

Greenfield

Hazard Mitigation

Plan

Update 2020



This plan integrates the following:

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

November 5, 2020
Final

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

By
The Greenfield 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: Greenfield Covered Bridge

Photo Credit: Town of Greenfield; <https://www.greenfield-nh.gov/about-greenfield/slideshows/images-around-town>

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Acknowledgements

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

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

This plan is an update to the prior Greenfield Hazard Mitigation Plan, approved 2014.

Approval Notification Dates for 2020 Update

Approved Pending Adoption (APA):	August 7, 2020
Jurisdiction Adoption:	October 8, 2020
CWPP Approval:	November 16, 2020
Plan Approval Date (HSEM):	November 5, 2020
FEMA Formal Received	November 12, 2020
Plan Distribution (MAPS):	November 19, 2020

TOWN OF GREENFIELD HAZARD MITIGATION PLANNING TEAM (HMPT)

The Town of Greenfield 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:

- Todd Mason..... Greenfield Director of DPW
- Jim Morris Greenfield DPW
- Hazen Fisk..... Greenfield DPW
- Karen Day..... Greenfield Selectboard/DEMD
- Diane Boilard Greenfield DEMD
- Tyler St. Cyr..... Greenfield Fire Department
- David Martin Greenfield EMD
- Rick McQuade Greenfield Fire Chief
- Frank Shea Greenfield Police Department
- David Hall Greenfield Fire Chief (retired)
- Beverly Pietlicki Greenfield Librarian
- Jon Grosjean Hancock EMD
- Adale Hale Greenfield Citizen
- Bob Marshall..... Greenfield SB/PB Rep.
- Patrick Joseph Greenfield Police Department
- Aaron Graham Greenfield Fire Department
- Jennifer Gilbert NH OSI
- Elizabeth Gilboy..... NH HSEM
- June Garneau MAPS
- Olin Garneau MAPS

Many thanks for all the hard work and effort given by each and every one of you. This plan would not exist without your knowledge and experience. The Town of Greenfield 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:

DEMD	Deputy Emergency Management Director
DPW	Department of Public Works
EMD.....	Emergency Management Director
PB Rep.	Planning Board Representative
SB.....	Selectboard

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Executive Summary

The Greenfield Hazard Mitigation Plan Update 2020 was compiled to assist the Town of Greenfield in reducing and mitigating future losses from natural, technological or human-caused hazardous events. The plan was developed by participants of the Town of Greenfield Hazard Mitigation Planning Team (HMPT), interested stakeholders, the general public and Mapping and Planning Solutions (MAPS). The plan contains the tools necessary to identify specific hazards and aspects of existing and future mitigation efforts.



This plan is an **update** to the 2014 Greenfield Hazard Mitigation Plan. In an effort to produce an accurate and current planning document, the planning team used the 2014 plan as a foundation, building upon that plan to provide more timely information.

It must be noted that all planning meetings for the development of this project were completed prior to the arrival of COVID-19 in the United States. The final writing of this plan has been completed during the COVID-19 outbreak; therefore there are references to the virus, particularly in Chapter 5, Section C, Infectious Diseases.

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

NATURAL HAZARDS

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

TECHNOLOGICAL HAZARDS

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

HUMAN-CAUSED HAZARDS

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

Some hazards that are listed in the 2018 New Hampshire Hazard Mitigation Plan were not included in this plan as the team felt they were extremely unlikely to occur in Greenfield or not applicable. These hazards along with an explanation of why they are not included in this plan can be seen in Chapter 3, Section A.

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

Some communities, when faced with an array of hazards, are able to adequately cope with the impact of these hazards. For example, although severe winter weather is often a common hazard in New Hampshire and more often than not considered to be the most likely to occur, most New Hampshire communities handle two to three foot snowstorms with little or no disruption of services. On the other hand, an unexpected ice storm can have disastrous effects on a community. Mitigation for this type of sudden storm is difficult to achieve: establishing warming and cooling centers, establishing notification systems, providing public outreach, tree trimming, opening shelters and perhaps burying overhead power lines are just a few of the action items that may be put in place.

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

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

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

For more acronyms, please refer to Appendix E: Acronyms

Mission Statement:

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

Vision Statement:

The Town of Greenfield 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 Greenfield Hazard Mitigation Plan Update 2020 was prepared in accordance with the Disaster Mitigation Act of 2000 (DMA), Section 322 Mitigation Planning, signed into law by President Clinton on October 30, 2000. This hazard mitigation plan was prepared by the Greenfield Hazard Mitigation Planning Team (HMPT) under contract with New Hampshire Homeland Security & Emergency Management (HSEM) operating under the guidance of Section 206.405 of 44 CFR Chapter 1 (10-1-97 Edition) and with the assistance and professional services of Mapping and Planning Solutions (MAPS). This plan was funded by HSEM through grants from the Federal Emergency Management Agency (FEMA). Matching funds for team members' time were also part of the funding formula.

B. PURPOSE & HISTORY OF THE FEMA MITIGATION PLANNING PROCESS

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

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

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

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

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

HSEM's goal is to have all New Hampshire communities complete a local hazard mitigation plan as a means to reduce future losses from natural hazards before they occur. HSEM outlined a process whereby communities throughout the state may be eligible for grants and other assistance upon completion of this hazard mitigation plan.

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

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

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

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

C. JURISDICTION

This plan addresses one jurisdiction – the Town of Greenfield, 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 on: *Critical Infrastructure & Key Resources (CIKR), current residential buildings, other structures within the town, future development, administrative, technical and physical capacity of emergency response services and response coordination between federal, state and local entities.*

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

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

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

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

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

E. PUBLIC & STAKEHOLDER INVOLVEMENT

Public and stakeholder involvement was stressed during the initial meeting and community officials were given a matrix of potential team members (page 18). Community officials were urged to contact as many people as they could to participate in the planning process, including not only residents but also officials and residents from surrounding communities. The Town of Greenfield understands that natural hazards do not recognize political boundaries.

Greenfield is part of the Contoocook Valley Regional School District, SAU1. Students in grades (PK & 1-4) attend Greenfield Elementary School in Greenfield. Students in grades 5-12 attend school in Peterborough as part of the regional school district.

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 Greenfield. A Press Release (see right) was posted at the Town Office. Furthermore, meeting dates were posted on the town's website and calendar (see below).

§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.

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

Press Release

FOR IMMEDIATE RELEASE

Updated: January, 2019

Contact: June Garneau
603-837-7122

TOWN OF GREENFIELD COMMENCES HAZARD MITIGATION PLANNING

The Emergency Management Director for the Town of Greenfield recently met with June Garneau, of Mapping and Planning Solutions and other Team members from Greenfield, to begin work on the required five-year update to the **2014 Greenfield 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; Greenfield citizens and any interested stakeholders are invited to participate. All interested parties should contact Dave Martin, the Greenfield Emergency Management Director, at 547-6897 if they wish to be included in the process.

Future meetings are scheduled for **February 5, February 19, March 19, April 9 and April 23**, all Tuesdays from 10:00 AM to Noon at the Greenfield 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 Garneau at Mapping and Planning Solutions, 603-837-7122.

[Home](#)

Hazard Mitigation Plan Update Meeting

Event Date: Tuesday, February 19, 2019 - 10:00am to 12:00pm

PUBLIC MEETING

Future meetings are scheduled for

February 5, February 19, March 19, April 9 and April 23,

all **Tuesdays from 10:00 AM to Noon** at the Greenfield Fire Station.


Per the Order of the Emergency Management Director



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


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

In addition to the Emergency Management Director (EMD) and the two Deputy EMDs, members of the Greenfield Fire and Police Departments and the Greenfield Public Works Department participated in meetings. Members of the Selectboard, a member of the Planning Board (Selectboard Representative), the Greenfield Library Director and the EMD from the neighboring Town of Hancock also took part in meetings. Lastly, one interested citizen took the opportunity to attend. Comments made by all team members including the citizen of the community who attended, were integrated into the narrative discussion and were incorporated into the essence of the document.



Upcoming Meetings

(Highlighted by “Counties” as of February 4, 2019)



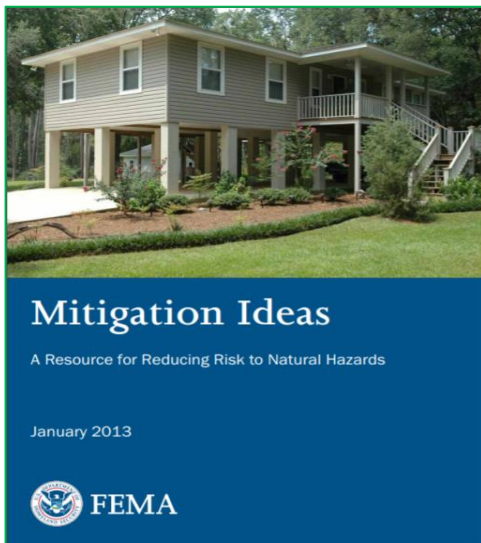
Day	Date	Time	Town/Location	Event Type	HSEM Field Rep	County
Tuesday	2/5/19	10:00 AM	Greenfield Fire Station	HMP	Liz Gilboy	Hillsboro
Tuesday	2/5/19	4:00 PM	Groton Town Offices	HMP	Paul Hatch	Grafton
Wednesday	2/6/19	1:00 PM	Woodstock Town Offices	HMP	Paul Hatch	Grafton
Tuesday	2/12/19	9:00 AM	Ashland Fire Station	HMP	Paul Hatch	Grafton
Tuesday	2/12/19	1:00 PM	Piermont Town Hall	EOP	Paul Hatch	Grafton
Wednesday	2/13/19	4:30 PM	Sandwich Town Offices	HMP	Heidi Lawton	Carroll
Tuesday	2/19/19	10:00 AM	Greenfield Fire Station	HMP	Liz Gilboy	Hillsboro
Tuesday	2/19/19	4:00 PM	Groton Town Offices	HMP	Paul Hatch	Grafton
Wednesday	2/20/19	6:30 PM	Randolph Town Offices	HMP	Heidi Lawton	Coos
Monday	2/25/19	1:00 PM	Jackson Town Offices	HMP	Heidi Lawton	Carroll

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

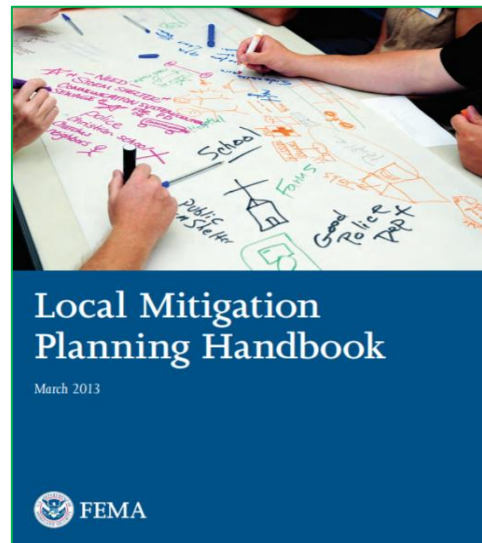
The planning process included a complete review of the Greenfield Hazard Mitigation Plan of 2014 for updates, development changes and accomplishments. In addition, as noted in the Bibliography and in footnotes located throughout the plan many other documents were used to create this mitigation plan. Some, but not all, of those plans and documents are listed as follows:

The Greenfield Hazard Mitigation Plan of 2014.....	Compare & Contrast
Greenfield Master Plan (2017).....	Community Information
Greenfield Annual Report (2017 & 2018)	Fire Report & Development
Other Hazard Mitigation Plans (Haverhill, Tamworth, Kingston)	Formats & Mitigation Ideas
The Greenfield Subdivision Regulations (2016)	New Development Regulations
The Greenfield Zoning Ordinance (2017)	Zoning Regulations
Floodplain Development Ordinance (part of Zoning).....	Floodplain Regulations
Census 2010 Data	Population Data
The NH DRA Summary of Inventory of Valuation MS-1 2018.....	Structure Evaluation
The Economic & Labor Market Information Bureau Community Profile.....	Population Trends
The American Community Survey (ACS 2013-2017)	Population Trends
Mitigation Ideas, FEMA, January 2013.....	Mitigation Strategies
The Department of Cultural & Natural Resources (DNCR)	DNCR Fire Report
The NH Office of Strategic Initiatives (OSI)	Flood Losses
The NH Department of Revenue property tax valuation.....	Property Information

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



<https://www.fema.gov/media-library/assets/documents/30627>



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

G. HAZARD MITIGATION GOALS

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

OVERARCHING GOALS

The following are the five overarching goals of this plan:

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

NATURAL HAZARD OBJECTIVES

- *Reduce long-term flood risks through assessment, identification and strategic mitigation of at risk/vulnerable infrastructure (dams, stream crossings, roadways, coastal levees, etc.).*
- *Minimize illnesses and deaths related to events that present a threat to human and animal health.*
- *Assist communities with plan development, outreach and public education in order to reduce the impact from natural disasters.*
- *Ensure mitigation strategies consider the protection and resiliency of natural, historical and cultural resources.*

TECHNOLOGICAL HAZARD OBJECTIVES


- *Ensure technological hazards are responded to appropriately and to mitigate the effect on citizens.*
- *Build upon state and local capabilities to identify and respond to emerging contaminants.*
- *Effectively collaborate between federal, state and local agencies as well as private partners, Non-Governmental Organizations (NGOs) and Volunteer Organizations Active in Disaster (VOADs).*

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

HUMAN-CAUSED HAZARD OBJECTIVES

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

Did You Know?



