadow Road Bridge	Prevention Natural Resource Protection Emergency Services Protection Structural	20	3	3	3	3	3	3	2
				Economic: Money has already been raised through Capital Reserves (therefore no impact) Environmental: DES permitting will be needed						
Action Item #19: Lobby the NH Department of Natural & Cultural Resources (DNCR) to better maintain the culverts on the Rail Trail in order to mitigate flooding and to improve the flow of stormwater. (F13)	Culverts on Rail Trail	Prevention Property Protection Natural Resource Protection Emergency Services Protection	21	3	3	3	3	3	3	3
				No apparent issues with this Action Item						
Action Item #20: Review the need to join the NFIP (F8) and the need to develop a floodplain development ordinance (F1) thus enabling the public access to flood insurance whether or not in the flood zone; consult with the NH Office of Strategic Initiatives (OSI) for guidance. (Table 6.1)	Town Wide (areas prone to flooding)	Prevention Property Protection Public Education & Awareness	17	1	3	3	1	3	3	3
				Social: Some in Town will find this intrusive Political: Some in Town will find this intrusive; the Town does not want to impose regulations on the public						

Proposed Mitigation Action Items	Affected Location	Type of Activity	TTL	S	T	A	P	L	E	E
Action Item #21: Review current subdivision regulations and recommend changes to increase fire suppression capabilities by requiring new subdivisions to provide onsite water storage, fire breaks, cisterns, fire ponds etc. (paid by developers) to ensure the best possible fire suppression capabilities; also, consider the need for regulations for clear cutting and building driveways or homes on steep slopes. (WF2, MU4, MU6)	Town Wide	Prevention Property Protection Public Education & Awareness Natural Resource Protection Emergency Services Protection	16	2	3	3	1	3	1	3
				Social: Some may feel that discussions of zoning, etc. may interfere with their personal plans Political: Some in Town would not want efforts spent on this project. Economic: Budget Constraints						
Action Item #22: Improve Prescott Hill Road near the Recreation Fields by upgrading the current drainage system with three 15" x 40" culverts and eliminate the dip in the road by building the road up about 3 feet to improve the flow of stormwater and to mitigate flooding on this section of Prescott Hill Road. Note: This area was affected by the October 2017 storm and may be covered by Presidential Disaster Declaration #4355. (F13)	Prescott Hill Road	Prevention Property Protection Natural Resource Protection Emergency Services Protection Structural	20	3	3	3	3	3	2	3
				Economic: Budget constraints						
Action Item #23: Improve the flow of stormwater through Millbrook Bridge (#161-135) with an engineered solution such as raising the I-beam of the bridge. (F13)	Millbrook Bridge	Prevention Property Protection Natural Resource Protection Emergency Services Protection Structural	19	3	3	3	3	3	2	2
				Economic: Budget constraints Environmental: Will need DES approval; wetland permits						
Action Item #24: Improve the 6' x 28' twin arch round metal culverts on Davis Road with an engineered solution to improve the flow of stormwater and eliminate flooding on this section of Davis Road. (F13)	Davis Road	Prevention Property Protection Natural Resource Protection Emergency Services Protection Structural	19	3	3	3	3	3	2	2
				Economic: Budget constraints Environmental: Will need DES approval; wetland permits						
Action Item #25: Update of the Master Plan and to incorporate a Natural Hazards section and mitigation action items from this Plan. (MU6) (Table 6.1)	Town Wide	Prevention	16	2	3	3	1	3	1	3
				Social: Some may feel that discussions of zoning, etc. may interfere with their personal plans Political: Some in Town would not want efforts spent on this project. Economic: Budget Constraints						

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** was to include those items which are being done and will continue to be done in the future.
- **Category 1** was to include 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** was to include those items that the Town did 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** was to include those items that would take a major funding effort, those that the Town had 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). 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 prior 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** Less than 1 year (0-12 months)
- **Medium Term** 2-3 years (13-36 months)
- **Long Term:** 4-5 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 E: Potential Mitigation Ideas*, for more information.

Mitigation Action Items are listed in order of priority.

Final Priority	Problem Statement New Mitigation Action Item	Type of Hazard	Responsible Department	Funding or Support	Time Frame	Est. Cost	TTL
0-1	<p>Problem Statement: <i>As tree limbs fall into roadways and drainage systems and as vegetation grows around utilities, there is a need to continue to work to keep this hazard to a minimum.</i></p> <p>Action Item #1: In addition to work that is done by and with local utility companies, continue to monitor and maintain brush cutting, drainage and culvert system maintenance and tree removal as part of a tree maintenance program and continue to create defensible space around power lines, oil and gas lines and other infrastructure; continue to work to reduce wildfire risk by clearing dead vegetation, cutting high grass and other fuel loads in the Community. (SW4, WF7, WF9 & F14)</p>	Severe Winter Weather & Ice Storms; High Winds (windstorms); Wildfire; Flooding; Tornado & Downbursts; Hurricane & Tropical Storm	Emergency Management Director & Highway Department	Local	Short Term Ongoing for the life of the Plan	Low Cost \$0 - \$1,000 or staff time only	20
0-2	<p>Problem Statement: <i>Hydrants in Grafton should be routinely maintained.</i></p> <p>Action Item #2: Routinely inspect the functionality of fire hydrants and continue the maintenance and repair of all hydrants and other water resources in Grafton; consider other areas of the Community that have limited water resources and address these issues by installing new hydrants, fire ponds and/or cisterns. (WF8)</p>	Wildfire	Fire Department	Local	Short Term Ongoing for the life of the Plan	Low Cost \$0 - \$1,000 or staff time only	21
0-3	<p>Problem Statement: <i>Although most police officers and firefighters have received NIMS & ICS trainings, not all of Grafton's town officials have.</i></p> <p>Action Item #3: The EMD should encourage all town officials and new hires 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. (Table 6.1)</p>	All Hazards	Emergency Management Director	Local	Short Term Ongoing for the life of the Plan as new staff is hired, elected or appointed	Low Cost \$0 - \$1,000 or staff time only	21

Final Priority	Problem Statement New Mitigation Action Item	Type of Hazard	Responsible Department	Funding or Support	Time Frame	Est. Cost	TTL
0-4	<p>Problem Statement: <i>The Town of Grafton does not have a functional needs population list available for use by emergency responders.</i></p> <p>Action Item #4: Develop and maintained a functional needs population list to serve as an effective tool during an emergency. (ET3 & WW6)</p>	All Hazards & Extreme Temperatures & Severe Winter Weather	Emergency Management Director	Local	Short Term Ongoing for the life of the Plan	Low Cost \$0 - \$1,000 or staff time only	21
0-5	<p>Problem Statement: <i>Although the Town has made a great 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.</i></p> <p>Action Item #5: Provide robust information on an Emergency Webpage on the Town's website 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); continue to develop ways to provide notification to citizens. (Table 6.1)</p>	All Hazards including: Severe Wind, Drought, Earthquake, Extreme Temperatures, Hail, Lightning, Severe Winter Weather, Tornado & Wildfire	Board of Selectmen & Emergency Management Director	Local	Short Term Ongoing for the life of the Plan	Low Cost \$0 - \$1,000 or staff time only	21

Final Priority	Problem Statement New Mitigation Action Item	Type of Hazard	Responsible Department	Funding or Support	Time Frame	Est. Cost	TTL
0-6	<p>Problem Statement: Education on state fire and building codes is done as needed; the Fire Department has provided links for fire codes on its website; this education for the Town's residents needs to continue as part of public outreach in the future.</p> <p>Action Item #6: Continue to educate the Town's residents about the risks associated with building without adherence to International Building Codes (IBC), the International Residential Codes (IRC) and National Fire Protection Association (NFPA) codes; use the Town's website to provide links to help guide builders and homeowners better understand the state codes that serve as a deterrent to the effects of natural hazards. (WF12, MU8 & MU14) (Table 6.1)</p>	All Hazards & Wildfire	Fire Chief	Local	Short Term Ongoing for the life of the Plan	Low Cost \$0 - \$1,000 or staff time only	21
0-7	<p>Problem Statement: The Town has purchased signage and used public outreach to advise residents of the need for proper 911 signage; however, the town is still only 75% compliant with the proper 911 signage.</p> <p>Action Item #7: 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 (already done), strengthening the E-911 ordinance, obtaining signage with building permits and/or through continued public outreach. (MU14) (Table 6.1)</p>	All Hazards	Board of Selectmen & Emergency Management Director	Local	Short Term Ongoing for the life of the Plan	Low Cost \$0 - \$1,000 or staff time only	20

Final Priority	Problem Statement New Mitigation Action Item	Type of Hazard	Responsible Department	Funding or Support	Time Frame	Est. Cost	TTL
0-8	<p>Problem Statement: <i>Some private and Class VI roads are not maintained to provide access for emergency response vehicles; this is a particular problem at Half Moon Pond.</i></p> <p>Action Item #8: Provide reminders to residents using multiple sources including a Town Emergency Webpage, to maintain private and Class VI roads to allow for emergency vehicular access; particularly at Half Moon Pond. (WF12 & MU15)</p>	All Hazards & Wildfire	Board of Selectmen & Fire Chief	Local	Short Term Ongoing for the life of the Plan	Low Cost \$0 - \$1,000 or staff time only	20
0-9	<p>Problem Statement: <i>Although some homeowner education has been done in the past, public outreach to the citizens of Grafton regarding fire safety, the Firewise program and mitigation techniques that can be used to protect homes from wildfires needs to continue into the future.</i></p> <p>Action Item #9: Provide public outreach to the citizens of Grafton regarding fire safety, the Firewise program and mitigation techniques that can be used to protect homes from wildfires using an Emergency Webpage on the Town's website; continue to post important information and notices of red flag burning days through mailings and 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 waste and the removal of dead or dry leaves, needles, twigs, and combustible materials from roofs, decks, eaves, porches and yards. (WF12) (Table 6.1)</p>	Wildfire	Fire Chief & Board of Selectmen	Local	Short Term Ongoing for the life of the Plan	Low Cost \$0 - \$1,000 or staff time only	21

Final Priority	Problem Statement New Mitigation Action Item	Type of Hazard	Responsible Department	Funding or Support	Time Frame	Est. Cost	TTL
0-10	<p>Problem Statement: Residents of Grafton may not be aware of the risk of building in the floodplain and the steps they can take to reduce flooding.</p> <p>Action Item #10: Through Public Outreach and the Town's website, 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, such as Ready.gov and the NFIP; continue to actively work with residents to ensure they are safe from flooding. (F22 & F23) (Table 6.1)</p>	Flooding	Board of Selectmen & Emergency Management Director	Local	<p>Short Term Ongoing for the life of the Plan</p>	<p>Low Cost \$0 - \$1,000 or staff time only</p>	21
0-11	<p>Problem Statement: This Plan, the Grafton Hazard Mitigation Plan 2018, will require an annual review and a complete update in five years.</p> <p>Action Item #11: Provide an annual review of the Grafton Hazard Mitigation Plan 2018 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)</p>	All Hazards	Board of Selectmen & Emergency Management Director	Local	<p>Short Term Ongoing for the life of the Plan</p>	<p>Low Cost \$0 - \$1,000 or staff time only</p>	21