On average,
\$1 spent on
HAZARD MITIGATION
 provides the
NATION
 approximately
\$4 IN FUTURE
BENEFITS

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

FEMA E-Brief, April 12, 2017

H. HAZARD MITIGATION PLANNING PROCESS & METHODOLOGY

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



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

PLANNING STEPS

Step 01: Team formation, orientation and goals

Step 02: Identify hazards and their risk and probability

Table 3.1 – Hazard Identification & Risk Assessment (HIRA)

Step 03: Profile and list historic and potential Hazards

Table 3.2 – Historic and Potential Hazards

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

Tables 4.1 to 4.4 – Critical Infrastructure & Key Resources

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

Chapter 3, Section D

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

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

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

Table 6.1 – Current Plans, Policies and Mutual Aid

Step 08: Examine the mitigation actions items from the last plan

Table 7.1 – Accomplishments since the Last Plan

Step 09: Evaluate and categorize potential mitigation action items

Tables 8.1 - Potential Mitigation Strategies & the STAPLEE

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

Table 9.1 – The Mitigation Action Plan

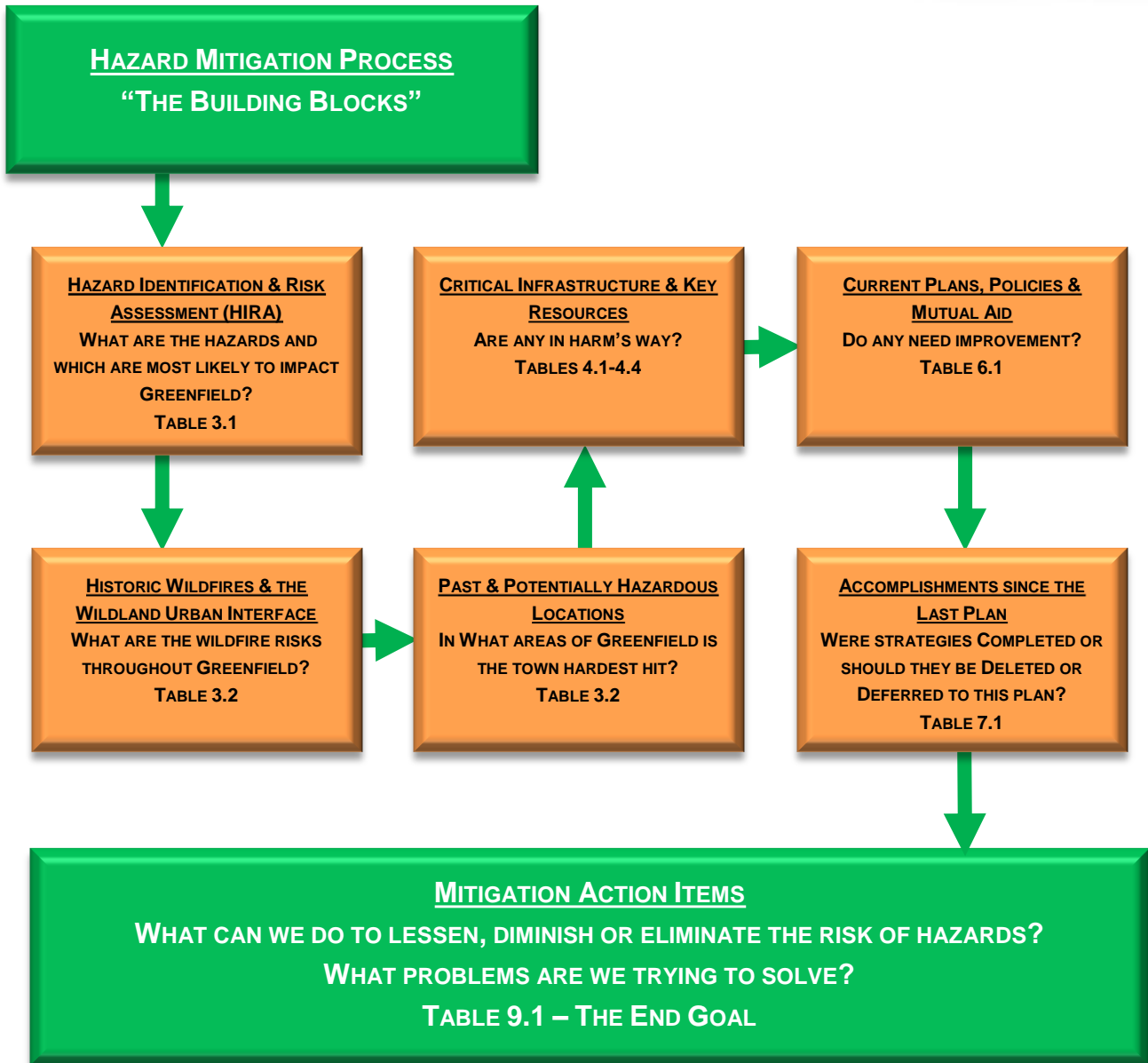
Step 11: Review the plan before submission to HSEM/FEMA for APA (Approved Pending Adoption)

Step 12: Adopt and monitor the plan

I. HAZARD MITIGATION BUILDING BLOCKS & TABLES

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

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



J. NARRATIVE DESCRIPTION OF THE PROCESS

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

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

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

MEETING 1, JANUARY 8, 2019

The first full meeting of the Greenfield Hazard Mitigation Team (HMPT) was held on January 8, 2019. Meeting attendance included Todd Mason (Department of Public Works Director), Jim Morris (Department of Public Works), Hazen Fisk (Department of Public Works), Karen Day (Selectboard and Deputy Emergency Management Director), Diane Boilard (Deputy Emergency Management Director), Tyler St. Cyr (Fire Department), David Martin (Emergency Management Director), Elizabeth Gilboy (NH Homeland Security & Emergency Management), 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.

Work then began on *Table 2.1, Town Statistics*. Most of the work on this table was completed at this meeting with the exception of a few items that June would either determine through GIS or get at a later date. There was some discussion about the seasonal population change in Greenfield with summer and winter homes. It was determined that Greenfield does not have a major influx of tourists or visitors in the winter, but the town may double its population on busy summer weekends.

HAZARDS MITIGATION POTENTIAL TEAM MEMBERS

FEDERAL

USDA Forest Service

STATE

Department of Transportation
(DOT)

Department of Natural & Cultural
Resources (DNCR)

Office of Strategic Initiatives (OSI)

LOCAL

Selectboard Members (Past/Present)

Town Manager/Administrator

Town Planner

Police Chief

Fire Chief

Emergency Management Director

Emergency Medical Services

Fire Warden

Health Services

Education/School

Recreation Directors

Public Works Director

Road Agent

Water Management

Public Utilities

Waste Management

Dam Operators

Major Employers

LOCAL - SPECIAL INTEREST

Land Owners

Home Owners

Forest Management

Timber Management

Tourism & Sportsman's Groups

Developers & Builders

EXPERTS

GIS Specialists

Next on the Agenda were hazard identification and the completion of *Table 3.1, Hazard Identification & Risk Assessment (HIRA)*. 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, six technological hazards and four human-caused hazards were identified. After analyzing these hazards in *Table 3.1, Severe Winter Weather, Extreme Temperatures, Inland Flooding, Infectious Diseases and High Wind Events* were the natural hazards designated “High Risk” for the town.

With time running out before the hazard descriptions were started, June advised the team to start thinking about specific hazard events for the next meeting. June thanked the team for their work and assigned “homework” to team members, including requesting that the Department of Public Works (DPW) Director prepare a list of road/culvert projects that would need to be completed within the next five years. June also asked the team to think about Critical Infrastructure & Key Resources (CIKR) and past events that have affected the town. The next meeting was scheduled for Tuesday, February 5, 2019.

Meeting 1 – January 8, 2019

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, FEBRUARY 5, 2019

Meeting attendance included Todd Mason, Karen Day, Diane Boilard, David Martin, Rick McQuade (Fire Chief), Frank Shea (Police Department), Kayla Henderson (NH Homeland Security & Emergency Management), Elizabeth Gilboy, Olin Garneau and June Garneau.

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

Next the team worked on descriptions of each hazard and how they could, or do impact the community. In order to gain more knowledge of the impact of these hazards, June asked the team to describe each hazard as it relates specifically to Greenfield.

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 steps 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. While doing the Hazard Descriptions, development trends were also discussed.

With time running out June reviewed what would take place at the next meeting and thanked the team. The next meeting was set for February 19, 2019.

MEETING 3, FEBRUARY 19, 2019

Meeting attendance included Todd Mason, Karen Day, Diane Boilard, David Martin, Rick McQuade, Frank Shea, David Hall (Fire Chief – Retired), Beverly Pietlicki (Librarian), Olin Garneau and June Garneau.

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

This table brought forth great conversation and recollection of past hazard events in the town and took the entire meeting to complete. June adjourned the meeting and explained what would take place at the next meeting. The next meeting was scheduled for March 19, 2019.

Meeting 2 – February 5, 2019

1) Last Meeting

- a) Reviewed planning process, purpose, funding & collaboration.
- b) Reviewed of community involvement and stakeholders
- c) Worked on Table 2.1, Town Information
- d) Worked Table 3.1, Hazard Identification & Analysis

2) Today's Topics

- a) Review....
 - i) Table 2.1, Town Statistics
 - ii) Table 3.1, Hazard Identification & Analysis
- b) Work on....
 - i) Hazard Descriptions
 - ii) Table 3.2, Historic Hazard Identification
 - iii) Table 4.1-4.4, Critical Infrastructure & Key Resources
 - iv) Table 6.1, Current Plans, Policies & Mutual Aid (time allowing)
 - v) Table 7.1, Accomplishments since the prior plan (time allowing)

3) Homework

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

4) Future Meetings

- a) February 19, 2019 @ 10:00 AM
- b) March 19, 2019 @ 10:00 AM
- c) April 9, 2019 @10:00 AM
- d) April 23, 2019 @ 10:00 AM

Meeting 3 – February 19, 2019

1) Last Meeting

- a) Reviewed....
 - i) Table 2.1, Town Statistics
 - ii) Table 3.1, Hazard Identification & Analysis
- b) Worked on....
 - i) Hazard Descriptions

2) Today's Topics

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

3) Homework

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

4) Future Meetings

- a) March 19, 2019 @ 10:00 AM
- b) April 9, 2019 @10:00 AM
- c) April 23, 2019 @ 10:00 AM

MEETING 4 – MARCH 19, 2019

Meeting attendance included Todd Mason, Karen Day, Diane Boilard, David Martin, Rick McQuade, Frank Shea, Beverly Pietlicki, Jon Grosjean (Hancock EMD), Adale Hale (Citizen), Elizabeth Gilboy, Olin Garneau and June Garneau.

Because there were newcomers at this meeting, the first item on the agenda was a brief review of the hazard mitigation process and the work that had already been done. Next, we completed remaining items in *Table 3.2, Historic Hazard Identification*.

While reviewing *Table 3.2*, June took the opportunity to explain the Wildland Urban Interface (WUI). The WUI is the area in which the urban environment interfaces with the wildland environment and the area that is most prone to the risk of wildfires. Because Greenfield is so heavily forested, the entire town was thought to be in the WUI. Mitigation strategies were discussed to protect structures and to educate the town's citizens about the risk of wildfire.