Final Priority	Problem Statement New Mitigation Action Item	Type of Hazard	Responsible Department	Funding or Support	Time Frame	Est. Cost	TTL
1-1	<p>Problem Statement: The areas of damage that occurred during the October 2017 storm (President Declaration DR-4355) need to be mitigated to prevent future flooding; damage estimate in February 2018 was for \$140,000.</p> <p>Action Item #12: As stated in Grafton's "Letter of Intent", look into potential HMGP funding for affected locations such as Prescott Hill Road, Wild Meadow Road, Riddle Hill Road, and other smaller roads where flooding and wind damage occurred; wind damage also affected the Fire Station (see Table 3.2 for more details). (F13)</p>	Flooding	Board of Selectmen & Emergency Management Director	Local & Grants	Short Term 1 year or less (0-12 Months)	High Cost \$10,000 or more	17
1-2	<p>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.</p> <p>Action Item #13: Provide public outreach to encourage all residents to contact CodeRED to add cell numbers, emails, unlisted numbers and to verify information; use the website, a possible brochure or a sign up at Town Meeting. (MU14) (Table 6.1)</p>	All Hazards	Emergency Management Director	Local	Short Term Ongoing for the life of the Plan going forward Short Term 1 year or less (0-12 Months) for initial action	Low Cost \$0 - \$1,000 or staff time only	21
2-1	<p>Problem Statement: Although the Grafton 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.</p> <p>Action Item #14: Continue maintenance of all drainage systems and the development of a written "Stormwater Maintenance Plan" to ensure continuity of actions and efficient stormwater management. (F5 & F14) (Table 6.1)</p>	Flooding	Highway Department	Local	Medium Term 2-3 years (13-36 Months)	Low Cost \$0 - \$1,000 or staff time only	20

Final Priority	Problem Statement New Mitigation Action Item	Type of Hazard	Responsible Department	Funding or Support	Time Frame	Est. Cost	TTL
2-2	<p>Problem Statement: <i>The Grafton Emergency Operations Plan as adopted in 2009 and is in need of an update according to the recommended five-year cycle.</i></p> <p>Action Item #15: Update the Grafton Emergency Operations Plan to coincide with the new State 15-ESF format and include "Player Packets" for Lead Agencies. (Table 6.1)</p>	All Hazards	Emergency Management Director	Local Time & Grants	Medium Term 2-3 years (13-36 Months)	Medium Cost \$1,000-\$10,000	21
2-3	<p>Problem Statement: <i>The aging 3' x 5' x 25' stone culvert on Wild Meadow Road cannot handle the flow of stormwater, causing flooding and washouts for up to 1/2 mile during heavy rain events; flooding was experienced here during Tropical Storm Irene but was not mitigated.</i></p> <p>Action Item #16: Improve the flow of stormwater on Wild Meadow Road by upgrading the aging 3' x 5' stone culvert with a 7' round metal culvert. (F13)</p>	Flooding	Road Agent	Local & Grants	Medium Term 2-3 years (13-36 Months)	High Cost \$10,000 or more	19
2-4	<p>Problem Statement: <i>The 4' arch metal pipe on Wild Meadow Road near the Alexandria town line is not large enough to accommodate the flow of stormwater, thus flooding and washing out this section of Wild Meadow Road; flooding was experienced here during Tropical Storm Irene but was not mitigated.</i></p> <p>Action Item #17: Upgrade the 4' arch metal pipe culvert on Wild Meadow Road near the Alexandria town line with a 6' concrete box culvert to improve the slow of stormwater and prevent road washouts on this part of Wild Meadow Road. (F13)</p>	Flooding	Road Agent	Local & Grants	Medium Term 2-3 years (13-36 Months)	High Cost \$10,000 or more	20

Final Priority	Problem Statement New Mitigation Action Item	Type of Hazard	Responsible Department	Funding or Support	Time Frame	Est. Cost	TTL
2-5	<p>Problem Statement: <i>There is one town-owned red-listed bridge on Wild Meadow Road that is red listed and needs to be repaired or replaced.</i></p> <p>Action Item #18: Obtain funding to repair/upgrade the Wild Meadow Road bridge which is the only red-listed bridge in Town. (MU13)</p>	Flooding	Board of Selectmen	Local & Grants (State Bridge Aid)	Medium Term 2-3 years (13-36 Months)	High Cost \$10,000 or more	20
2-6	<p>Problem Statement: <i>The culverts on the Rail Trail have not been adequately maintained to allow for the flow of stormwater.</i></p> <p>Action Item #19: Lobby the NH Department of Natural & Cultural Resources (DNCR) to better maintain the culverts on the Rail Trail in order to mitigate flooding and to improve the flow of stormwater. (F13)</p>	Flooding	Emergency Management Director & DNCR	No financial obligation from Town ----- DNCR is the responsible financial agent	Medium Term 2-3 years (13-36 Months)	Low Cost \$0 - \$1,000 or staff time only	21
2-7	<p>Problem Statement: <i>Grafton does not belong to the National Flood Insurance Program (NFIP); there is a small floodplain along the banks of the Smith River.</i></p> <p>Action Item #20: Review the need to join the NFIP (F8) and the need to develop a floodplain development ordinance (F1) thus enabling the public access to flood insurance whether or not in the flood zone; consult with the NH Office Strategic Initiatives (OSI) for guidance. (Table 6.1)</p>	Flooding	Board of Selectmen & Emergency Management Director	Local	Medium Term 2-3 years (13-36 Months)	Low Cost \$0 - \$1,000 or staff time only	17

Final Priority	Problem Statement New Mitigation Action Item	Type of Hazard	Responsible Department	Funding or Support	Time Frame	Est. Cost	TTL
2-8	<p>Problem Statement: <i>The current subdivision regulations do not address fire protection in new subdivisions, clear-cutting or building driveways or homes on steep slopes.</i></p> <p>Action Item #21: Review current subdivision regulations and recommend changes to increase fire suppression capabilities by requiring new subdivisions to provide onsite water storage, fire breaks, cisterns, fire ponds etc. (paid by developers) to ensure the best possible fire suppression capabilities; also, consider the need for regulations for clear cutting and building driveways or homes on steep slopes. (WF2, MU4, MU6)</p>	All Hazards & Wildfire	Planning Board & Fire Chief	Local	Medium Term 2-3 years (13-36 Months)	Low Cost \$0 - \$1,000 or staff time only	16
3-1	<p>Problem Statement: <i>A dip in Prescott Hill Road near the Town's Recreation Fields causes localized flooding, at times producing over 2 feet of water over the road.</i></p> <p>Action Item #22: Improve Prescott Hill Road near the Recreation Fields by upgrading the current drainage system with three 15" x 40" culverts and eliminate the dip in the road by building the road up about 3 feet to improve the flow of stormwater and to mitigate flooding on this section of Prescott Hill Road. Note: This area was affected by the October 2017 storm and may be covered by Presidential Disaster Declaration #4355. (F13)</p>	Flooding	Road Agent	Local & Grants	Long Term 4-5 years (37-60 Months)	High Cost \$10,000 or more	20
3-2	<p>Problem Statement: <i>A low I-beam on Millbrook Bridge (#161-135) interferes with the surge of stormwater, causing flood waters to wash over the bridge and road causing heavy damage.</i></p> <p>Action Item #23: Improve the flow of stormwater through Millbrook Bridge (#161-135) with an engineered solution such as raising the I-beam of the bridge. (F13)</p>	Flooding	Road Agent	Local & Grants	Long Term 4-5 years (37-60 Months)	High Cost \$10,000 or more	19

Final Priority	Problem Statement New Mitigation Action Item	Type of Hazard	Responsible Department	Funding or Support	Time Frame	Est. Cost	TTL
3-3	<p>Problem Statement: The twin 4' x 28' round metal culverts on Davis Road are 45-50 years old and are showing serious signs of age; in addition, ice jams and debris build-up takes place at these twin culverts causing flooding, road washouts and road closures.</p> <p>Action Item #24: Improve the 6' x 28' twin arch round metal culverts on Davis Road with an engineered solution to improve the flow of stormwater and eliminate flooding on this section of Davis Road. (F13)</p>	Flooding	Road Agent	Local & Grants	Long Term 4-5 years (37-60 Months)	High Cost \$10,000 or more	19
3-4	<p>Problem Statement: The Grafton Master Plan is a working document that is used by Town departments as a tool to guide development and growth in a responsible way; the Master Plan was last updated in 1987, is past the recommended 10-year update and does not include a section on natural hazards.</p> <p>Action Item #25: Update of the Master Plan and to incorporate a Natural Hazards section and mitigation action items from this Plan. (MU6) (Table 6.1)</p>	All Hazards	Planning Board	Local	Long Term 4-5 years (37-60 Months)	Medium Cost \$1,000-\$10,000	16

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, particularly since communities may suffer budget cuts or experience personnel turnover during both the planning and implementation stages. A good plan will incorporate periodic monitoring and evaluation mechanisms to allow for review of successes and failures or even just simple updates. 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.

The Grafton Hazard Mitigation Plan 2018 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, 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 ensures that these actions will be done.

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. As this is the first hazard mitigation plan developed by the Town of Grafton, there are no examples of integration of prior plans into other Town plans and documents. It is expected that the Town will incorporate elements from this Plan into the following documents:

Grafton 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. Grafton's Master Plan was completed in 1987 and is overdue for a recommended update. 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. **(Action Item #25)**

Grafton Emergency Operations Plan 2009 (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 Grafton EOP was completed in 2009; an update for the Emergency Operations Plan is overdue and in need of an update. The new EOP will include elements from this hazard mitigation plan. **(Action Item #15)**

Town Budget & Capital Reserve Funds:

The Town of Grafton maintains Capital Reserve Funds for major expenditures, but does not maintain a Capital Improvement Plan. The Capital Reserve Fund is adjusted annually in coordination with the Board of Selectmen 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**

Adoption by the local governing body demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in the Plan. Adoption legitimizes the Plan and authorizes responsible agencies to execute their responsibilities. The Plan shall include documentation of the resolution adopting the Plan as per requirement §201.6(c)(5).