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

Having worked past the usual two hours (this meeting lasted a full 2½ hours), June reviewed what we would be working on at the next meeting on April 9, 2019.

MEETING 5 – APRIL 9, 2019

Meeting attendance included Karen Day, Diane Boilard, David Martin, Rick McQuade, Frank Shea, Beverly Pietlicki, Bob Marshall (Selectboard Member), Olin Garneau and June Garneau.

June lead the team through a quick review of the work that was done at the last meeting, including a review of the Critical Infrastructure & Key Resources that were listed in *Tables 4.1-4.4*. Time was also spent on a review of *Table 3.2*.

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

Meeting 4 – March 19, 2019**1) Last Meeting**

- a) Worked on....
 - i) *Table 3.2, Historic Hazard Identification*

2) Today's Topics

- a) Work on...
 - i) *Table 4.1-4.4, Critical Infrastructure & Key Resources*
 - ii) *Table 6.1, Current Plans, Policies & Mutual Aid*

3) Homework

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

4) Future Meetings

- a) April 9, 2019 @ 10:00 AM
- b) April 23, 2019 @ 10:00 AM

Meeting 5 – April 9, 2019**1) Last Meeting**

- a) Worked on....
 - i) Brief review for newcomers to meeting
 - ii) Completed *Table 3.2, Historic Hazard Identification*
 - iii) Completed *Tables 4.1-4.4, Critical Infrastructure & Key Resources*

2) Today's Topics

- a) Work on....
 - i) Review materials sent to team
 - ii) *Table 6.1, Current Plans, Policies & Mutual Aid*
 - iii) *Table 7.1, Accomplishments since the prior plan (time allowing)*

3) Homework

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

4) Future Meetings

- a) April 23, 2019 @ 10:00 AM

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

With robust conversation and great discussion, the work that was done on Table 6.1, was very worthwhile and productive. Although the table was not completed and the meeting already extended to 2.5 hours, the decision was made to finish this table at the next meeting. June adjourned the meeting and set the next meeting for April 23, 2019.

MEETING 6 – APRIL 23, 2019

Meeting attendance included Todd Mason, Karen Day, Diane Boilard, David Martin, Rick McQuade, Elizabeth Gilboy, Olin Garneau and June Garneau.

Work today began with the completion of *Table 6.1, Current Policies, Plans & Mutual Aid*. The review also included a complete review of Table 6.1 to ensure that the comments and ideas expressed by the team at the last meeting were fully represented. Work on this table resulted in 20 new “Action Items” for this plan, some of which are also in Table 7.1.

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

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 the tables with many of the action items that had been deferred from Table 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 (see Chapter 9, Section B).

Like the previous two meetings, this meeting ran over the usual 2-hour meeting time and was extended to a three hour meeting (with lunch included). Having completed just a few of the action items in Tables 8.1 and 9.1, June adjourned the meeting and schedule the next meeting for July 2, 2019.

Meeting 6 – April 23, 2019

1) Last Meeting

- a) Reviewed....
 - i) Tables 3.2 & 4.1
- b) Worked on...
 - i) Table 6.1, Current Plans, Policies & Mutual Aid

2) Today's Topics

- a) Finish work on....
 - i) Table 6.1, Current Plans, Policies & Mutual Aid
- b) Work on...
 - i) Table 7.1, Accomplishments since the prior plan (time allowing)

3) Homework

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

4) Future Meetings

- a) _____
- b) _____

Before ending 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 Greenfield (see right).

Link to explore:

FEMA Mitigation Ideas Book

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

MEETING 7 – JULY 2, 2019

Meeting attendance included Todd Mason, Karen Day, Diane Boilard, David Martin, Rick McQuade, Frank Shea, Bob Marshall, Patrick Joseph (Police Officer), Aaron Graham (Firefighter), Elizabeth Gilboy, Olin Garneau and June Garneau.

To begin the meeting, June walked the team through a complete review of Table 7.1. Having translated her notes from the last meeting into paragraphs, June reviewed each item in Table 7.1 to see if the concepts and ideas of the team remained intact and to verify the accuracy of the information. With this review a few changes were made leaving 13 additional items from Table 7.1 (that were not also in Table 6.1) deferred to become new mitigation action items for this plan. Although several strategies from the last plan were determined to be emergency preparedness and not mitigation, the team decided to keep them in the plan as reminders to get these important action items completed.

Meeting 7 – July 2, 2019

1) Last Meeting

- a) Finished....
 - i) Table 6.1, Current Plans, Policies & Mutual Aid
- b) Worked on....
 - i) Table 7.1, Accomplishments since the prior Plan
 - ii) Table 8.1, Mitigation Action Plan (did not finish)
 - iii) STAPLEE (did not finish)

2) Today's Topics

- a) Work on....
 - i) Table 8.1, Mitigation Action Plan
 - ii) STAPLEE
 - iii) Priority & Ranking (time allowing)

3) Homework

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

4) Future Meetings

- a) _____
- b) _____

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

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

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

Next on the agenda was to continue work on *Table 8.1, Potential Mitigation Action Items & the STAPLEE* and *Table 9.1, The Mitigation Action Plan*. As explained at the previous meeting, both of these tables were included in one table for the meeting; they were now populated with potential action items from not only Table 6.1 but also Table 7.1.

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

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

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. This meeting, like two prior meetings, also ran over the usual 2-hour meeting, ending after 2.5 hours.

Before adjourning, June provided the team with one last handout that would be used during the next meeting, an explanation of the Ranking/Prioritizing (Chapter 9, Section A) method. The next meeting was scheduled for August 6, 2019.

MEETING 8 – AUGUST 6, 2019

Meeting attendance included Todd Mason, Karen Day, Diane Boilard, David Martin, Rick McQuade, Frank Shea, Bob Marshall, Olin Garneau and June Garneau.

The meeting began where we had left off in Tables 9.1 & 8.1. After we had considered each strategy that was forwarded from Tables 6.1 & 7.1, the team considered additional mitigation items, some June had suggested from other plans and others that were discussed at prior meetings. After much discussion and a careful review, ultimately, the team settled on 41 “Mitigation Action Items” that they felt were achievable and that would help to diminish the impact of natural hazards in the future.

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.

Prior to the meeting, June had pre-ranked the action items based on the time frame, the town's authority to get the strategy accomplished, the type of strategy and the STAPLEE score and placed them in four categories as shown in Chapter 9, Section A. A handout with all of the identified action items was made for the team; using this handout the team was able to see all of the action items clearly and to determine any changes that needed to be made, including the “rank”. Then within each rank, the team assigned a priority; for example, if seven action items were ranked “1” then the priority rank was 1-7. In this fashion, the team was able to determine which action items were the most important within their rankings and in which order the action items would be accomplished.

Meeting 8 – August 6, 2019

1) Last Meeting

- a) Worked on....
 - i) Table 9.1, Mitigation Action Plan (did not finish)
 - ii) STAPLEE (did not finish)

2) Today's Topics

- a) Work on....
 - i) Table 9.1, Mitigation Action Plan
 - ii) STAPLEE
 - iii) Priority & Ranking (time allowing)

3) Homework

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

4) Future Meetings

- a) _____
- b) _____

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.

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



Photo: Greenfield Elementary School

Photo Credit: Town of Greenfield; <https://www.greenfield-nh.gov/about-greenfield/slideshows/images-around-town>

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Chapter 2: Community Profile

A. INTRODUCTION

Greenfield is a beautiful community located in Hillsborough County in the south central part of New Hampshire. The town is bordered by Bennington and Franconia to the north, Lyndeborough to the east, Temple to the south and Peterborough and Hancock to the west. The town is most well-known for the Crotched Mountain Rehabilitation Center (CMRC) and Greenfield State Park.

Greenfield
New Hampshire



TOWN GOVERNMENT

A three-member Selectboard governs the Town of Greenfield with a Town Administrator overseeing the day-to-day operations. The town's departments include, but are not limited to, Fire, Police, Public Works, Planning, Library, Zoning Board of Adjustment and Conservation Commission. The largest employer in Greenfield is CMRC with approximately 900 employees.

DEMOGRAPHICS & HOUSING

Over the last 30 years, the population of Greenfield has increased drastically; the population change from 1980 (972) to 2010 (1,749) showed an increase of 777 according to US Census 2010. This represents a growth rate of approximately 79.94%. Greenfield's population in 2017 was estimated to be 1,858.⁴ The American Community Survey (2013-2016) estimates the median household income to be \$71,429 and the median age is 46.9 years.⁵

The American Community Survey (2013-2017) estimates a total of 769 housing units, most of which are single family (674). Multiple-family structures total 82 and mobile homes and other housing units number 13. Census 2010 estimates that of the 81 vacant housing units, 45 are used for recreational, seasonal or occasional use thus confirming the presence of second home and seasonal residents.

EDUCATION & CHILD CARE

Greenfield students in grades PK-4 attend Greenfield Elementary School in Greenfield. Students in grades 5-12 attend Contoocook Valley Regional School District in the neighboring town of Peterborough with Antrim, Bennington, Dublin, Franconia, Hancock, Peterborough, Sharon and Temple. There are no colleges or universities in Greenfield.

Incorporated: 1791

Origin: This area was part of Cumberland or the "Society Land" which had been set aside by the Masonian Proprietors for their own estates. When first settled in 1753 by the Lynde family, it was known as Lyndeborough Addition. The Monadnock hills cut residents off from Lyndeborough's church and school, so in 1791 they petitioned for the right to form their own town. The name was chosen to indicate the town's location on a level, fertile ground between the hills. Greenfield is the location of the Crotched Mountain Foundation, a rehabilitation center for handicapped children; and Greenfield State Park, on Otter Lake.

Villages and Place Names: unknown

Population, Year of the First Census Taken: 934 residents in 1800

Population Trends: Population change for Greenfield totaled 1,320 over 57 years, from 538 in 1960 to 1,858 in 2017. The largest decennial percent change was a 55 percent increase between 1980 and 1990, the next two decades had increases of 11 percent and 5 percent respectively. The 2017 Census estimate for Greenfield was 1,858 residents, which ranked 145th among New Hampshire's incorporated cities and towns.

Population Density and Land Area, 2017 (US Census Bureau): 70.1 persons per square mile of land area. Greenfield contains 26.5 square miles of land area and 0.6 square miles of inland water area.

Source: Economic & Labor Market Information Bureau, NH Employment Security, July 2019; Received 6/5/18

⁴ Economic & Labor Market Information Bureau, NH Employment Security, November 2018. Community Response 6/05/2018.

⁵ American Community Survey, 2013-2017; the Census Bureau

NATURAL FEATURES

The Town of Greenfield covers approximately 26.5 square miles of land area and 0.6 square miles of inland water. The community is dominated by the lakes, rivers and streams of southern New Hampshire. The highest peak is North Pack Monadnock at 2,276' above sea level. The lowest elevation in town is 840' above sea level in the center of town.

Vegetation is typical of northern New England including both deciduous and conifer forests, open fields, swamp and riverine areas. The terrain lends itself to an abundance of small ponds, streams and rivers, most notably Otter Lake, Zephyr Lake and Powder Mill Pond.

TRANSPORTATION

There are two major roadways which run through Greenfield, they are, NH Routes 31 and 136. NH Route 31 travels from Lyndeborough in the southeast to Bennington in the north. NH Route 136 travels from Franconia in the northeast intersecting NH Route 31 in the center of Greenfield and continuing to Peterborough in the southwest. Other smaller and less travelled roadways lend access to other areas of the town.

B. EMERGENCY SERVICES

EMERGENCY OPERATIONS CENTER & EMERGENCY MANAGEMENT DIRECTOR

The Town of Greenfield has a designated Emergency Management Director (EMD) and two designated Deputy Emergency Management Directors. The EMD maintains an Emergency Operations Center (EOC) as part of the town's emergency preparedness program. The EOC is where the EMD, department heads, government officials and volunteer agencies gather to coordinate their response to a major emergency or disaster event. In Greenfield the designated EOC is the Fire Station. If the need arises and the Fire Station is not available, the Town Office could be utilized as a secondary EOC.

GREENFIELD FIRE RESCUE & EMS

The Greenfield Fire Department is a volunteer fire department providing quality fire services and emergency medical services to the residents and visitors of Greenfield 24 hours a day, 365 days a year. The department staffs a part-time Chief, 20 on-call firefighters and operates one station within the community. The Greenfield Fire Department participates in Keene Mutual Aid along with other area departments. Emergency medical transportation is provided by Wilton Ambulance.

GREENFIELD POLICE DEPARTMENT

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

GREENFIELD HIGHWAY DEPARTMENT

The Greenfield Department of Public Works (DPW) operates on a year-round, 24-hour basis as needed. The department staffs a full-time Roads Manager, a full-time Buildings & Grounds Manager, two full-time crewmen for roads and one seasonal part-time crewman for extra help. The DPW's mission is to support the citizens of Greenfield through the safe operation, proper maintenance and future development of highway, supporting infrastructure and utilities in a manner that is cost conscious without sacrificing quality. The DPW belongs to the NH Public Works Mutual Aid Association.

MEDICAL FACILITIES

Greenfield's closest medical facility is Monadnock Community Hospital in Peterborough (6 miles, 25 beds). If the need arises, Crotched Mountain Rehabilitation Center in Greenfield may be able to offer assistance, but this facility is not a hospital.

EMERGENCY SHELTER(S)

The primary shelter is the location to which evacuees are directed at the time of an emergency. In Greenfield, the designated primary shelter is the Town Office which offers a large sleeping area, rest rooms, showers, kitchen facilities and is generated. If the needed arises and the Town Office is not available, the Barbara C. Harris Conference Center could be utilized as a secondary shelter, however this building is only partially generated. Other possible secondary shelters for the town include: Greenfield Elementary School, Crotched Mountain Rehabilitation Center and Stephenson Library.

C. GREENFIELD'S CURRENT & FUTURE DEVELOPMENT TRENDS

Over the last 10 years development in Greenfield has been consistent with development trends in the rest of New Hampshire. Nearly every community in New Hampshire had experienced a significant drop in new home construction since the mid- to late-2000s. This trend is only now beginning to change. Information provided by City-Data.com (see chart to right) supports this trend in Greenfield.⁶

The team reported that development in Greenfield over the past five years has been slow. No major subdivisions or new CIKR have been built; most construction, although limited, consisted of a few new single family homes. No large-scale development is anticipated in the near future. In addition, no development has occurred in hazard prone areas or has impacted the town's hazard vulnerability.

In the 2018 Annual Report, the town's Building Inspector/Code Enforcement Officer reported:

"...We have seen continued growth in town in the form of new residential construction this year. This is a parallel to the region where

Single-family new house Construction building permits

- 1997: 1 building, cost: \$91,700
- 1998: 6 buildings, average cost: \$77,800
- 1999: 7 buildings, average cost: \$92,600
- 2000: 11 buildings, average cost: \$109,500
- 2001: 2 buildings, average cost: \$120,700
- 2002: 5 buildings, average cost: \$120,000
- 2003: 5 buildings, average cost: \$152,600
- 2004: 14 buildings, average cost: \$201,700
- 2005: 19 buildings, average cost: \$213,200
- 2006: 11 buildings, average cost: \$266,200
- 2007: 14 buildings, average cost: \$237,400
- 2008: 2 buildings, average cost: \$200,000
- 2009: 2 buildings, average cost: \$132,500
- 2010: 5 buildings, average cost: \$113,000
- 2011: 5 buildings, average cost: \$120,600
- 2012: 5 buildings, average cost: \$204,100
- 2013: 3 buildings, average cost: \$143,300
- 2014: 1 building, cost: \$200,000
- 2015: 6 buildings, average cost: \$250,000
- 2016: 4 buildings, average cost: \$250,000
- 2017: 3 buildings, average cost: \$250,000

⁶ City-Data.com; <http://www.city-data.com/city/Greenfield-New-Hampshire.html>

new home construction is up in most localities". The Building Inspector/Code Enforcement Officer also discussed the building of a "substantial commercial venture", a "...new storage facility containing 3-6000 square foot buildings which will be located next to the lumber mill on Route 31 north."⁷ The Annual Report noted that there were four new homes built in 2018.

The Town Administrator, the Building Inspector/Code Enforcement Officer, the Planning Board and the Selectboard will monitor growth in Greenfield using existing regulatory documents such as the Floodplain Development Ordinance, the Zoning Ordinance, the Subdivision Regulations and the Greenfield Master Plan. Building Permits are required in Greenfield and as a small community, Planning Board and Selectboard members along with other town officials are almost always aware of building that is taking place.

The Building Inspector/Code Enforcement Officer and 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.

TABLE 2.1: TOWN STATISTICS

Table 2.1 - Town Statistics				
Census Population Data	2010	2000	1990	1980
Greenfield, NH - Census Population Data	1,749	1,671	1,506	972
Hillsborough County	400,721	382,384	336,549	276,608
Population Estimate for 2017 (*ACS 2013-2017)	1,858			
Elderly Population-% over 65 (*ACS 2013-2017)	17.0%			
Median Age (*ACS 2013-2017)	46.9			
Median Household Income (*ACS 2013-2017)	\$71,429			
Individuals below the poverty level (*ACS 2013-2017)	7.4%			
Change in Population-Summer (%)	100%			
Change in Population-Winter (%)	0%			
Housing Statistics (2010 Census)				
Total Housing Units	699			
Occupied Housing Units	618 (496 Owner Occupied; 122 Renter Occupied)			
Vacant Housing Units	81 (45 Seasonal, Recreation, Occasional Use; 21 All Other Vacant Units)			
Assessed structure value (2018-MS1)	Value	1% Damage	5% Damage	
Residential	\$84,691,700	\$846,917	\$4,234,585	
Manufactured Housing	\$1,402,600	\$14,026	\$70,130	
Commercial	\$5,453,900	\$54,539	\$272,695	
Discretionary Preservation Easement	\$0	\$0	\$0	
Tax Exempt	\$8,178,700	\$81,787	\$408,935	
Utilities	\$3,133,700	\$31,337	\$156,685	

⁷ Town of Greenfield, Annual Report, 2018, Michael Borden, Building Inspector / Code Enforcement Officer, page 105

Table 2.1 - Town Statistics

Totals	\$102,860,600	\$1,028,606	\$5,143,030
*Chart above indicates the value of structures only and the likely loss value based on either a loss of 1% or 5% of structures. 2018 Greenfield Annual Report.			
Regional Coordination			
County	Hillsborough		
Tourism Region	Monadnock		
Municipal Services & Government			
Town Administrator	Yes		
Board of Selectmen	Yes (3 member), elected		
Planning Board	Yes, elected		
School Board	Yes, elected		
Zoning Board of Adjustment	Yes, appointed		
Conservation Committee	Yes, appointed		
Master Plan	Yes, 2017		
Emergency Operation Plan (EOP)	Yes, 2017		
Hazard Mitigation Plan (HMP)	Yes, 2014		
Zoning Ordinances	Yes, 2017		
Subdivisions Regulations	Yes, 2016		
Capital Improvement Plan	Yes		
Capital Reserve Funds	Yes		
Building Permits Required	Yes		
Town Web Site	Yes, www.greenfield-nh.gov		
Floodplain Ordinance	Yes, part of Zoning		
Member of NFIP	May 1, 1980		
Flood Insurance Rate Maps (DFIRMS)	September 25, 2009		
Flood Insurance Rate Study (FIS)	September 25, 2009		
Percent of Local Assessed Valuation by Property Type-2017 (NH Department of Revenue)			
Residential Buildings	92.5%		
Commercial Land & Buildings	5.1%		
Other (including Utilities)	2.9%		
Emergency Services			
Town Emergency Warning System(s)	NH Emergency Notification System (ENS)		
School Emergency Warning System(s)	Power School		
Emergency Page	No		
Facebook	Library & Fire Department		
ListServ	Opt-in Plan only		
Local Newspapers	Monadnock Ledger-Transcript (bi-weekly), The Greenfield Spirit (town newsletter, 6 times a year)		
Public Access TV	No		
Local TV Stations	WMUR, channel 9 (Manchester)		
Local Radio	No		
Police Department	Yes full-time Chief, 2 full-time, 5 part-time		

Table 2.1 - Town Statistics

<i>Police Dispatch</i>	Hillsborough County Sheriff's Department
<i>Police Mutual Aid</i>	Surrounding towns, county-wide mutual aid
<i>Animal Control Officer</i>	Police Department
<i>Fire Department</i>	Yes volunteer, part-time Chief & 20 on-call volunteers
<i>Fire Dispatch</i>	Keene Mutual Aid
<i>Fire Mutual Aid</i>	Keene Mutual Aid
<i>Fire Stations</i>	1
<i>Fire Warden</i>	Yes
<i>Emergency Medical Services</i>	Greenfield Fire Department
<i>EMS Dispatch</i>	Keene Mutual Aid
<i>Emergency Medical Transportation</i>	Wilton Ambulance
<i>HazMat Team</i>	Keene Fire Department
<i>Established EMD</i>	Yes
<i>Established Deputy EMD</i>	Yes (2)
<i>Public Health Network</i>	Greater Monadnock Regional Public Health Network
<i>Health Officer</i>	Yes
<i>Building Inspector / Code Enforcement Officer</i>	Yes
<i>Established Public Information Officer (PIO)</i>	Selectboard or Town Department heads depending on the emergency
<i>Nearest Hospital(s)</i>	Monadnock Community, Peterborough (6 miles, 25 beds)
<i>Local Humane Society or Veterinarians</i>	Monadnock Humane Society (Swanzy), Peterborough Veterinary Clinic (Peterborough), Great Brook Veterinary Clinic (Antrim)
<i>Primary EOC</i>	Fire Station (generator)
<i>Secondary EOC</i>	Town Office (generator)
<i>Primary Shelter</i>	Town Office (generator)
<i>Secondary Shelter</i>	Barbara C. Harris Conference Center (partially generated), other possible shelters: Greenfield Elementary (generator hook-up), Crotched Mountain Rehabilitation Center (CMRC-generator), Stephenson Library (no generator, potential shelter or warming center)
Utilities	
<i>Town Sewer</i>	10-15 houses on town sewer & private septic
<i>Department of Public Works</i>	Yes, full-time Roads Manager, full-time Buildings & Grounds Manager, 2 full-time (Roads), 1 seasonal part-time
<i>Miles of Class V Roads</i>	Total 38 miles, 13 miles paved and 25 gravel
<i>Public Works Mutual Aid</i>	Yes
<i>Water Supply</i>	Private wells
<i>Waste Water Treatment Plant</i>	Yes (limited)
<i>Electric Supplier</i>	Eversource
<i>Natural Gas Supplier</i>	None
<i>Cellular Telephone Access</i>	Fair
<i>Pipelines</i>	No
<i>High Speed Internet</i>	Good
<i>Telephone Company</i>	Consolidated Communications (Fairpoint)

Table 2.1 - Town Statistics

Transportation		
Primary Evacuation Routes	NH Route 31 & 136	
Secondary Evacuation Routes	Forest Road	
Nearest Interstate	I-89, Exit 5 (29 miles)	
Nearest Airstrip	Hawthorne-Feather, Deering (3,260 ft. asphalt runway)	
Nearest Commercial Airport(s)	Manchester-Boston Regional Airport (28 miles)	
	Logan International Airport, Boston (71 miles)	
Public Transportation	No	
Railroad	Tracks only, inactive line with future potential	
Education & Childcare		
Elementary School	Grades Pre-K - 4, Greenfield Elementary School	
Middle/High School	Grades 5-8 attend the South Meadow Middle School and grades 9-12 attend the ConVal Regional High School, both in Peterborough NH and part of the Contoocook Valley Regional School District (Peterborough)	
Private School	Grades Pre-K - 12, Crotched Mountain School	
School Administrative Unit	SAU 1	
Conserved Land as a Percent of Land in the community (GIS Analysis, 2019 Conservation Files, Granit, UNH)		
	Square Miles	Percent of Town Land
Approximate Square Miles in Community	26.50	100.0%
Approximate Total Un-Conserved Land	18.68	70.5%
Approximate Total Conserved Land	7.82	29.5%
Municipal/County Land (1)	0.43	1.6%
Federal Owned Land (2)	2.04	7.7%
State Owned Land (3)	1.65	6.2%
Quasi Private(4)	0.00	0.0%
Private Land (5)	3.70	14.0%
Fire Statistics (NH Division of Forests & Lands, Fire Warden Report and the town)		
Wildfire Fires (2017 & 18)	No reported wildfires of 1+ acres	
Hillsborough County Fire Statistics (2018)	3 fires, 2 acres	
State Forest Fires Statistics (2018)	53 fires, 46 acres	
*ACS: The American Community Survey, a five-year average of randomly mailed long-form surveys from the Census Bureau		
Information found in Table 2.1, unless otherwise noted, was derived from the Economic & Labor Market Information Bureau, NH Employment Security, July 2019. Community Response Received 6/5/2018; https://www.nhes.nh.gov/elmi/products/cp/profiles-pdf/greenfield.pdf		

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Chapter 3: Hazard Identification, Risk Assessment & Probability

A. HAZARD IDENTIFICATION

The first step in hazard mitigation is to identify hazards. The team determined that 11 natural hazards have potential to affect the community. *Table 3.1, Hazard Identification & Risk Assessment (HIRA)*, provides estimates of the level of impact that each listed hazard could have on humans, property and business and averages them to establish an index of “severity”. The estimate of “probability” for each hazard is multiplied by its severity to establish an overall “relative threat” factor.