The Grafton 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 Hazard Mitigation Plan and incorporate any changes that help mitigate the susceptibility of the Community and its citizens to the dangers of natural or human-caused disasters. An example of this integration can be seen in this Plan's mitigation action item. **(Action Items #21)**

The local governments will modify other plans and actions as necessary to incorporate hazard and/or wildfire issues; the Board of Selectmen 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 November 16, 2016. The Plan was presented to the Town for review, submitted to HSEM for Conditional Approval (*APA, Approved Pending Adoption*), formally adopted by the Board of Selectmen and resubmitted to HSEM for Final Approval. Once Final Approval from HSEM was met, copies of the Plan were distributed to the Town, HSEM, 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 Grafton, NH

HMGP Grant Expiration
To Be Determined

This Agreement between the Town of Grafton (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 2016 Hazard Mitigation Plan (the Plan).¹⁴ This Plan will be considered a "New" plan as this is the first Hazard Mitigation Plan developed by the Town of Grafton.

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.

¹⁴ The year of the Plan may vary depending on grant approval and work progress

- 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 Grafton Board of Selectmen 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 Grafton Hazard Mitigation Plan.
- MAPS will provide Quarterly Reports as required by Homeland Security for the duration of the project.
- After final approval is received from FEMA, MAPS will provide the Town with a one copy of the Plan containing all signed documents, approvals and GIS maps along with a CD 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; additional copies of the Plan will be priced according to number of pages. 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 Board of Selectmen 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 Board of Selectmen 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 projects into the Capital Improvement Plan (if available).*
 - *Integrate mitigation strategies and priorities from the Plan into other Town planning documents.*

Terms

- **Fees & Payment Schedule:** The contract price is limited to \$7,500; 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\$3,800
 - 2. Second payment upon Plan submittal to FEMA for Conditional Approval.....\$3,500
 - 3. Final payment upon project completion and receipt of final Plan copy\$200
 - Total Fees.....\$7,500
- **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 Grafton 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 \$2,500; reimbursement of funds paid will be made by HSEM once \$1,000 in match time is met. Matching funds are the responsibility of the Town of Grafton, 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 September 30, 2016 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 Plan.
- **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 Grafton. 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 Grafton 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 50 Hazard Mitigation Plans and more than 35 Emergency Operations Plans. MAPS has completed the following FEMA courses:

- 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

Contacts

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PO Box 175
Grafton, NH 03240
boottest@yahoo.com
(603) 523-8315

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

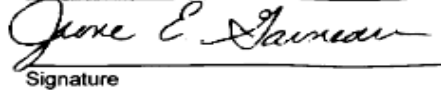
FOR THE TOWN OF GRAFTON, NH


Signature

John J. BABIARZ/EMD
Printed Name/Title

6-OCT-2015
Date

FOR MAPPING AND PLANNING SOLUTIONS


Signature

June Garneau, Owner
September 21, 2015

Signatures are scanned facsimiles; original signatures are on file.

B. Approved Pending Adoption (APA) Letter from HSEM

Grafton, NH - Approvable Pending Adoption

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

Sent: Wed 8/29/2018 1:19 PM

To: June Garneau; 'selectmen@townofgraffton.com'; 'boottest@yahoo.com'

Good afternoon!

The Department of Safety, Division of Homeland Security & Emergency Management (HSEM) has completed its review of the Grafton, 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 Grafton, NH Hazard Mitigation Plan and again, congratulations on your successful community planning efforts.

Sincerely,

Kayla J. Henderson
Hazard Mitigation Planning
NH Homeland Security and Emergency Management
33 Hazen Drive
Concord, NH 03301
NEW: 603-223-3650
603-223-3609 (fax)

Signature is a scanned facsimile; original signatures are on file.

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C. Signed Certificate of Adoption

CERTIFICATE OF ADOPTION

GRAFTON, NH

BOARD OF SELECTMEN

A RESOLUTION ADOPTING THE TOWN OF GRAFTON HAZARD MITIGATION PLAN 2018

WHEREAS, the Town of Grafton 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 Grafton has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its Hazard Mitigation Plan 2018 under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held between November 16 2016 and February 7, 2018 regarding the development and review of the Hazard Mitigation Plan 2018 and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedure for the Town of Grafton; and

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

RESOLVED by the Board of Selectmen:

1. The Plan is hereby adopted as an official plan of the Town of Grafton;
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;

Grafton, Hazard Mitigation Plan 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 Board of Selectmen by the Emergency Management Director.

Adopted this day, the 18th of Sept, 2018

Chairman of the Board of Selectmen

Jennie Joyce
Signature

Jennie Joyce
Print Name

Member of the Board of Selectmen

Signature

Print Name

Member of the Board of Selectmen

Stephen Darrow
Signature

STEPHEN DARROW
Print Name

Emergency Management Director

John J. Babiarz
Signature

John J. BABIARZ
Print Name

IN WITNESS WHEREOF, the undersigned has affixed his/her signature and the corporate seal of the Town of Grafton on this day, 9/18/ 2018

Rosalie T. Babiarz
Notary

ROSALIE T. BABIARZ
Justice of the Peace - New Hampshire
My Commission Expires October 5, 2021
Expiration

Date

Signatures are scanned facsimile; original signatures are on file.

D. Final Approval Letter from FEMA

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

FEMA

OCT 12 2018

Whitney Welch
State Hazard Mitigation Officer
NH Department of Safety
Homeland Security and Emergency Management
33 Hazen Drive
Concord, NH 03303

Dear Ms. Welch:

We would like to acknowledge the Town of Grafton and the State of New Hampshire for their dedication and commitment to mitigation planning.

As outlined in the FEMA-State Agreement for FEMA-DR-4316 your office has been delegated the authority to review and approve local mitigation plans under the Program Administration by States Pilot Program. On **October 9, 2018** our Agency was notified that your office completed its review of the Grafton Hazard Mitigation Plan 2018 and determined it meets the requirements of 44 C.F.R. Pt. 201.

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

Approved mitigation plans are eligible for points under the National Flood Insurance Program's Community Rating System (CRS). Complete information regarding the CRS can be found at <http://www.fema.gov/national-flood-insurance-program-community-rating-system>, or through your local floodplain administrator.

The Grafton Hazard Mitigation Plan 2018 must be reviewed, revised as appropriate, and resubmitted to New Hampshire Homeland Security and Emergency Management for approval within **five years of the plan approval date of October 9, 2018** in order to maintain eligibility for mitigation grant funding. We encourage the Town to continually update the plan's assessment of vulnerability, adhere to its maintenance schedule, and implement, when possible, the mitigation actions proposed in the plan.

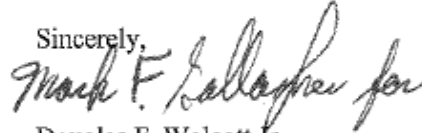
OCT 12 2018

Whitney Welch

Page 2

Once again, thank you for your continued dedication to public service demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please do not hesitate to contact Melissa Surette at (617) 956-7559.

Sincerely,



Douglas F. Wolcott Jr.

Acting Deputy Regional Administrator

DFW: ms

cc: Fallon Reed, Chief of Planning, New Hampshire
 Kayla Henderson, Hazard Mitigation Planner, New Hampshire
 Jennifer Gilbert, New Hampshire State NFIP Coordinator



Grafton, NH - Local Hazard Mitigation Plan - Formal Approval

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

Sent: Tue 10/9/2018 12:10 PM

To: June Garneau; 'selectmen@townofgraffton.com'; 'boottest@yahoo.com'

Cc: Hatch, Paul; Welch, Whitney

 Message  Grafton NH Final Local Mitigation Plan Review Tool.pdf (663 KB)

Good afternoon,

Congratulations! The Town of Grafton's Local Hazard Mitigation Plan has received **Formal Approval** as of today, **October 9, 2018**. 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 Grafton 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

Hazard Mitigation Planning

NH Homeland Security and Emergency Management

33 Hazen Drive

Concord, NH 03301

NEW: 603-223-3650

603-223-3609 (fax)



Signatures are scanned facsimile; original signatures are on file.

E. CWPP Approval Letter from DNCR

Grafton, NH
A Resolution Approving the
Grafton Hazard Mitigation Plan 2018
As a Community Wildfire Protection Plan

Several public meetings and committee meetings were held between November 16 2016 and February 7, 2018 regarding the development and review of the Grafton Hazard Mitigation Plan 2018. The Grafton Hazard Mitigation Plan 2018 contains potential future projects to mitigate hazard and wildfire damage in the Town of Grafton.

The Fire Chief (also the Emergency Management Director) along with the Board of Selectmen 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 Board of Selectmen and the Fire Chief (EMD) approve the Grafton Hazard Mitigation Plan 2018 and understand that with approval by DNCR, this Plan will also serve as a Community Wildfire Protection Plan.

For the Town of Grafton

APPROVED and SIGNED this day, Sept 18, 2018.

Jennie Joyce
 Chairman of the Board of Selectmen

Jennie Joyce
 Printed Name

John J. GAGZARZ
 Fire Chief & Emergency Management Director

John J. GAGZARZ
 Printed Name

For the Department of Natural & Cultural Resources (DNCR)

APPROVED and SIGNED this day, September 28, 2018.

Dan G. Miner
 Forest Ranger, NH Division of Forest and Lands, DNCR

APPROVED and SIGNED this day, Oct. 3rd, 2018.

Thomas J. G. [Signature]
 Director – NH Division of Forest and Lands, DNCR

Signature is a scanned facsimile; original signatures are on file.

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F. Annual Review or Post Hazard 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 Grafton, 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.

Grafton, NH
Hazard Mitigation Plan

REVIEWED AND APPROVED

DATE: _____

SIGNATURE: _____

PRINTED NAME: _____

Emergency Management Director

CONCURRENCE OF APPROVAL

SIGNATURE: _____

PRINTED NAME: _____

Chairman of the Select Board

Changes and notes regarding the 2018 Hazard Mitigation Plan

Please use reverse side for additional notes 

Additional Notes – Year One:

[illegible]

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 Grafton, 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.

Grafton, NH
Hazard Mitigation Plan

REVIEWED AND APPROVED

DATE: _____

SIGNATURE: _____

PRINTED NAME: _____

Emergency Management Director

CONCURRENCE OF APPROVAL

SIGNATURE: _____

PRINTED NAME: _____

Chairman of the Select Board

Changes and notes regarding the 2018 Hazard Mitigation Plan

Please use reverse side for additional notes 

Additional Notes – Year Two:

[illegible]

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 Grafton, 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.

Grafton, NH
Hazard Mitigation Plan

REVIEWED AND APPROVED

DATE: _____

SIGNATURE: _____

PRINTED NAME: _____

Emergency Management Director

CONCURRENCE OF APPROVAL

SIGNATURE: _____

PRINTED NAME: _____

Chairman of the Select Board

Changes and notes regarding the 2018 Hazard Mitigation Plan

Please use reverse side for additional notes 

Additional Notes – Year Three:

[illegible]

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 Grafton, 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.