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

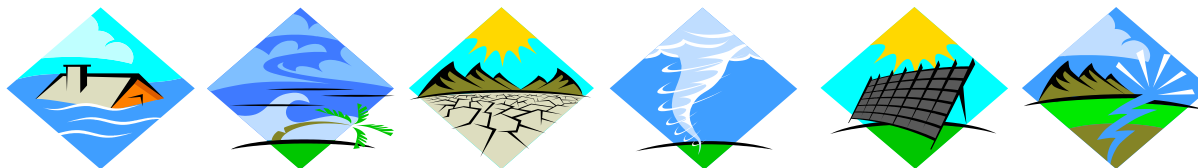
<u>State Hazard</u>	<u>Reason for exclusion from this plan</u>
Avalanches	No known areas of avalanches in the town
Coastal Flooding	Distance away from the sea
Landslides	No known areas of landslide in the town
Solar Storm & Space Weather	The team did not feel like this was a threat they could manage

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

B. RISK ASSESSMENT

The hazards listed in Table 3.1 were then classified based upon the “Relative Threat” score as calculated in Column F; these were then separated into three categories using Jenks’ Optimization, which is also known as natural breaks classification.⁸ The “Relative Threat” score was then labelled into three categories, *High Risk, Medium Risk and Low Risk* as shown in Table 3.1, Column G. These categories are also indicated in Chapter 5, Sections B-D. By using this grouping process, the plan demonstrates each hazard’s likelihood of occurrence in combination with its potential effect on the town. This process illustrates a comprehensive hazard statement and assists the town with understanding which hazards should receive the most attention.

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



⁸ The natural breaks classification process is a method of manual data classification partitions data into classes based upon natural groups within the data distribution; ESRI, <http://support.esri.com/en/knowledgebase/GISDictionary/term/natural%20breaks%20classification>

C. PROBABILITY

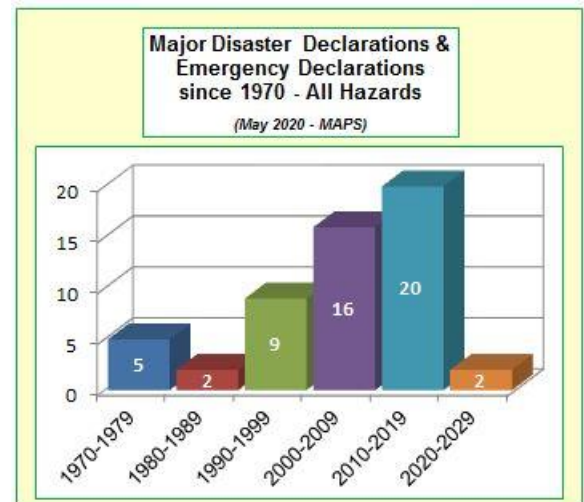
The determination of the probability of occurrence is contained within Column D in Table 3.1 which assesses hazards based upon the likelihood of the hazard's manifestation within a 25 year period. The probability scores indicate whether the identified hazard has a *Very Low*, *Low*, *Moderate*, *High*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

Overall, the Town of Greenfield is fairly safe from the effects of natural, technological and human-caused hazards. However, due to Greenfield's geographic location, forested lands, hills, heavy snow pack and topography, there is always a probability that future hazards will occur.

HAZARD PROBABILITY & CLIMATE CHANGE

Although not identified as a natural hazard in this plan, no plan can be considered complete today without some discussion of the impact that climate change has had on weather patterns. *"The challenges posed by climate change, such as more intense storms, frequent heavy precipitation, heat waves, drought, extreme flooding, and higher sea levels, could significantly alter the types and magnitudes of hazards impacting states in the future"*, FEMA stated in its new State Mitigation Plan Review Guide⁹. By including climate change in the new hazard mitigation guide for state planners, FEMA is recognizing the reality of climate change.

The chart to the right shows the increased frequency of Major Disaster Declarations and Emergency Declarations in the State of New Hampshire, which may be indicative of climate change.¹⁰ COVID-19 is indicated for the decade beginning in 2020.



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

HAZARD PROBABILITY COMBINED WITH LONG TERM UTILITY OUTAGE

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

⁹ State Mitigation Plan Review Guide, FEMA, Released March 2015, Effective March 2016, Section 3.2, page 13

¹⁰ Derived from FEMA's record of disasters; categorized by decade since 1970 by the planner; 2020-2029 includes COVID-19

TABLE 3.1: HAZARD IDENTIFICATION & RISK ASSESSMENT (HIRA)

Table 3.1: Hazard Identification & Risk Assessment (HIRA)							
Scoring for Probability	Column A	Column B	Column C	Column D	Column E (A+B+C)/3	Column F D x E	Column G Risk
1=Very Low (0-20%)	What is the probability of death or injury?	What is the probability of physical losses & damage?	What is the probability of interruption of service?	What is the probability of this occurring within 25 years?	Average of Human, Property & Business Impact	Relative Threat	High 6.0-9.0 Medium 3.0-5.9
2=Low (21-40%)							
3=Moderate (41-60%)							
4=High (61-80%)	Human Impact	Property Impact	Business Impact	Probability of Occurrence	Severity	Risk Severity x Occurrence	Low 0-2.9
5=Very High (81-100%)							
Natural Hazards							Risk Level
1) Severe Winter Weather	3.00	3.00	3.00	3.00	3.00	9.00	High
2) Extreme Temperatures	2.00	2.00	2.00	4.00	2.00	8.00	High
3) Inland Flooding	2.00	3.00	2.00	3.00	2.33	7.00	High
4) Infectious Diseases	3.00	1.00	3.00	3.00	2.33	7.00	High
5) High Wind Events	2.00	2.00	2.00	3.00	2.00	6.00	High
6) Lightning	1.00	2.00	2.00	3.00	1.67	5.00	Medium
7) Wildfires	2.00	2.50	2.00	2.00	2.17	4.33	Medium
8) Tropical & Post-Tropical Cyclones	2.00	2.00	2.00	2.00	2.00	4.00	Medium
9) Drought	1.00	1.00	1.50	3.00	1.17	3.50	Medium
10) Dam Failure	3.00	3.00	3.00	1.00	3.00	3.00	Medium
11) Earthquakes	2.00	2.00	2.00	1.00	2.00	2.00	Low
Technological Hazards							Risk Level
1) Aging Infrastructure	2.00	2.00	1.00	5.00	1.67	8.33	High
2) Hazardous Materials	4.00	4.00	3.00	2.00	3.67	7.33	High
3) Long Term Utility Outage	2.00	3.00	2.00	3.00	2.33	7.00	High
4) Conflagration	4.00	4.00	4.00	1.00	4.00	4.00	Medium
5) Radiological	4.00	4.00	4.00	1.00	4.00	4.00	Medium
6) Known & Emerging Contaminates	1.00	1.00	1.00	1.00	1.00	1.00	Low
Human-Caused Hazards							Risk Level
1) Transport Accidents	3.00	3.00	3.00	3.00	3.00	9.00	High
2) Mass Casualty Incidents	4.00	2.00	2.00	2.00	2.67	5.33	Medium
3) Terrorism & Violence	4.00	4.00	4.00	1.00	4.00	4.00	Medium
4) Cyber Event	1.00	1.00	4.00	1.00	2.00	2.00	Low

D. NATIONAL FLOOD INSURANCE PROGRAM (NFIP) STATUS

Greenfield has been a member of the National Flood Insurance Program (NFIP) since May 1, 1980. Greenfield has a relatively small flood plain with approximately 1.94 square miles of land in the 100-year floodplain¹¹, .06 square miles of which is inland water. The floodplain areas of Greenfield are primarily around Powder Mill Pond, Otter Lake, Zephyr Lake and along the Contoocook River. Greenfield is likely to experience flooding on several roads and along most small rivers and streams. The latest Flood Insurance Rate Studies (FIRS) and Digital Flood Insurance Rate Maps (DFIRMS) are dated September 25, 2009.

According to the NH Office Strategic Initiatives, there are four NFIP residential policies in effect in Greenfield for a total of \$890,500 of insurance in force, three which are single-family units and one which is a non-residential unit. One loss has been paid for a total of \$4,217. There have been no repetitive loss claims.¹²

TOWN OF GREENFIELD FLOODPLAIN DEVELOPMENT ORDINANCE

The Town of Greenfield adopted and incorporated the Town of Greenfield Floodplain Development Ordinance as a part of the Zoning Ordinance. The floodplain ordinance was most recently revised in 2009.¹³

The ordinance states that the “...the regulations in this ordinance shall apply to all lands designated as special flood hazard areas by the Federal Emergency Management Agency (FEMA) in its “Flood Insurance Study for Town of Greenfield, NH together with the Floodway Maps of the town dated (May 1, 1980 to be changed with updated by the state) which are declared to be part of this ordinance and are hereby incorporated by reference.”¹⁴ The town closely monitors the NFIP and those structures in town that are susceptible to flooding.

The Greenfield Floodplain Development Ordinance includes the following sections; italicized copy is taken directly from the floodplain ordinance:

- Item I – Provides a “Definition of Terms” that pertain to flooding and this ordinance.
- Item II – States, “*All proposed development in any special flood hazard area shall require a permit.*”
- Item III - Describes the review procedure to be taken by the Building Inspector regarding the design, the materials, the methods and practices that are required to prevent flooding for new construction or substantial improvements in the floodplain.



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

¹¹ GIS Analysis of Hillsborough County DFIRM (Digital Flood Insurance Rate Map)

¹² NH Office of Strategic Initiatives; Jennifer Gilbert, February 8, 2019

¹³ https://www.greenfield-nh.gov/sites/greenfieldnh/files/uploads/floodplain_ordinance_2009.pdf

¹⁴ Town of Greenfield Floodplain Development Ordinance

- Item IV – Discusses water and sewer systems and the “assurance that these systems will be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters...to avoid impairment to them or contamination from them during periods of flooding.”
- Item V - Describes requirements for new or substantial improvements in Zones A & AE regarding “...the as-built elevation of the lowest floor”, “flood proofing” and “certification of flood proofing”.
- Item VI – States, “The Building Inspector shall not grant a building permit until the applicant certifies that all necessary permits have been received from those governmental agencies from which approval is required by federal or state law, including Section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1334.”
- Item VII - Discusses riverine situations and watercourses with regards to alteration, relocation, and encroachments and the requirements needed to prevent damage to local waterways as a result of such things.
- Item VIII – Sets the criteria for special flood hazard areas and the determination of the 100-year flood level. This section also discusses manufactured homes and recreational vehicles.
- Item VIX – Details the legal responsibilities for variance and appeals and the Zoning Board of Adjustment’s notification process to the applicant.

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

The team understands that benefits of the NFIP also extend to structures that are not in the 100-year floodplain. The town will continue to work with the Office of Strategic Initiatives (OSI) and will carefully monitor its compliance with the NFIP. The team felt that it is worthwhile to have NFIP brochures and information available at the Town Office for current homeowners and potential developers and has included multiple flood-related mitigation strategies in this plan (see Tables 8.1 & 9.1).