Grafton, NH
Hazard Mitigation Plan

REVIEWED AND APPROVED

DATE: _____

SIGNATURE: _____

PRINTED NAME: _____

Emergency Management Director

CONCURRENCE OF APPROVAL

SIGNATURE: _____

PRINTED NAME: _____

Chairman of the Select Board

Changes and notes regarding the 2018 Hazard Mitigation Plan

Please use reverse side for additional notes 

Additional Notes – Year Four:

[illegible]

Chapter 12: Appendices

- APPENDIX A: BIBLIOGRAPHY
- APPENDIX B: TECHNICAL AND FINANCIAL ASSISTANCE FOR HAZARD MITIGATION
 - *Hazard Mitigation Grant Program (HMGP)*
 - *Pre-Disaster Mitigation (PDM)*
 - *Flood Mitigation Assistance (FMA)*
 - *Repetitive Flood Claims (RFC)*
 - *Severe Repetitive Loss (SRL)*
- APPENDIX C: THE EXTENT OF HAZARDS
- APPENDIX D: PRESIDENTIAL DISASTER & EMERGENCY DECLARATIONS
- APPENDIX E: POTENTIAL MITIGATION IDEAS
- APPENDIX F: ACRONYMS
- APPENDIX G: MAP DOCUMENTS
 - *Map 1 – Base Risk Analysis*
 - *Map 2 – Historic Fires & the Wildland Urban Interface (WUI)*
 - *Map 3 – Past & Potential Areas of Concern*
 - *Map 4 – Critical Infrastructure & Key Resources*

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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**
 - Whitefield Hazard Mitigation Plan, 2017
 - Orford Hazard Mitigation Plan, 2016
 - Lyme Hazard Mitigation Plan, 2017
- **NH State Multi-Hazard Mitigation Plan**, 2013
 - <http://www.nh.gov/safety/divisions/hsem/HazardMitigation/documents/hazard-mitigation-plan.pdf>
- **NH Division of Forests and Lands Quarterly Update**
 - <http://www.nhdfil.org/fire-control-and-law-enforcement/fire-statistics.aspx>
- **Disaster Mitigation Act (DMA) of 2000**, Section 101, b1 & b2 and Section 322a
 - <http://www.fema.gov/library/viewRecord.do?id=1935>
- **Economic & Labor Market Information Bureau**, NH Employment Security, October 2017; Community Response for Grafton, Received, 5/11/2016, Census 2000 and Revenue Information derived from this site; <https://www.nhes.nh.gov/elmi/products/cp/profiles-pdf/grafon.pdf>

Photos: Photos taken by MAPS unless otherwise noted.

Additional Websites

- **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
- 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 of Strategic Initiatives; <http://www.nh.gov/osi/planning/programs/fmp/join-nfip.htm>
- Code of Federal Regulations; Title 14, Aeronautics and Space; Part 1, Definitions and Abbreviations; https://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title14/14tab_02.tpl
- 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 programs¹⁵:

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

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'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 Presidential 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

¹⁵ 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

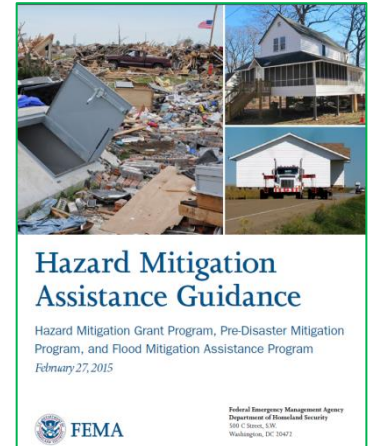
What is the Hazard Mitigation Grant Program?

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 Hazards

Hazards indicated with an asterisk * are included in this Plan.

DAM FAILURE

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 breach and an unintentional release of water. Dams are classified in the following manner¹⁶:

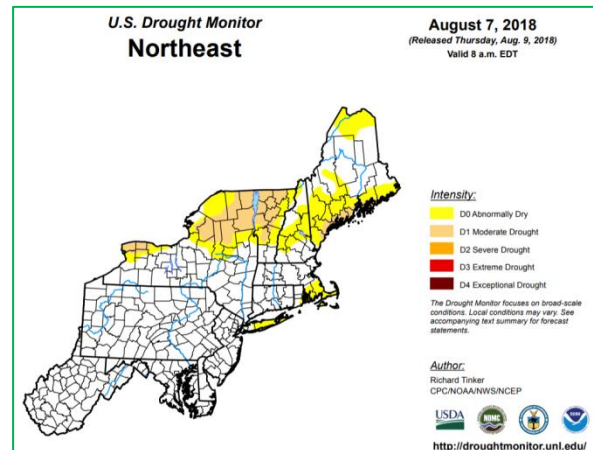
Classification	Description	Inspection Intervals
Non-Menace	A dam that is not a menace because it is in a location and of a size that failure or misoperation of the dam would not result in probable loss of life or loss to property. The dam must be less than six feet in height if the storage capacity is 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 or 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

^[1] NH DES http://des.nh.gov/organization/divisions/water/dwgb/wrpp/documents/primer_chapter11.pdf

¹⁶ <http://des.nh.gov/organization/commissioner/pip/factsheets/db/documents/db-15.pdf>

*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. The most recent Northeast Drought monitor is shown to the right.¹⁷



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.

*EARTHQUAKE

An earthquake is a rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric and phone lines and often cause landslides, flash floods, fires and avalanches. 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.¹⁸

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 New Hampshire history.

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

¹⁷ <http://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?Northeast>

¹⁸ Modified Mercalli Scale/Richter Scale Chart; MO DNR, http://www.dnr.mo.gov/geology/geosrv/geores/richt_mercalli_relation.htm

EROSION, MUDSLIDE & LANDSLIDE

Erosion is the wearing away 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.¹⁹

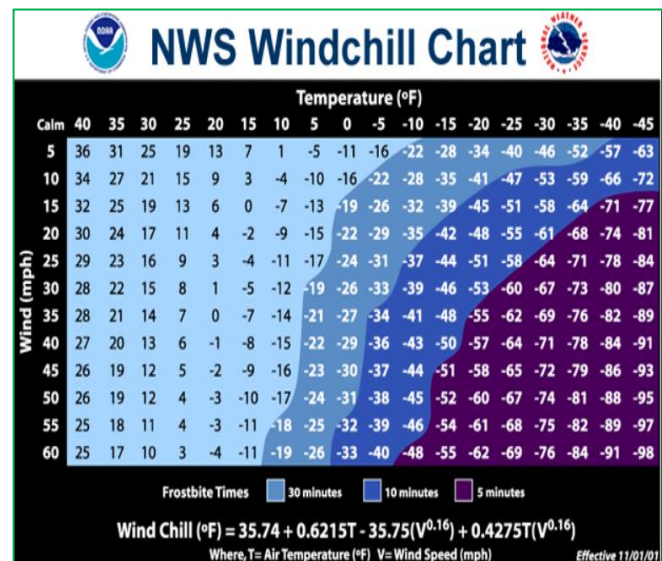
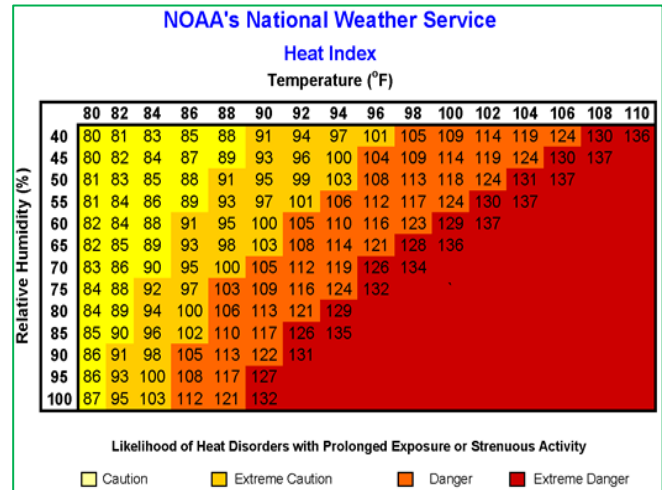
*EXTREME TEMPERATURES

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."²⁰ The chart above explains the likelihood of heat disorders that may result from high heat.²¹



¹⁹Mitigation Ideas, A Resource for Reducing Risk to Natural Hazards, FEMA, January 2013

²⁰ NOAA, Index/Heat Disorders; <http://www.srh.noaa.gov/ssd/html/heatwv.htm>

²¹ NOAA; <http://www.nws.noaa.gov/os/heat/index.shtml>

EXTREME COLD

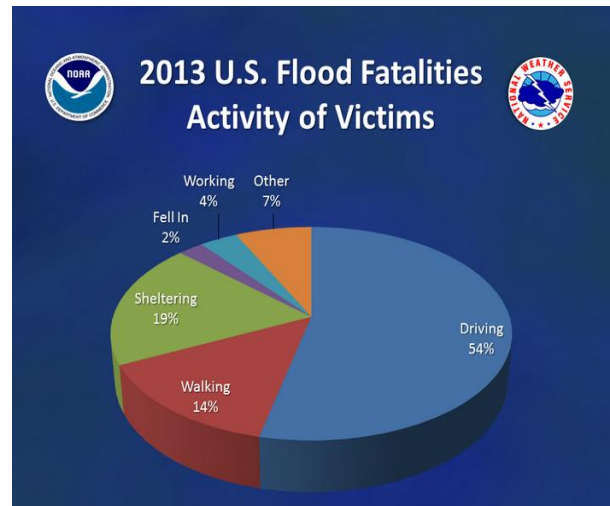
What constitutes extreme cold and its effects can vary across different areas of the country. In regions relatively unaccustomed to winter weather, near freezing temperatures are considered “extreme cold.” Whenever temperatures drop decidedly below normal and as wind speed increases, heat can leave your 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.²² The National Weather Service Chart (previous page) shows windchill as a result of wind and temperature.²³

***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.



FLOODING (LOCAL, ROAD EROSION)

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”. What this means is that there is a 1% chance of a flood of that size happening in any year. Flooding is often associated with hurricanes, heavy rains, ice jams and rapid snowmelt in the spring.