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

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

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

TABLE 3.2: HISTORIC HAZARD IDENTIFICATION

2014 HMPT = 2014 Hazard Mitigation Planning Team

2020 HMPT = 2020 Hazard Mitigation Planning Team

DR Major Disaster Declarations (DR) since 1953

EM Emergency Declarations (EM) since 1953

Type of Event	Date of Event	Location	Description	Source
A. Inland flooding including inland, riverine, heavy rainfall, rapid snowmelt, ice jam flooding, flooding as a result of dam failure & local road flooding: Riverine flooding is the most common disaster event in the State of NH. Significant riverine flooding in some areas of the state occurs in less than ten year intervals and seems to be increasing with climate change. The entire State of NH has a high flood risk. Flood events have the potential to impact the community on a townwide basis. No significant flooding events have taken place in Greenfield since March 2010.				
Summary of flood events including Major Disaster & Emergency Declarations in the state & regionwide				
Flooding Prior to 1970	1927, 1936, 1938, 1943 (2), 1953, 1955, 1959	Spring and fall flooding events resulting from severe storms and/or heavy snowmelt	See below	
Flooding 1970-1979	1972 (DR-327), 1973 (DR-399), 1974 (DR-411), 1976, 1978 (DR-549), 1979 (EM-3073)			
Flooding 1980-1989	1986 (DR-771), 1987 (DR-789)			
Flooding 1990-1999	1990 (DR-876), 1991 (DR-923), 1991 (DR -917); 1995, 1996 (DR-1077), 1996 (DR-1144), 1998 (DR-1231)			
Flooding 2000-2009	2003 (DR-1489), 2005 (DR-1610), 2006 (DR-1643), 2007 (DR-1695), 2008 (DR-1787), 2008 (DR-1799)			
Flooding 2010 - Present	2010 (DR-1892), 2010 (DR-1913), 2011 (DR-4006), 2012 (DR-4065), 2013 (DR-4139), 2015 (DR-4206), 2017 (DR-4329), 2017 (DR-4355), 2018 (DR-4370), 2019 (DR-4457)			
Detailed summary of flood events in the community				
Inland Flooding Heavy Rain & Flooding	October 7-18, 2005	Belknap, Cheshire, Grafton, Hillsborough, Merrimack & Sullivan	Major Disaster Declaration DR-1610: To date, state and federal disaster assistance has reached more than \$3 million to help residents and business owners in New Hampshire recover from losses resulting from the severe storms and flooding in October. Greenfield received heavy rain and some roads were closed due to flooding.	FEMA & 2020 HMPT

Type of Event	Date of Event	Location	Description	Source
Inland Flooding Heavy Rain & Flooding	May 12-23, 2006	Belknap, Carroll, Grafton, Hillsborough, Merrimack, Rockingham & Strafford	Major Disaster Declaration DR-1643: Flooding in most of southern NH; May 12-23, 2006 (aka: Mother's Day Storm) Greenfield received heavy rain and flooding of some roads causing a few road closures. The National Guard was activated to assist the neighboring towns of Wilton and Lyndeborough. Peterborough (MacDowell Dam) had water into the spillways.	FEMA & 2020 HMPT
Inland Flooding Heavy Rain & Flooding	April 15-23, 2007	All Ten NH Counties	Major Disaster Declaration DR-1695: Flood damages; FEMA & SBA obligated more than \$27.9 million in disaster aid following the April nor'easter (aka: Tax Day Storm) Greenfield received heavy rain with some road closures due to flooding.	FEMA & 2020 HMPT
Inland Flooding Heavy Rain & Flooding	September 6-7, 2008	Hillsborough	Major Disaster Declaration: DR-1799: Severe storms and flooding beginning on September 6-7, 2008. Greenfield received heavy rain but no significant flooding.	FEMA & 2020 HMPT
Inland Flooding Heavy Rain & Flooding	August 2009	Townwide	Forest Road received significant flooding in August 2009. Part of Forest Road was washed out and closed for at least a couple of weeks.	HMPT 2020
Inland Flooding Heavy Rain & Flooding	February 23 - March 3, 2010	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan	Major Disaster Declaration: DR-1892: Flood and wind damage to most of southern NH including six counties; 330,000 homes without power; more than \$2 million obligated by June 2010. Greenfield received heavy rain but no significant flooding. FEMA funding was applied and received for cleanup of wind damage.	FEMA & 2020 HMPT
Inland Flooding Heavy Rain & Flooding	March 14-31, 2010	Hillsborough & Rockingham	Major Disaster Declaration DR-1913: Flooding to two NH counties including Hillsborough and Rockingham counties. Greenfield received heavy rain but no significant flooding. FEMA funding was applied and received for cleanup.	FEMA & 2020 HMPT
Inland Flooding Heavy Rain & Flooding	Past & Potential Occurrences	New Boston Road	This area floods when more than 3 inches of rain falls. The last occurrence was in 2011. Culverts are at risk at this location and although culverts have been upgraded since the prior plan, there is still a risk from beavers.	2014 & 2020 HMPTs
Inland Flooding Heavy Rain & Flooding	Past & Potential Occurrences	Dunklee Road (Scenic Road)	This area floods when more than 3 inches of rain falls. The last occurrence was in 2005. Three residential structures are at risk at this location; however the town has received approval from DES to replace the culvert Dunklee Road that causes the problem.	2014 & 2020 HMPTs
Inland Flooding Heavy Rain & Flooding	Past & Potential Occurrences	Miner Road (Scenic Road)	This area floods when more than 3 inches of rain falls. The last occurrence was in 2006. One culvert washed away in 2004 and was rebuilt. No other structures are at risk and there are currently no issues on this road.	2014 & 2020 HMPTs

Type of Event	Date of Event	Location	Description	Source
Inland Flooding Heavy Rain & Flooding	Past & Potential Occurrences	Holden Road (Scenic Road)	This area floods when more than 3 inches of rain falls. The last occurrence was in 2006. No structures are at risk at this location and there are currently no issues on this road; however elevation of Holden Road would help limit flooding and decrease the occurrence of mud.	2014 & 2020 HMPTs
Inland Flooding Heavy Rain & Flooding	Past & Potential Occurrences	Slip Road (Scenic Road) (former end Gulf Road)	This area floods when more than 3 inches of rain falls. The last occurrence was in 2006. Access to two residential structures is at risk at this location due to the lowness of the area, no mitigation possible at this time.	2014 & 2020 HMPTs
Inland Flooding Heavy Rain & Flooding	Past & Potential Occurrences	Blanchard Hill Road (Scenic Road)	Culvert previously washed out. Blanchard Hill Road has been re-ditched and is no longer an issue.	2014 & 2020 HMPTs
Inland Flooding Heavy Rain & Flooding	Past & Potential Occurrences	Thomas Road & Coach Road (Scenic Road)	Edges of the road washed out in heavy rains. Re-ditching and other work on Coach Road has been done, but the DPW still needs to replace one more culvert on Coach Road. There is also a current beaver problem on this road. Thomas Road is okay.	2014 & 2020 HMPTs
Inland Flooding Heavy Rain & Flooding	Past & Potential Occurrences	Cavender Road (Scenic Road)	Impassible flooding in the past on Cavender Road. Cavender Road has been improved and is no longer an issue.	2014 & 2020 HMPTs
Inland Flooding Heavy Rain & Flooding	Past & Potential Occurrences	Russell Station Road	This area floods when more than 3 inches of rain falls. The last occurrence was in 2006. One culvert is at risk at this location. Russell Station Road has new upgraded culverts and new paving. There is no longer an issue.	2014 & 2020 HMPTs
Inland Flooding Heavy Rain & Flooding	Past & Potential Occurrences	Old Lyndeborough Mountain Road (Scenic Road)	This area floods when more than 3 inches of rain falls. The last occurrence was in 2006. Access to seven residential structures is at risk, 4 of which are in the flood zone. Old Lyndeborough Mountain Road has been upgraded and there is no longer an issue on this road.	2014 & 2020 HMPTs
Inland Flooding Heavy Rain & Flooding	Past & Potential Occurrences	Cornwell Road (Scenic Road)	This area floods when more than 3 inches of rain falls. The last occurrence was in 2006. Two sets of twin culverts are at risk at this location. One area of Cornwell Road in a swampy area and subject to flooding. Cornwell Road needs to be elevated to reduce the risk.	2014 & 2020 HMPTs
Inland Flooding Heavy Rain & Flooding	Past & Potential Occurrences	Swamp Road (Scenic Road)	This area floods when more than 3 inches of rain falls. The last occurrence was in 2006. One large culvert has been replaced however there are still several smaller culverts that need to be improved on Swamp Road.	2014 & 2020 HMPTs
Inland Flooding Heavy Rain & Flooding	Potential Occurrences	Old Bennington Road (Scenic Road)	Old Bennington Road floods only when the culvert is plugged; mitigation would include elevating the road. The road surface on Old Bennington Road also should be improved where a sandy surface exists.	2014 & 2020 HMPTs
Inland Flooding Heavy Rain & Flooding	Potential Occurrences	Zephyr Lake Road	A beaver problem exists on Zephyr Lake Road. The DPW continues to monitor and assess the beaver situation to diminish the chance of flooding.	2020 HMPT

Type of Event	Date of Event	Location	Description	Source
B. Wildfires: New Hampshire is heavily forested and is therefore vulnerable to wildfire, particularly during periods of drought. The proximity of many populated areas to the state's forested land exposes these areas to the potential impact of wildfire. Wildfires have the potential to impact the Jurisdiction on a town wide basis. Several small wildfires (less than 1 acre) have occurred and although all wildfires have the potential to expand, no wildfires have been significant since the prior plan. No significant lightning strikes, that have either caused wildfires or affected buildings, have occurred since the prior hazard mitigation plan.				
Summary of wildfire events including Major Disaster & Emergency Declarations in the state & nationwide				
Wildfire (Shaw Mountain)	July 2, 1953	Carroll County	Major Disaster Declaration DR-11: This wildfire occurred in Carrol County at Shaw Mountain. This fire did not reach Hillsborough County or Greenfield.	FEMA & 2020 HMPT
Wildfire (Bayle Mountain)	May 2015	Carroll County	The Bayle Mountain Fire: This Class D fire burned 275 acres and took five days to put out on rocky and steep terrain in Ossipee, NH. Blackhawk and private helicopters along with fire crews from all over the state assisted to extinguish this fire. The Bayle Mountain Fire did no damage to homes. This fire did not reach Hillsborough County or Greenfield.	Local Resources
Wildfire (Stoddard)	April 2016	Cheshire County	Fire Management Assistance Declaration, FM-5123: Stoddard, NH. The Stoddard Fire burned 190 acres in April 2016 and caused the evacuation of 17 homes; Class D fire. This fire did not reach Hillsborough County or Greenfield.	FEMA & 2020 HMPT
Wildfire (Covered Bridge Fire)	November 2016	Carroll County	The Covered Bridge Fire: A brush fire near the Albany Covered Bridge grew to 329 acres, primarily on White Mountain National Forest land. No structures were lost; Class E fire. This fire did not reach Hillsborough County or Greenfield.	Local Resources
Wildfire (Dilly Cliff)	October 2017	Grafton County	The Dilly Cliff Fire in the Lost River Gorge Trail in North Woodstock off Route 112 (Lost River Road); Class C: Human-caused; 75 acres. The Dilly Cliff Fire was determined to be extinguished 36 days after it began. This fire did not reach Hillsborough County or Greenfield.	Local Resources
Detailed summary of wildfire events in the community				
Wildfire Lightning	1998	School House	School house was destroyed, caused by lightning strike.	2014 & 2020 HMPTs
Wildfire Lightning	2003	South of Zephyr Lake	Caused by lightning strike.	2014 & 2020 HMPTs
Wildfire	2003	Off Old Bennington Road	Set by campers	2014 & 2020 HMPTs
Wildfire Lightning	Past & Potential	Crotched Mountain	Mostly cause by lightning strikes	2014 & 2020 HMPTs

Type of Event	Date of Event	Location	Description	Source
Wildfire	Potential	Town Wide	The whole town is at risk with may large blocks of forest and problems accessing remote areas.	2014 & 2020 HMPTs
Wildfire	Potential	Greenfield State Park	While there have been no known past occurrences of wildfires, there are 235 camp sites at the park.	2014 & 2020 HMPTs
C. High Wind Events including Tropical & Post-Tropical Cyclones, Tornadoes, Downbursts & Windstorms: Tornadoes are spawned by thunderstorms and occasionally by hurricanes; tornadoes may occur singularly or in multiples. A downburst is a severe localized wind blasting down from a thunderstorm. Downburst activity is prevalent throughout NH and is becoming more common with climate change; most downbursts go unrecognized unless significant damage occurs. Hurricanes develop from tropical depressions which form off the coast of Africa. New Hampshire's exposure to direct and indirect impacts from hurricanes is real, but modest, as compared to other states in New England. A hurricane that is downgraded to a Tropical Storm is more likely to have an impact in New Hampshire. Tornadoes and other wind events have the potential to impact the community on a town wide basis. No significant high wind events have taken place in Greenfield since 2016 or 2017, when an unusual high wind event cause power outages and downed trees and no major tropical cyclones, hurricanes or tropical storms have struck Greenfield since Tropical Storm Irene in 2011				
Summary of high wind events & tropical & post-tropical cyclone events including Major Disaster & Emergency Declarations in the state & regionwide				
Tropical & Post-Tropical Cyclones	1804; 1869; 1938, 1944, 1954 (2), 1960, 1976, 1978, 1985, 1991 (DR-917), 1999 (DR-1305), 2005 (EM-3258), 2011 (EM-3333 & DR-4026), 2012 (EM-3360)		Number 4 (1938), Number 7 (1944); Carol (1954), Edna (1954), Donna (1960), Belle (1976), Amelia (1978), Gloria (1985), Bob (1991), Floyd (1999), Katrina (2005), Irene (2011), Sandy (2012)	See below
Tornadoes	1814, 1890, 1951, 1953, 1957, 1961, 1963, 2008 (DR-1782)		All were reported as F2 tornadoes except for the June 1953 tornado which was reported as an F3.	See below
Detailed summary of high wind & tropical & post-tropical cyclone events in the community				
Tropical & Post-Tropical Cyclone Great New England Hurricane	September 21, 1938	State & Region Wide	The Great New England Hurricane: Statewide there were multiple deaths and damages in NH were about \$12.3 million dollars in 1938 dollars (about \$200 million now). Throughout New England 20,000 structures were damaged and 26,000 automobiles, 6,000 boats and 325,000 sugar maples were lost. 80% of the people lost power. Damage was similar in Greenfield than in other parts of the state with significant flooding. Water control projects, such as the building of MacDowell Dam in Peterborough (1948), have helped decrease the likelihood of flooding. (Source http://nhpr.org/post/75th-anniversary-new-englands-greatest-hurricane)	FEMA & 2020 HMPT
Tropical & Post-Tropical Cyclone Hurricanes Carol & Edna	August 31, 1954	State & 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. Greenfield experienced high winds and rain during this event; no damage recollection of damage assessments. (Source: http://www.wmur.com/Timeline-History-Of-NH-Hurricanes/11861310)	FEMA & 2020 HMPT

Type of Event	Date of Event	Location	Description	Source
High Wind Event Tornado	June 1, 1956	Hillsborough County	F1 tornado, distance 22.5 miles. (Source: www.geostat.org/data/greenfield-nh/tornados)	2014 & 2020 HMPTs
High Wind Event Tornado	July 2, 1961	Hillsborough County	F2 tornado, distance: 13.5 miles. (Source: www.geostat.org/data/greenfield-nh/tornados)	2014 & 2020 HMPTs
High Wind Event Tornado	July 21, 1961	Hillsborough County	F1 tornado, distance 8.8 miles. (Source: www.geostat.org/data/greenfield-nh/tornados)	2014 & 2020 HMPTs
High Wind Event Tornado	August 26, 1961	Hillsborough County	F1 tornado, distance 23.4 miles. (Source: www.geostat.org/data/greenfield-nh/tornados)	2014 & 2020 HMPTs
High Wind Event Tornado	May 9, 1963	Hillsborough County	F1 tornado, distance 16.2 miles. (Source: www.geostat.org/data/greenfield-nh/tornados)	2014 & 2020 HMPTs
High Wind Event Tornado	May 20, 1963	Hillsborough County	F1 tornado, distance 9.2 miles. (Source: www.geostat.org/data/greenfield-nh/tornados)	2014 & 2020 HMPTs
High Wind Event Tornado	June 9, 1963	Hillsborough County	F2 tornado; distance 19.1 miles. (Source: www.geostat.org/data/greenfield-nh/tornados)	2014 & 2020 HMPTs
High Wind Event Tornado	July 19, 1966	Hillsborough County	F1 tornado, distance 17.3 miles. (Source: www.geostat.org/data/greenfield-nh/tornados)	2014 & 2020 HMPTs
High Wind Event Tornado	July 17, 1968	Hillsborough County	F2 tornado, distance 9.1 miles. (Source: www.geostat.org/data/greenfield-nh/tornados)	2014 & 2020 HMPTs
High Wind Event Tornado	July 19, 1968	Hillsborough County	F1 tornado, distance 20.7 miles. (Source: www.geostat.org/data/greenfield-nh/tornados)	2014 & 2020 HMPTs
High Wind Event Tornado	August 20, 1968	Hillsborough County	F1 tornado, distance 20.6 miles. (Source: www.geostat.org/data/greenfield-nh/tornados)	2014 & 2020 HMPTs
High Wind Event Tornado	June 6, 1969	Hillsborough County	F2 tornado, distance 16.9 miles. (Source: www.geostat.org/data/greenfield-nh/tornados)	2014 & 2020 HMPTs
High Wind Event Tornado	July 11, 1970	Hillsborough County	F1 tornado, distance 21.3 miles. (Source: www.geostat.org/data/greenfield-nh/tornados)	2014 & 2020 HMPTs
High Wind Event Tornado	August 13, 1983	Hillsborough County	F2 tornado, distance 18.6 miles. (Source: www.geostat.org/data/greenfield-nh/tornados)	2014 & 2020 HMPTs

Type of Event	Date of Event	Location	Description	Source
High Wind Event Tornado	July 5, 1984 (2)	Hillsborough County	F1 tornado, distance 11.5 miles & an F1 tornado, distance 20.3 miles. (Source: www.geostat.org/data/greenfield-nh/tornados)	2014 & 2020 HMPTs
High Wind Event Tornado	June 16, 1986	Hillsborough County	F1 tornado, distance 17.9 miles. (Source: www.geostat.org/data/greenfield-nh/tornados)	2014 & 2020 HMPTs
Tropical & Post-Tropical Cyclone Hurricane Bob	August 18-20, 1991	State & Region Wide	Major Disaster Declaration DR-917: High winds and heavy rain, no reported damage in Greenfield.	FEMA & 2020 HMPT
High Wind Event Tornado	July 2, 1997 (2)	Hillsborough County	F1 tornado, distance 21.4 miles & an F2, distance 1.1 miles. One of the two tornadoes on this day started above Otter Lake and traveled east-northeast into Francestown. Two buildings, American Steel and the DPW Garage had major damage and the Recycling Center was destroyed. (Source: www.geostat.org/data/greenfield-nh/tornados)	2014 HMPT & 2020 HMPT
High Wind Event Tornado	May 31, 1998	Hillsborough County	F2 tornado, distance 6.7 miles. (Source: www.geostat.org/data/greenfield-nh/tornados)	2014 & 2020 HMPTs
Tropical & Post-Tropical Cyclone Hurricane Katrina (evacuation)	August 29-October 1, 2005	All Ten NH Counties	Emergency Declaration EM-3258: Assistance to evacuees from the area struck by Hurricane Katrina and to provide emergency assistance to those areas beginning on August 29, 2005, and continuing; the President's action made Federal funding available to the state and all 10 counties of the State of New Hampshire. No known evacuees or pets came to Greenfield.	FEMA & 2020 HMPT
Tropical & Post-Tropical Cyclone Tropical Storm Irene	August 26-September 6, 2011	EM 3333: All Ten NH Counties DR-4026: Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, & Sullivan	Major Disaster Declaration DR-4026 & Emergency Declaration EM-3333: Tropical Storm Irene Aug 26th-Sept 6, 2011 Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, & Sullivan Counties; Emergency Declaration for all ten counties. Greenfield received heavy rain but no significant flooding or damage.	FEMA & 2020 HMPT
High Wind Event Windstorm Long Term Utility Outage	2016 or 2017	Town Wide & Region Wide	A widespread wind event caused damage throughout Greenfield. Power lines and poles down and more than five roads were closed due to downed trees. Several transformers were down on Cavender Road and the road had to be shut down causing limited accessibility. Some in town were without power for a few days. Eversource replaced several transformers and poles. Other roads that were affected by downed trees and power lines included New Boston Road, Riverbend, Colonial and Old Lyndeborough Roads	FEMA & 2020 HMPT

Type of Event	Date of Event	Location	Description	Source
D. Severe Winter Weather including Nor'easters, Blizzards & Ice Storms: Severe winter weather in NH may include heavy snow storms, blizzards, Nor'easters and ice storms, particularly at elevations over 1,000 feet above sea level. Generally speaking, NH will experience at least one of these hazards during any winter season, however most NH communities are well prepared for such hazards. Severe winter weather and ice storms have the potential to impact the community on a townwide basis. No significant winter weather events have taken place in Greenfield since January 2015.				
Summary of severe winter weather events including Major Disaster & Emergency Declarations in the state & regionwide				
Severe Winter Weather Ice Storms	1942; 1969; 1970; 1979; 1991; 1998 (DR-1199); 2008 (DR-1812)		Ice Storms: major disruptions to power; transportation; public and private utilities	FEMA & 2020 HMPT
Severe Winter Weather Snowstorms	1920, 1929, 1940, 1950, 1952, 1958 (2), 1960, 1961, 1969, 1978, 1982, 1993 (EM-3101), 2001 (EM-3166), 2003 (EM-3177), 2003 (EM-3193), 2004, 2005 (EM-3207), 2005 (EM-3208), 2005 (EM-3211), 2008 (EM-3297), 2009, 2011 (EM-3344 & DR-4049), 2013 (EM-1405), 2015 (DR-4209), 2017 (DR-4316), 2018 (DR-4371)		Events marked by snowfalls exceeding 2' in parts of the state; disruptions to power and transportation	FEMA & 2020 HMPT
Detailed summary of severe winter storm events in the community				
Severe Winter Storm Snowstorm	Winter of 1968-69	State & 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. There was no significant recollection in Greenfield other than heavy snow that was handled by the Department of Public Works.	2020 HMPT
Severe Winter Storm High Winds, Tidal Surge, Coastal Flooding & Snow	February 16, 1978	State & Region Wide	Major 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. There was no significant recollection in Greenfield other than heavy snow that was handled by the Department of Public Works.	FEMA & 2020 HMPT
Severe Winter Storm Ice Storm	January 7-25, 1998	State & Region Wide	Major Disaster Declaration DR-1199: A significant ice storm struck nearly every part of the state, particularly in northern communities and in areas over 1,000 feet above sea level. Greenfield had minor ice issues at higher elevations.	FEMA & 2020 HMPT

Type of Event	Date of Event	Location	Description	Source
Severe Winter Storm 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; In Greenfield, the heavy snow accumulation was handled by the Department of Public Works although snow removal became an issue.	FEMA & 2020 HMPT
Severe Winter Storm Snowstorm	February 17-18, 2003	Cheshire, Hillsborough, Merrimack, Rockingham & Strafford	Emergency Declaration EM-3177: Declaration covers jurisdictions with record and near-record snowfall from the snowstorm that occurred February 17-18, 2003. In Greenfield, the heavy snow accumulation was handled by the Department of Public Works.	FEMA & 2020 HMPT
Severe Winter Storm 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. In Greenfield, the heavy snow accumulation was handled by the Department of Public Works.	FEMA & 2020 HMPT
Severe Winter Storm Snowstorm	January 22-23, 2005 February 10-11, 2005 March 11-12, 2005	EM-3208-002 (Jan, Feb & Mar): All Ten NH Counties EM-3207 (Jan): 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 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); 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; (Hillsborough (not declared): State of NH: \$1,107,426.59); Emergency Declaration EM-3208: February storm; FEMA had obligated more than \$1 million by March 2005 to help pay for costs of the heavy snow and high winds in February 2005; (No declaration in Hillsborough County; State of NH: \$521,536.78); Emergency Declaration EM-3211: March snowstorm; more than \$2 million has been approved to help pay for costs of the snow removal; (Hillsborough: \$710,836; State of NH: \$697,501.41). In Greenfield heavy snow accumulation was handled by the Department of Public Works.	FEMA & 2020 HMPT
Severe Winter Storm Snowstorm & Long Term Utility Outage	February 2006	Greenfield	Trees down and power outages (for three days) throughout Greenfield due to heavy snowfall. In Greenfield, the heavy snow accumulation was handled by the Department of Public Works.	2014 & 2020 HMPTs