²² CDC; <http://www.bt.cdc.gov/disasters/winter/guide.asp>

²³ National Weather Service; <http://www.nws.noaa.gov/om/windchill/>

FLOODING (DAM FAILURE)

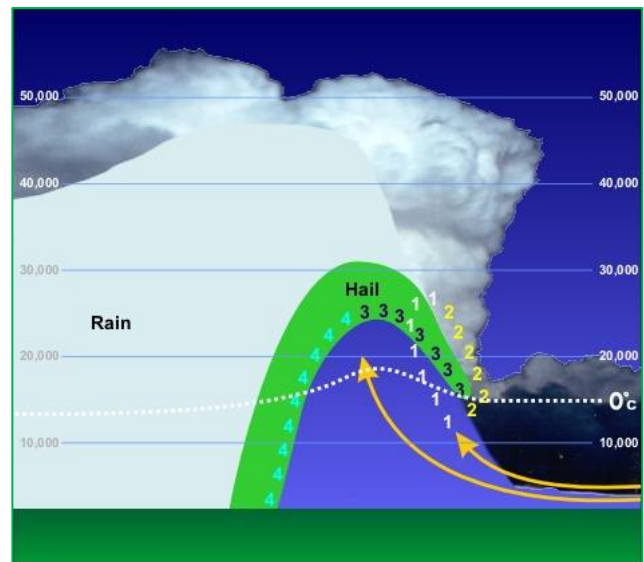
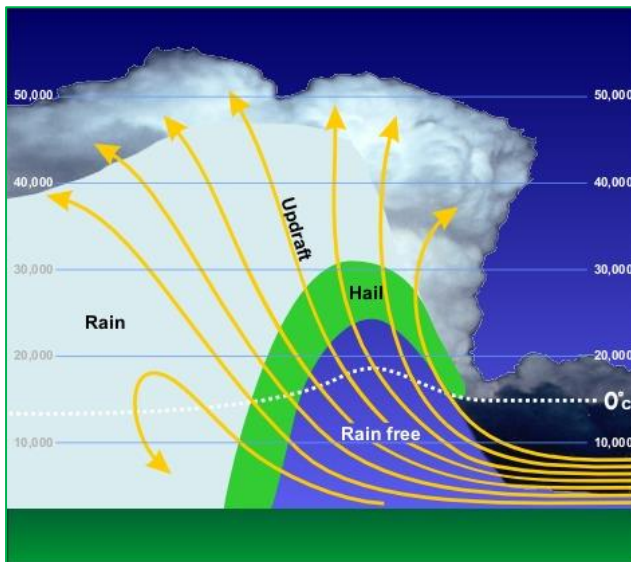
Flooding as a result of dam failure can be small enough to only affect the immediate area of the dam, or large enough to cause catastrophic results to cities, towns and human life that is below the dam. The extent of flooding depends largely on the size of the dam, the amount of water that is being held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

***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 inches. It weighed 1 lb. 15 oz."²⁴

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.²⁵ The charts below show how hail is formed.²⁶



²⁴ NOAA National Severe Storms Laboratory; <https://www.nssl.noaa.gov/education/svrwx101/hail/>

²⁵ <http://www.pinterest.com/pin/126171227030590678/>

²⁶ <http://oceanservice.noaa.gov/education/yos/resource/JetStream/tstorms/hail.htm#hail>

*HIGH WIND (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.²⁷

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.²⁸

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, foam 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	

²⁷ NOAA; <http://www.nws.noaa.gov/glossary/index.php?letter=w>

²⁸ NOAA, Storm Prediction Center, <http://www.spc.noaa.gov/faq/tornado/beaufort.html>

*HURRICANE & TROPICAL STORM

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" (to the right²⁹) 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, however and require preventative measures. In the western North Pacific, the term "super typhoon" is used for tropical cyclones with sustained winds exceeding 150 mph.³⁰

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.

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, 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.

TROPICAL STORMS

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.

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.³¹

²⁹ National Hurricane Center; <http://www.nhc.noaa.gov/aboutsshws.php>

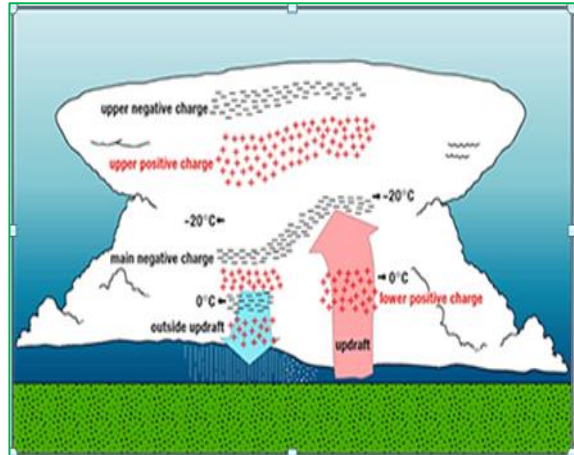
³⁰ National Hurricane Center, NOAA; <http://www.nhc.noaa.gov/aboutsshws.php>

³¹ http://www.wpc.ncep.noaa.gov/research/mcs_web_test_test_files/Page1637.htm

*SEVERE THUNDER & LIGHTNING STORM

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."³²

Thunder, a result of lightning, is created when the "lightning channel heats the air to around 18,000 degrees Fahrenheit..."³³ 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.



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

Although thunderstorms and their associated lightning can occur any time of year, in New England they are most likely to occur in the summer months and during the late afternoon or early evening hours and 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."³⁴

³² NOAA National Severe Storms Laboratory, <https://www.nssl.noaa.gov/education/svrwx101/lightning>

³³ Ibid

³⁴ Ibid

*SEVERE WINTER SNOW & ICE STORM

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

SNOW STORMS

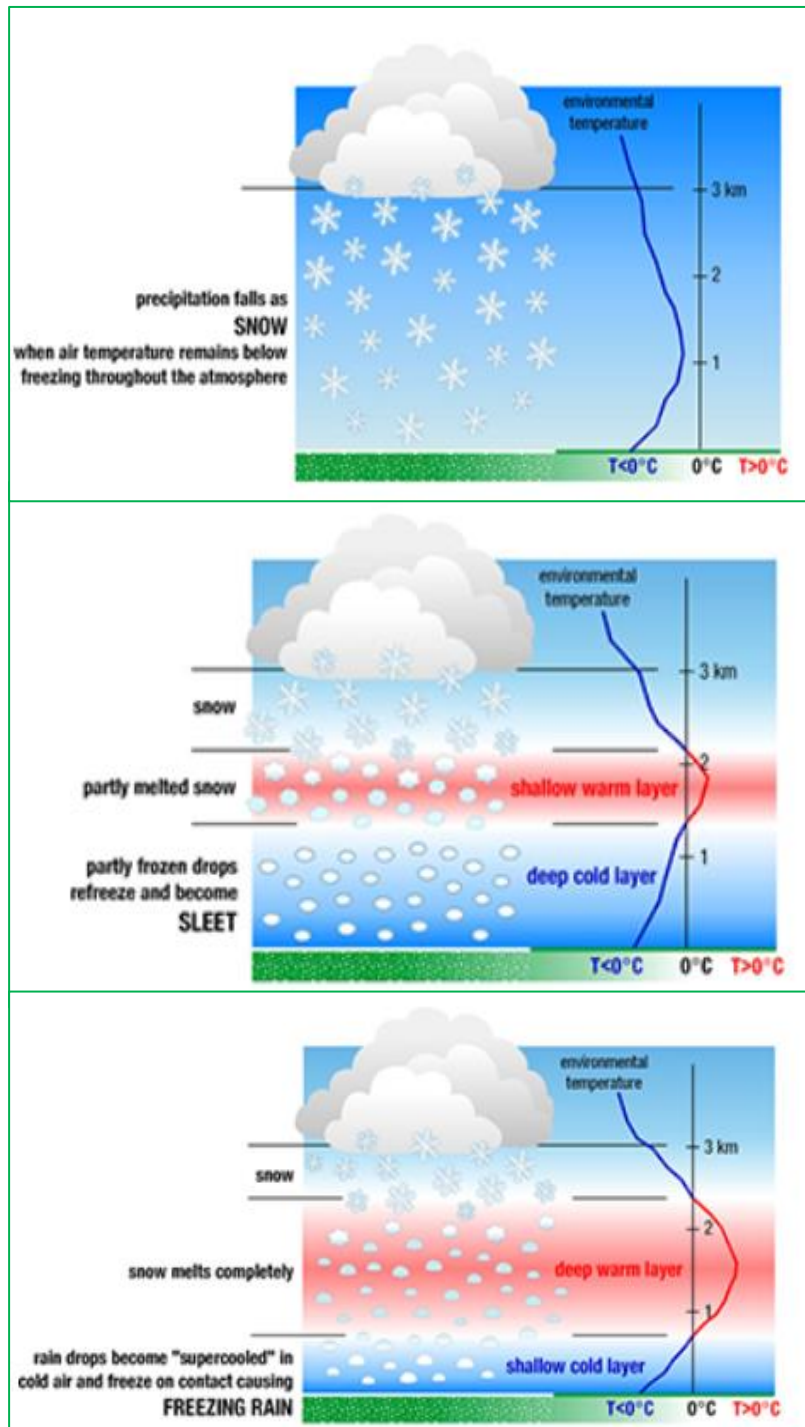
A winter storm can range from moderate snow to blizzard conditions. Blizzard conditions are considered blinding wind-driven snow over 35 mph that lasts several days. A severe winter storm deposits four or more inches of snow during a 12-hour period or six inches of snow during a 24-hour period.

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.”³⁵



Types of Severe Winter Weather
NOAA – National Severe Storms Laboratory

³⁵ 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.³⁶

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

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

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

SNOW AVALANCHE

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.”³⁷



“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.”

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.”³⁸

³⁶ The Weather Channel, <http://www.weather.com/news/weather-winter/rating-ice-storms-damage-sperry-piltz-20131202>

³⁷ Copyright Richard Armstrong, NSIDC, <http://nsidc.org/cryosphere/snow/science/avalanches.html>






³⁸ NSIDC, <http://nsidc.org/cryosphere/snow/science/avalanches.html>; image credit: Betsy Armstrong

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.”³⁹

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 below shows avalanche danger as determined by likelihood, size & distribution.⁴⁰

North American Public Avalanche Danger Scale Avalanche danger is determined by the likelihood, size and distribution of avalanches.				
Danger Level		Travel Advice	Likelihood of Avalanches	Avalanche Size and Distribution
5 Extreme		Avoid all avalanche terrain.	Natural and human-triggered avalanches certain.	Large to very large avalanches in many areas.
4 High		Very dangerous avalanche conditions. Travel in avalanche terrain <u>not</u> recommended.	Natural avalanches likely; human-triggered avalanches very likely.	Large avalanches in many areas; or very large avalanches in specific areas.
3 Considerable		Dangerous avalanche conditions. Careful snowpack evaluation, cautious route-finding and conservative decision-making essential.	Natural avalanches possible; human-triggered avalanches likely.	Small avalanches in many areas; or large avalanches in specific areas; or very large avalanches in isolated areas.
2 Moderate		Heightened avalanche conditions on specific terrain features. Evaluate snow and terrain carefully; identify features of concern.	Natural avalanches unlikely; human-triggered avalanches possible.	Small avalanches in specific areas; or large avalanches in isolated areas.
1 Low		Generally safe avalanche conditions. Watch for unstable snow on isolated terrain features.	Natural and human-triggered avalanches unlikely.	Small avalanches in isolated areas or extreme terrain.
Safe backcountry travel requires training and experience. You control your own risk by choosing where, when and how you travel.				

³⁹ Copyright Richard Armstrong, NSIDC, <http://nsidc.org/cryosphere/snow/science/avalanches.html>

⁴⁰ http://www.avalanche.org/danger_card.php

*TORNADO & DOWNBURST

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."⁴¹ The chart (above), adapted from wunderground.com, shows a comparison of the Fujita Scale to the Enhanced Fujita Scale.

Tornadoes are relatively uncommon natural hazards in New Hampshire; on average, about six tornadoes touch down each year. Damage largely depends on where the tornado strikes. If it were to strike an inhabited area, the impact could be severe.

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
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 through 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.

⁴¹ 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.⁴²

***WILDFIRE**

As stated by the National Wildfire Coordinating Group (NWCG), wildfires are designated in seven categories as seen in the top chart to the right.⁴³ For the purpose of statistical analysis, the US Forest Service recognizes the cause of fires according to the bottom chart to the right.⁴⁴

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."⁴⁵

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. Therefore, the loss to the forest itself will not be a factor in our loss calculation analysis.

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

⁴² NOAA - <http://www.srh.noaa.gov/jetstream/tstorms/wind.html>

⁴³ <http://www.nwcg.gov/pms/pubs/glossary/s.htm>

⁴⁴ https://www.fs.fed.us/cgi-bin/Directives/get_dirs/fsh?5109.14

⁴⁵ International Wildland-Urban Interface Code, 2012, International Code Council, Inc.

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Appendix D: NH Presidential Disaster & Emergency Declarations

Presidential Disaster Declarations

Number	Description	Date of Event	Counties	Description
DR-4371	Severe Winter Storm & Snowstorm	March 13-14, 2018	Carroll, Strafford & Rockingham	Presidential 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	Presidential 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	Presidential 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.
DR-4329	Severe Storms, Flooding	July 1-2, 2017	Grafton & Coos	Presidential 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 & Coos Counties
DR-4316	Severe Winter Storm and Snowstorm	March 14-15, 2017	Belknap & Carroll	Presidential Emergency Declaration DR-4316: Severe winter storm and snowstorm in Belknap & Carroll Counties; disaster aid to supplement state and local recovery efforts.
DR-4209	Severe Winter Storm and Snowstorm	January 26-28, 2015	Hillsborough, Rockingham & Stafford	Presidential Emergency Declaration DR-4206: 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	Presidential Emergency 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	8-Feb-13	All Ten NH Counties	Presidential Emergency Declaration DR-4105: Nemo; heavy snow in February 2013.
DR-4095	Hurricane Sandy	October 26-November 8, 2012	Belknap, Carroll, Coos, Grafton & Sullivan	Presidential 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.
DR-4065	Severe Storm & Flooding	May 29-31, 2012	Cheshire	Presidential Disaster Declaration DR-4065: Severe Storm and Flood Event May 29-31, 2012 Cheshire County.
DR-4049	Severe Storm & Snowstorm	October 29-30, 2011	Hillsborough & Rockingham	Presidential Disaster Declaration DR-4049: Severe Storm and Snowstorm Event October 29-30, 2011 Hillsborough and Rockingham Counties.
DR-4026	Tropical Storm Irene	August 26-September 6, 2011	Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, & Sullivan	Presidential Disaster Declaration DR-4026: Tropical Storm Irene Aug 26th- Sept 6, 2011 Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, & Sullivan Counties.

Number	Description	Date of Event	Counties	Description
DR-4006	Severe Storms & Flooding	May 26-30, 2011	Coos & Grafton County	Presidential Disaster Declaration DR-4006: May Flooding Event, May 26th-30th 2011 Coos & Grafton County. (aka: Memorial Day Weekend Storm)
DR-1913	Severe Storms & Flooding	March 14-31, 2010	Hillsborough & Rockingham	Presidential 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	Presidential Disaster Declaration: DR-1892: Flood and wind damage to most 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	Presidential 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.
DR-1799	Severe Storms & Flooding	September 6-7, 2008	Hillsborough	Presidential Declaration: DR-1799: Severe storms and flooding beginning on September 6-7, 2008.
DR-1787	Severe Storms & Flooding	July 24-August 14, 2008	Belknap, Carroll & Grafton & Coos	Presidential Declaration DR-1787: Severe storms, tornado, and flooding on July 24, 2008.
DR-1782	Severe Storms, Tornado, & Flooding	24-Jul-08	Belknap, Carroll, Merrimack, Strafford & Rockingham	Presidential Declaration DR-1782: Tornado damage to several NH counties.
DR-1695	Nor'easter, Severe Storms & Flooding	April 15-23, 2007	All Ten NH Counties	Presidential Disaster Declaration DR-1695: Flood damages; FEMA & SBA obligated more than \$27.9 million in disaster aid following the April nor'easter. (aka: Tax Day Storm)
DR-1643	Severe Storms & Flooding	May 12-23, 2006	Belknap, Carroll, Grafton, Hillsborough, Merrimack, Rockingham & Strafford	Presidential 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	Presidential 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.
DR-1489	Severe Storms & Flooding	July 21-August 18, 2003	Cheshire & Sullivan	Presidential 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.
DR-1305	Tropical Storm Floyd	September 16-18, 1999	Belknap, Cheshire & Grafton	Presidential 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	NA	Presidential Disaster Declaration DR-1231:

Number	Description	Date of Event	Counties	Description
DR-1199	Ice Storms	January 7-25, 1998	NA	Presidential Disaster Declaration DR-1199:
DR-1144	Severe Storms/Flooding	October 20-23, 1996	NA	Presidential Disaster Declaration DR-1144:
DR-1077	Storms/Floods	October 20-November 15, 1995	NA	Presidential Disaster Declaration DR-1077:
DR-923	Severe Coastal Storm	October 30-31, 1991	NA	Presidential Disaster Declaration DR-923:
DR-917	Hurricane Bob, Severe Storm	August 18-20, 1991	NA	Presidential Disaster Declaration DR-917:
DR-876	Flooding, Severe Storm	August 7-11, 1990	NA	Presidential Disaster Declaration DR-876:
DR-789	Severe Storms & Flooding	March 30-April 11, 1987	NA	Presidential Disaster Declaration DR-789
DR-771	Severe Storms & Flooding	July 29-August 10, 1986	NA	Presidential Disaster Declaration DR-771:
DR-549	High Winds, Tidal Surge, Coastal Flooding & Snow	16-Feb-78	NA	Presidential Disaster Declaration DR-549: Blizzard of 1978
DR-411	Heavy Rains, Flooding	21-Jan-74	NA	Presidential Disaster Declaration DR-411:
DR-399	Severe Storms & Flooding	11-Jul-73	NA	Presidential Disaster Declaration DR-399:
DR-327	Coastal Storms	18-Mar-72	NA	Presidential Disaster Declaration DR-327:
DR-11	Forest Fire	2-Jul-53	NA	Presidential Disaster Declaration DR-11:

Emergency Disaster Declarations

Number	Description	Date of Event	Counties	Description
EM-3360	Hurricane Sandy	October 26-31, 2012	All Ten NH Counties	Presidential Emergency Declaration EM-3360: Hurricane Sandy came ashore in NJ and brought high winds, power outages and heavy rain to NH- All ten counties in the State of New Hampshire.
EM-3344	Severe Snow Storm	October 29-30, 2011	All Ten NH Counties	Presidential Emergency Declaration EM-3344: Severe storm during the period of October 29-30, 2011; all ten counties in the State of New Hampshire. (aka: Snowtober)
EM-3333	Hurricane Irene	August 26-September 6, 2011	All Ten NH Counties	Presidential Emergency Declaration EM-3333: Emergency Declaration for Tropical Storm Irene for in all ten counties.
EM-3297	Severe Winter Storm	11-Dec-08	All Ten NH Counties	Presidential Emergency Declaration EM-3297: Severe winter storm beginning on December 11, 2008.

Number	Description	Date of Event	Counties	Description
EM-3258	Hurricane Katrina Evacuation	August 29-October 1, 2005	All Ten NH Counties	Presidential 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	Presidential 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	Presidential Emergency Declaration EM-3208: FEMA had obligated more than \$1 million by March 2005 to help pay for costs of the heavy snow and high winds; Total aid for the February storm is \$1,121,727.20 (Carroll: \$91,832.72; Cheshire: \$11,002.18; Coos: \$11,6508.10; Grafton: \$213,539.52; Sullivan: \$68,288.90; State of NH: \$521,536.78) EM 3208-002: 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 snow storms that hit the state, according to disaster recovery officials. Total aid for all three storms is \$6,892,023.87 (January: \$3,658,114.66; February: \$1,121,727.20; March: \$2,113,182.01)
EM-3207	Snow	January, 22-23, 2005	Belknap, Carroll, Cheshire, Grafton, Hillsborough, Rockingham, Merrimack, Strafford & Sullivan	Presidential Emergency Declaration EM-3207: JANUARY STORM DAMAGE: 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	Presidential Emergency Declaration EM-3193: The declaration covers jurisdictions with record and near-record snowfall that occurred over the period of December 6-7, 2003
EM-3177	Snowstorm	February 17-18, 2003	Cheshire, Hillsborough, Merrimack, Rockingham & Strafford	Presidential 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, & Strafford	Presidential Emergency Declaration EM-3166: Declaration covers jurisdictions with record and near-record snowfall from the late winter storm that occurred March 2001
EM-3101	High Winds & Record Snowfall	March 13-17, 1994	NA	Presidential Emergency Declaration EM-3101:
EM-3073	Flooding	15-Mar-79	NA	Presidential Emergency Declaration EM-3073:

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: Potential Mitigation Ideas⁴⁶

Drought

- D1 Assess Vulnerability to Drought Risk
- D2 Monitoring Drought Conditions
- D3 Monitor Water Supply
- D4 Plan for Drought
- D5 Require Water Conservation during Drought Conditions
- D6 Prevent Overgrazing
- D7 Retrofit Water Supply Systems
- D8 Enhance Landscaping & Design Measures
- D9 Educate Residents on Water Saving Techniques
- D10 Educate Farmers on Soil & Water Conservation Practices
- D11 Purchase Crop Insurance

Earthquake

- EQ1.... Adopt & Enforce Building Codes
- EQ2.... Incorporate Earthquake Mitigation into Local Planning
- EQ3.... Map & Assess Community Vulnerability to Seismic Hazards
- EQ4.... Conduct Inspections of Building Safety
- EQ5.... Protect Critical Facilities & Infrastructure
- EQ6.... Implement Structural Mitigation Techniques
- EQ7.... Increase Earthquake Risk Awareness
- EQ8.... Conduct Outreach to Builders, Architects, Engineers and Inspectors
- EQ9.... Provide Information on Structural & Non-Structural Retrofitting

Erosion

- ER1.... Map & Assess Vulnerability to Erosion
- ER2.... Manage Development in Erosion Hazard Areas
- ER3.... Promote or Require Site & Building Design Standards to Minimize Erosion Risk
- ER4.... Remove Existing Buildings & Infrastructure from Erosion Hazard Areas
- ER5.... Stabilize Erosion Hazard Areas
- ER6.... Increase Awareness of Erosion Hazards

Extreme Temperatures

- ET1 Reduce Urban Heat Island Effect
- ET2 Increase Awareness of Extreme Temperature Risk & Safety
- ET3 Assist Vulnerable Populations
- ET4 Educate Property Owners about Freezing Pipes

Hailstorm

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

Landslide

- LS1.... Map & Assess Vulnerability to Landslides
- LS2.... Manage Development in Landslide Hazard Areas
- LS3.... Prevent Impacts to Roadways
- LS4 Remove Existing Buildings & Infrastructure from Landslide

Lightning

- L1 Protect Critical Facilities
- L2 Conduct Lightning Awareness Programs

Flood

- F1 Incorporate Flood Mitigation in Local Planning
- F2 Form Partnerships to Support Floodplain Management
- F3 Limit or Restrict Development in Floodplain Areas
- F4 Adopt & Enforce Building Codes and Development Standards
- F5 Improve Stormwater Management Planning
- F6 Adopt Policies to Reduce Stormwater Runoff
- F7 Improve Flood Risk Assessment
- F8 Join or Improve Compliance with NFIP
- F9 Manage the Floodplain beyond Minimum Requirements
- F10 Participate in the CRS
- F11 Establish Local Funding Mechanism for Flood Mitigation
- F12 Remove Existing Structures from Flood Hazard Areas
- F13 Improve Stormwater Drainage System Capacity
- F14 Conduct Regular Maintenance for Drainage Systems & Flood Control Structures
- F15 Elevate of Retrofit Structures & Utilities
- F16 Floodproof Residential & Non-Residential Structures
- F17 Protect Infrastructure
- F18 Protect Critical Facilities
- F19 Construct Flood Control Measures
- F20 Protect & Restore Natural Flood Mitigation Features
- F21 Preserve Floodplains as Open Space
- F22 Increase Awareness of Flood Risk & Safety
- F23 Educate Property Owners about Flood Mitigation Techniques

Severe Wind

- SW1... Adopt & Enforce Building Codes
- SW2... Promote or Require Site & Building Design Standards to Minimize Wind Damage
- SW3... Assess Vulnerability to Severe Wind
- SW4... Protect Power Lines & Infrastructure
- SW5... Retrofit Residential Buildings
- SW6... Retrofit Public Buildings & Critical Facilities
- SW7... Increase Severe Wind Awareness

Severe Winter Weather

- WW1.. Adopt & Enforce Building Codes
- WW2.. Protect Buildings & Infrastructure
- WW3.. Protect Power Lines
- WW4.. Reduce Impacts to Roadways
- WW5.. Conduct Winter Weather Risk Awareness Activities
- WW6.. Assist Vulnerable Populations

Tornado

- T1 Encourage Construction of Safe Rooms
- T2 Require Wind-Resistant Building Techniques
- T2 Conduct Tornado Awareness Activities

⁴⁶ Mitigation Ideas, A Resource for Reducing Risk to Natural Hazards, FEMA, January 2013

Wildfire

WF1 ... Map & Assess Vulnerability to Wildfire
WF2 ... Incorporate Wildfire Mitigation in the Comprehensive Plan
WF3 ... Reduce Risk through Land Use Planning
WF4 ... Develop a Wildland Urban Interface Code
WF5 ... Require or Encourage Fire-Resistant Construction Techniques
WF6 ... Retrofit At-Risk Structure with Ignition-Resistant Materials
WF7 ... Create Defensible Space around Structures & Infrastructure
WF8 ... Conduct Maintenance to Reduce Risk
WF9 ... Implement a Fuels Management Program
WF10 . Participate in the Firewise Program
WF11 . Increase Wildfire Awareness
WF12 . Educate Property Owners about Wildfire Mitigation Techniques

Multi-Hazards

MU1 ... Assess Community Risk
MU2 ... Map Community Risk
MU3 ... Prevent Development in Hazard Areas
MU4 ... Adopt Regulations in Hazard Areas
MU5 ... Limit Density in Hazard Areas
MU6 ... Integrate Mitigation into Local Planning
MU7 ... Strengthen Land Use Regulations
MU8 ... Adopt & Enforce Building Codes
MU9 ... Create Local Mechanisms for Hazard Mitigation
MU10 . Incentivize Hazard Mitigation
MU11 . Monitor Mitigation Plan Implementation
MU12 . Protect Structures
MU13 . Protect Infrastructure & Critical Facilities
MU14 . Increase Hazard Education & Risk Awareness
MU15 . Improve Household Disaster Preparedness
MU16 . Promote Private Mitigation Efforts

Appendix F: 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
DNCR.....	Department of Natural & Cultural Resources (formerly DRED)
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
HSEM.....	Homeland Security & Emergency Management (NH)
ICS	Incident Command System
LEOP	Local Emergency Operations Plan
MOU.....	Memorandum of Understanding
NCRC&D.....	North Country Resource Conservation & Development Council
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
NHDOT	NH Department of Transportation
NHOSI.....	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

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Appendix G: Map Documents

The following 11" x 17" maps are included in hard copy plans:

Map 1 – Base Risk Analysis

Map 2 – Historic Wildfires & Wildland Urban Interface

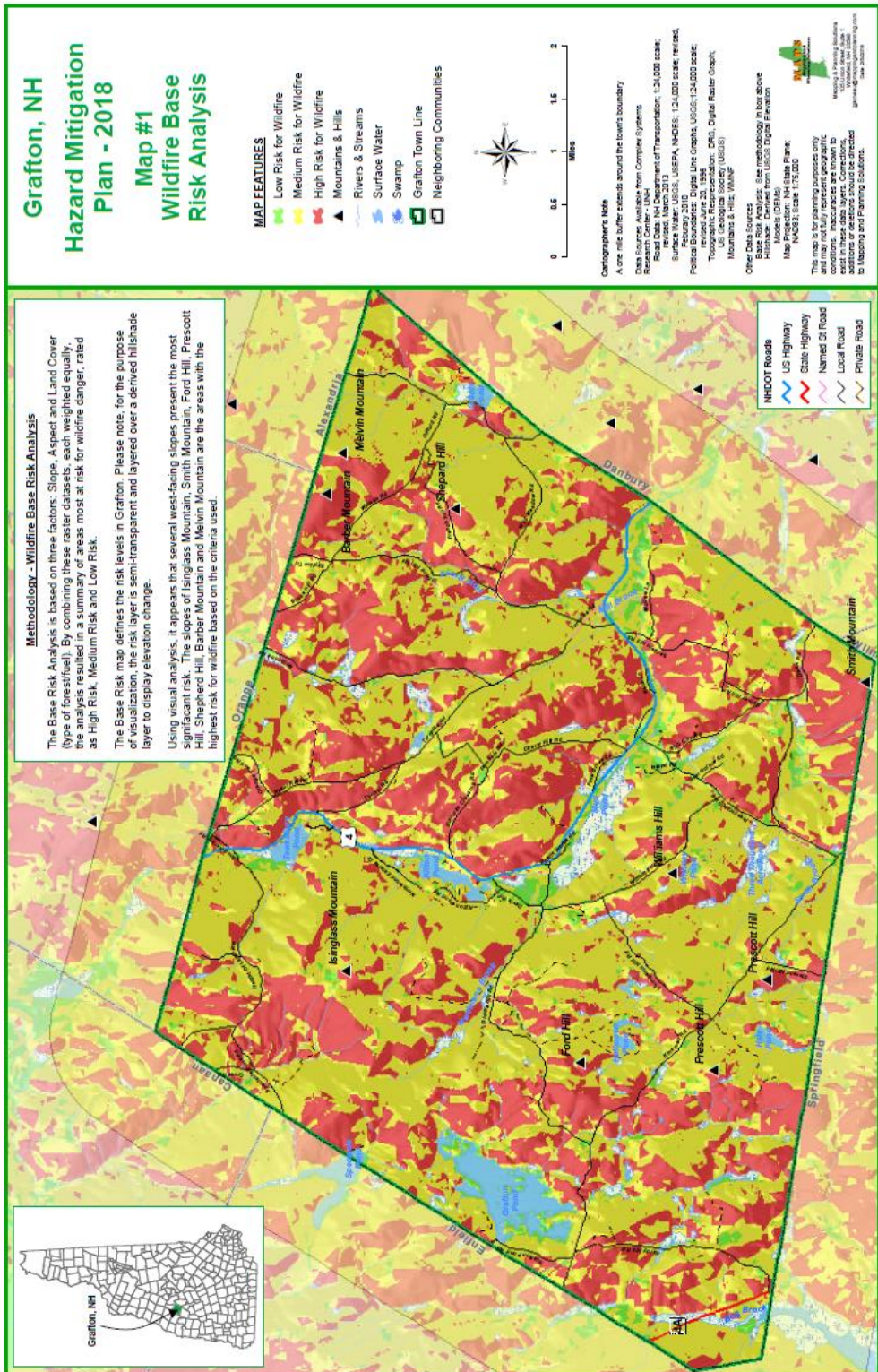
Map 3 – Past & Potential Areas of Concern

Map 4 – Critical Infrastructure & Key Resources

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MAP 1 – BASE RISK ANALYSIS

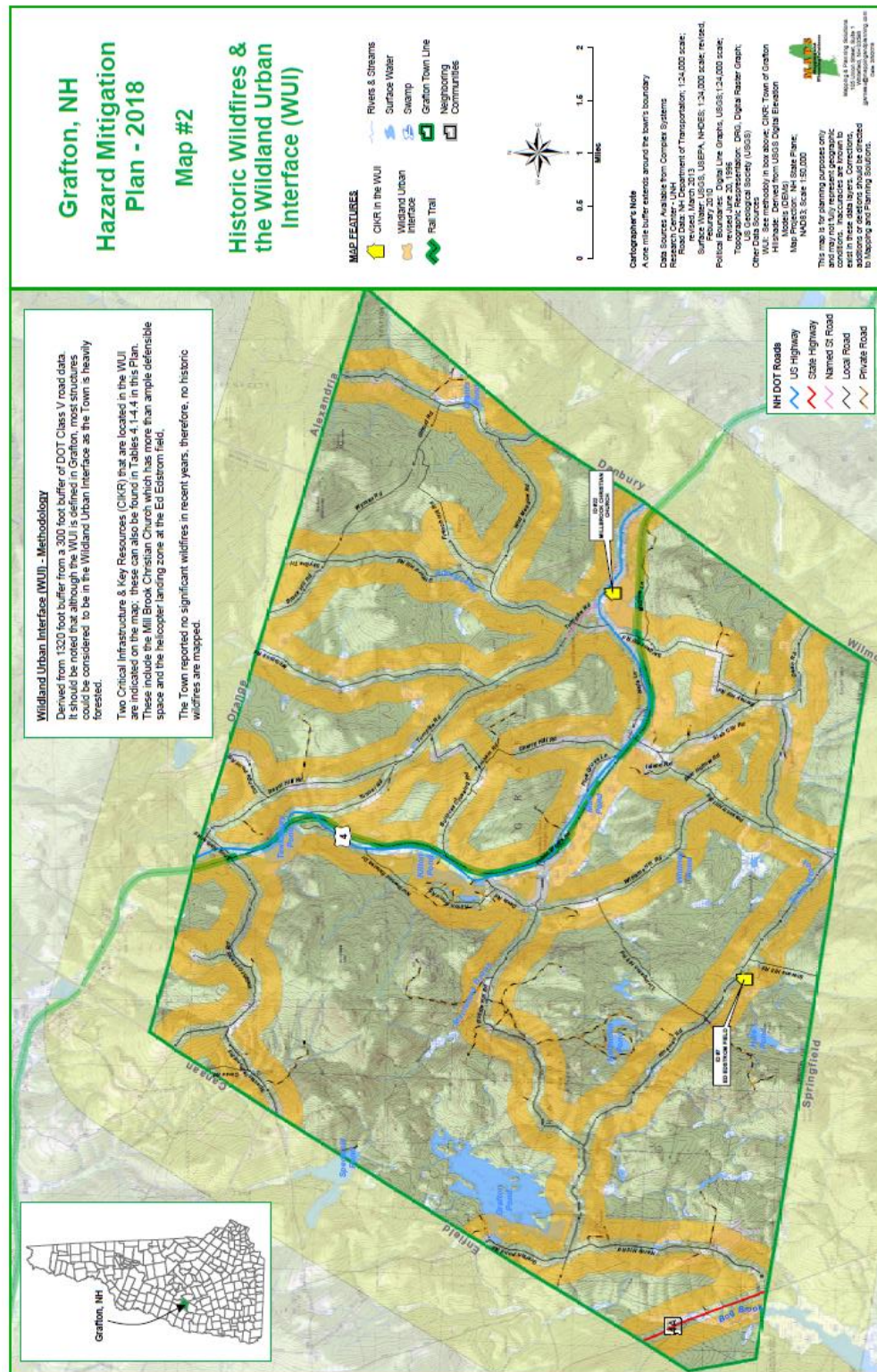
To be replaced with 11" x 17" map in final hard copy.



PLACE HOLDER FOR MAP 1

MAP 2 – HISTORIC WILDFIRES & THE WILDLAND URBAN INTERFACE

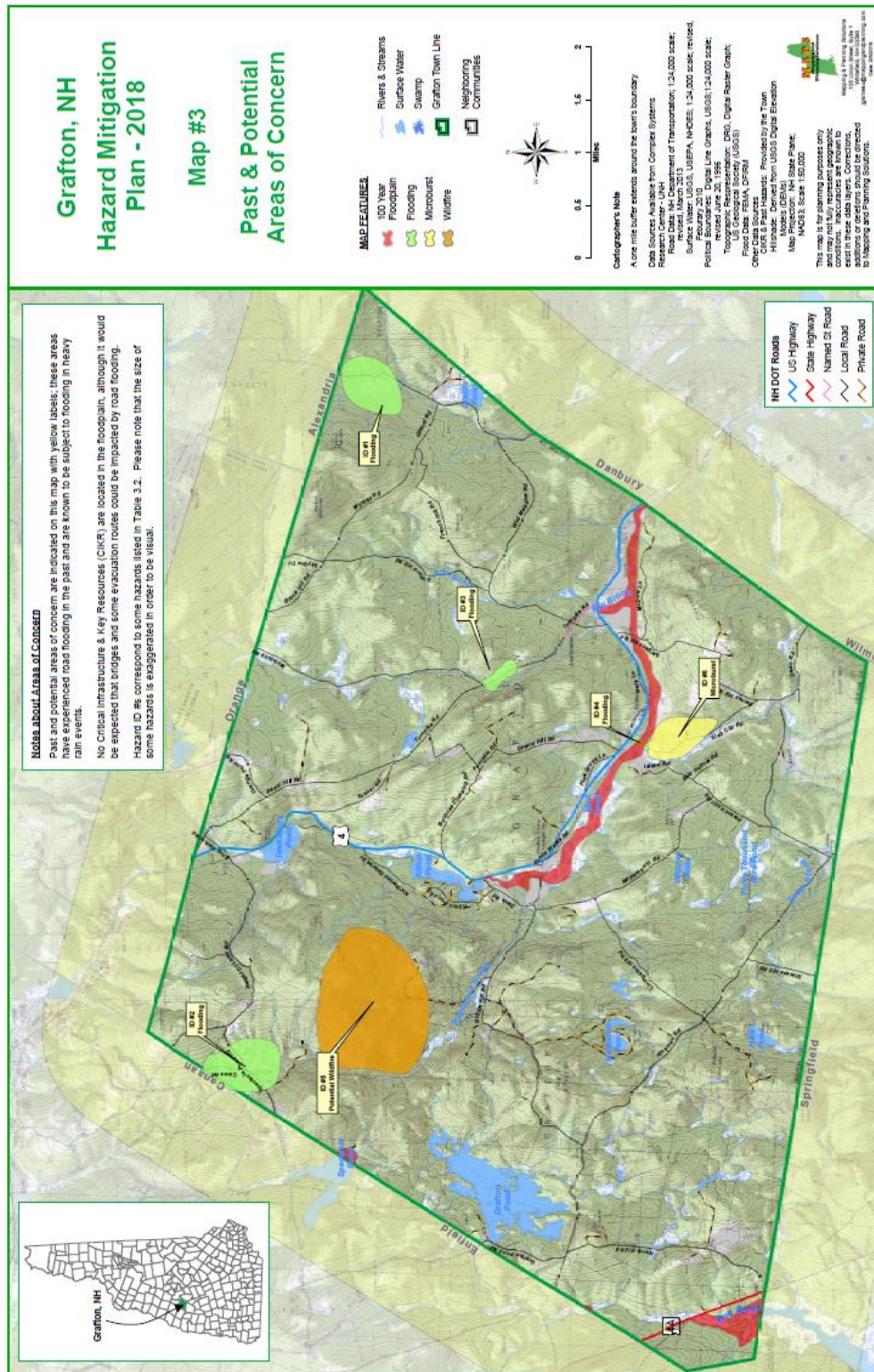
To be replaced with 11" x 17" map in final hard copy.



PLACE HOLDER FOR MAP 2

MAP 3 – PAST & POTENTIAL AREAS OF CONCERN

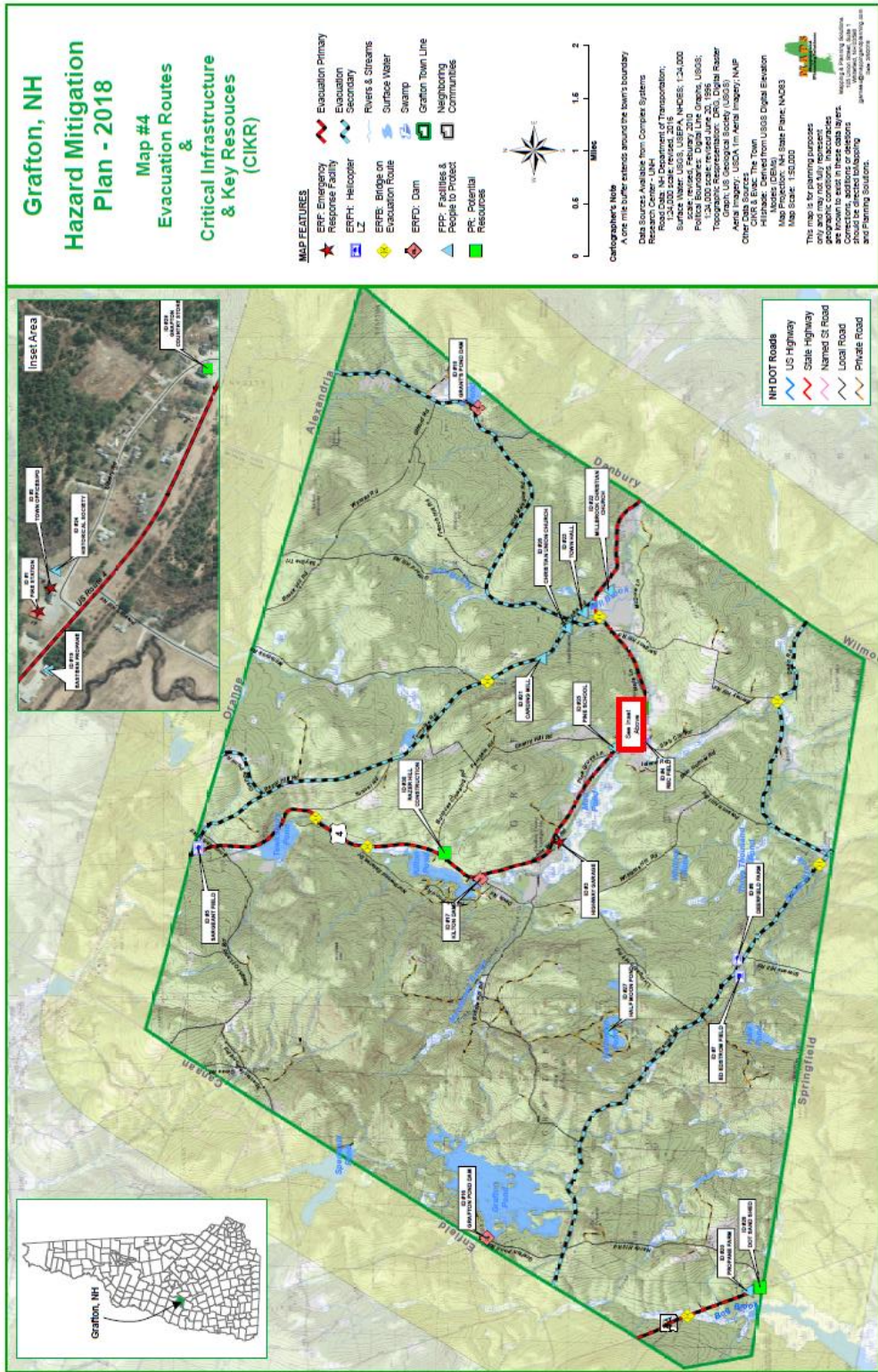
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PLACE HOLDER FOR MAP 3

MAP 4 – CRITICAL INFRASTRUCTURE & KEY RESOURCES

To be replaced with 11" x 17" map in final hard copy.



PLACE HOLDER FOR MAP 4

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Grafton Fire Station

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