Type of Event	Date of Event	Location	Description	Source
Severe Winter Storm Snow & Ice Storm & Long Term Utility Outage	December 11-23, 2008	All Ten NH Counties	Major Disaster Declaration DR-1812 & Emergency Declaration EM-3297: Damaging ice 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. In Greenfield, wires and trees down causing road closures. Ice covered trees throughout the community but was worse at higher elevations. Power and phone outages for up to two weeks. The town received FEMA funding for cleanup.	FEMA & 2020 HMPT
Severe Winter Storm Snowstorm	October 29-30, 2011	DR-4049: Hillsborough & Rockingham EM-3344: All Ten NH Counties	Major Disaster Declaration DR-4049 & Emergency Declaration EM-3344: Severe Storm and Snowstorm Event October 29-30, 2011 Hillsborough and Rockingham Counties; EM-3344 , all ten NH countries. (aka: Snowtober). In Greenfield, the heavy snow accumulation was handled by the Department of Public Works. FEMA funding was applied for and received to cover cleanup from this storm.	FEMA & 2020 HMPT
Severe Winter Storm Snowstorm	February 8, 2013	All Ten NH Counties	Major Disaster Declaration DR-4105: Nemo; heavy snow in February 2013. In Greenfield heavy snow accumulation was handled by the Department of Public Works.	FEMA & 2020 HMPT
Severe Winter Storm Snowstorm	January 26-28, 2015	Hillsborough, Rockingham & Stafford	Major Disaster Declaration DR-4209: Severe winter storm in Hillsborough, Rockingham and Strafford Counties; disaster aid to supplement state and local recovery efforts. In Greenfield, the heavy snow accumulation was handled by the Department of Public Works.	FEMA & 2020 HMPT
Severe Winter Weather Snowstorm	March 14-15, 2017	Belknap & Carroll	Major Disaster Declaration DR-4316: A severe winter storm and snowstorm occurred in two New Hampshire counties resulting in disaster aid to supplement state and local recovery efforts. Although Hillsborough County was not declared in this declaration, the town reported heavy snow that was handled by the Department of Public Works.	FEMA & 2020 HMPT
Severe Winter Weather Snowstorm	March 13-14, 2018	Carroll, Strafford & Rockingham	Major Disaster Declaration, DR 4371: The Federal Emergency Management Agency announced a major disaster declaration on June 8, 2018 for a period of a severe winter storm from March 13-14, 2018. Although Hillsborough County was not declared in this declaration, the town reported heavy snow that was handled by the Department of Public Works.	FEMA & 2020 HMPT

Type of Event	Date of Event	Location	Description	Source
E. Earthquakes: According to the NH State Hazard Mitigation Plan, New Hampshire is considered to lie in an area of "Moderate" seismic activity when compared to other areas of the United States. New Hampshire is bordered to the north and southwest by areas of "Major" activity. Generally, earthquakes in NH cause little or no damage and have not exceeded a magnitude of 5.5 since 1940. Earthquakes have the potential to impact the community on a townwide basis. No significant earthquakes have taken place in Greenfield since the last hazard mitigation plan.				
Summary of earthquakes with a magnitude of 4.0 or greater in the state & regionwide				
Earthquakes	6/11/1638 (Central NH, 6.5); 10/29/1727 (Off Coastline, 6.0-6.3), 11/18/1755 (Off Coastline, 5.8); 11/10/1810 (Portsmouth, NH, 4.0); 7/23/1823 (Off Hampton, NH, 4.1); 12/19/1882 (Concord, NH, Unknown); 3/5/1905 (Lebanon, NH, Unknown); 8/30/1905 (Rockingham County, Unknown); 11/09/1925 (Ossipee, NH, 4.0); 3/18/1926 (New Ipswich, NH, Unknown); 11/10/1936 (Laconia, NH, Unknown); 12/20/1940 (Ossipee, NH, 5.5-5.8); 12/24/40 (Ossipee, NH, 5.5-5.8); 1/19/1982 (Laconia, NH, 4.0); 11/20/1988 (Berlin, NH, 4.0); 4/6/1989 (Berlin, NH, 4.1); 10/16/2012 (Hollis Center, ME, 4.0)		Occurrences of earthquakes with a magnitude of 4.0 or greater in recorded New Hampshire History	State of NH Multi-Hazard Mitigation Plan, Update 2018
Detailed summary of earthquake events that were felt in the community since 1940				
Earthquake	December 20, 1940	Ossipee, NH	Magnitude 5.5	State of NH Multi-Hazard Mitigation Plan, Update 2018 & 2020 HMPT
Earthquake	December 24, 1940	Ossipee, NH	Magnitude 5.5	
Earthquake	June 15, 1973	Quebec Border / NH	Magnitude 4.8	
Earthquake	January 19, 1982	West of Laconia, NH	Magnitude 4.5	
Earthquake	June 23, 2010	Ontario-Quebec Border	Magnitude 5.0	
Earthquake	June 26, 2010	Boscawen, NH	Magnitude 3.1	
Earthquake	October 16, 2012	Hollis Center, ME	Magnitude 4.0; felt in Greenfield but no damage reported (septic tank at the fire station cracked in Lyndeborough)	

Type of Event	Date of Event	Location	Description	Source
F. Drought: Droughts are generally not as damaging or disruptive as floods and other hazards and they are more difficult to define. A drought is a natural hazard that evolves over months or even years and can last as long as several years to as short as a few months. According to the NH State Hazard Mitigation Plan, New Hampshire has a low probability, severity and overall risk for drought. Droughts have the potential to impact the community on a townwide basis. No significant droughts have occurred in Greenfield since the 2016 drought.				
Summary of drought in the state & regionwide				
Drought	1775 (Drought); 1840 (Drought); 1882 (Drought); 1910's (Drought); 1929-1936 (Regional Drought); 1939-1944; 1947-1950 (Moderate Drought); 1960-1969 (Severe Regional Drought); 1999; 2001-2002 (Severe Drought); 2016-2017 (Extreme Drought)	Occurrences of serious droughts in recorded New Hampshire History		State of NH Multi-Hazard Mitigation Plan, Update 2018
Summary of drought in the community since 1929				
Drought	1929-1936	State & Regionwide	Regional	State of NH Multi-Hazard Mitigation Plan, Update 2018 & 2020 HMPT
Drought	1939-1944	State & Regionwide	Severe in southeast and moderate elsewhere	
Drought	1947-1950	State & Regionwide	Moderate	
Drought	1960-1969	State & Regionwide	Regional longest recorded continuous spell of less than normal precipitation	
Drought	2001-2002	State & Regionwide	Third worst drought on record;	
Drought	Spring 2012	State & Regionwide	Considered worse than the drought of 1941-42 (2014 HMPT)	
Drought	2016-2017	State & Regionwide	Declared drought for the summer of 2016 and into 2017, moderating from extreme in southern New Hampshire to dry in the most northern communities. The drought affected Greenfield with many wells the community drying up and with an increase in the number of small brush fires.	
G. Miscellaneous Past or Potential Hazards: Natural, Technological and Human-caused hazards and other unusual hazardous events have been noted throughout New Hampshire. Among others, one concern is the transport of hazardous material through communities by rail and tractor-trailer. Other natural or human-caused hazards have the potential to impact the community on a town wide basis. No additional hazards, including lightning, have taken place in Greenfield since the last hazard mitigation plan. No additional hazards have taken place in Greenfield with the exception of COVID-19.				
Lightning	Past & Potential	Crotched Mountain	Lightning strikes with frequency and has caused brush fires.	2014 & 2020 HMPTs
Lightning	Past & Potential	Muzzey Hill Road	Lightning strikes with frequency; no reports of fire.	2014 & 2020 HMPTs
Lightning	Potential	Fletcher Farm Road, Gould Hill Road, Blanchard Hill Road, Thomas Road	High elevations; no reports of strikes.	2014 & 2020 HMPTs
Transportation Accident	2001	Otter Lake	Fuel oil tank dumped fuel into the lake.	2014 & 2020 HMPTs

Type of Event	Date of Event	Location	Description	Source
Transportation Accident	Potential	NH 31 & NH 136 and other town roads.	Heavy truck travel increases the risk	2014 & 2020 HMPTs
Transportation Accident	Potential & During March 2019	Mountain Road	In 2019, water started bubbling up onto road creating a winter ice hazard, although no accidents have occurred. The entire road should be rebuilt. The area has substantial ledge.	2020 HMPT
Infectious Disease	January 20, 2020 – ongoing	All Ten NH Counties	Major Disaster Declaration, DR-4516: The Federal Emergency Management Agency ("FEMA") within the US Department of Homeland Security is giving public notice of its intent to provide assistance to the State of New Hampshire, local and tribal governments, and certain private nonprofit organizations under the major disaster declaration issued by the President on April 3, 2020, as a result of the Coronavirus Disease 2019 (COVID-19).	FEMA & 2020 HMPT
Infectious Disease	January 20, 2020 – ongoing	All Ten NH Counties	Emergency Declaration EM-3445: Ten county declaration to provide individual assistance and public assistance as a result of the impact of COVID-19	FEMA & 2020 HMPT

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

Natural Hazards	<p>Although the team did not identify specific examples or past occurrences of these hazards, it was felt worthwhile to list them as potential hazards to the town. These hazards have the potential to impact the community either locally or on a townwide basis.</p> <p>See Table 3.1, Hazard Threat Analysis and Chapter 5 for more details on these hazards.</p>
Extreme Temperatures	
Technological Hazards	
Aging Infrastructure	
Hazardous Materials	
Conflagration	
Radiological	
Dam Failure	
Known & Emerging Contaminates	
Human Caused	
Mass Casualty Incidents	
Terrorism & Violence	
Cyber Event	

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

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

Chapter 4: Critical Infrastructure & Key Resources (CIKR)

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

TABLE 4.1 - EMERGENCY RESPONSE FACILITIES (ERF) & EVACUATION

EMERGENCY RESPONSE FACILITIES (ERF)			
ERF'S are primary facilities and resources that may be needed during an emergency response.			
Facility	Type of Facility	Hazard Risk	
Fire Station (generator)	Emergency Services & Primary EOC	All Hazards	1
Town Offices (generator)	Town Government, Records, Buildings & Grounds, Primary Shelter Police Station Secondary EOC	All Hazards	1
Town Garage (portable generator)	Heavy Equipment, Sand & Gravel	All Hazards, Wind & Lightning	2
Consolidated Switching Station	Communications	All Hazards	1
Monadnock Community Hospital (Peterborough)	Hospital	All Hazards & Lightning	2
St. Joseph's Medical Center (Milford)	Hospital	All Hazards	1
Ambulance Services are provided by Wilton Ambulance. If needed, backup services are provided by Peterborough Ambulance and Antrim Fire.			
<u>Emergency fuel for town vehicles is provided as follows:</u> <ul style="list-style-type: none"> • Department of Public Works/diesel pumps at the DPW Garage (portable generator) • The Police Department/Crotched Mountain (generator) • Fire Department/Fire Station (generator) • Also Fuel would also be available for emergency at the NH DOT Garage (generator) 			
HELICOPTER LANDING ZONES (ERFH)			
Oak Park, 971, Forest Road (Rt. 31)	Helicopter Landing Zone	All Hazards	1
Peterborough Hospital	Helicopter Landing Zone	All Hazards	1
Crotched Mountain Rehab, Verney Dr.	Helicopter Landing Zone	All Hazards	1
DOT Parking Lot, Sawmill Road	Helicopter Landing Zone	All Hazards	1
Greenfield State Park	Helicopter Landing Zone-Seasonal	All Hazards	1
Barbara C. Harris Ballfield	Helicopter Landing Zone-Seasonal	All Hazards	1
Cavender Road/Riverbend Drive Intersection	Helicopter Landing Zone-Seasonal	All Hazards	1
East Road	Helicopter Landing Zone-Seasonal	All Hazards	1

EMERGENCY RESPONSE FACILITIES (ERF)			
Yankee Farmer, New Boston Road	Helicopter Landing Zone-Seasonal	All Hazards	1
Church Field on Frankestown Road (Rt. 136)	Helicopter Landing Zone-Seasonal	All Hazards	1
Brantwood Camp, Mountain Road	Helicopter Landing Zone-Seasonal	All Hazards	1
Plowshare Farm, Mountain Road	Helicopter Landing Zone-Seasonal	All Hazards	1
Cilley Field, Muzzey Hill Road	Helicopter Landing Zone-Seasonal	All Hazards	1
Robertson Farm Field, Old Bennington Road	Helicopter Landing Zone-Seasonal	All Hazards	1
Swamp Road Intersection, Old Bennington Road	Helicopter Landing Zone-Seasonal	All Hazards	1
American Steel Parking Lot, Sawmill Road	Helicopter Landing Zone-Seasonal	All Hazards	1
EVACUATION ROUTES			
NH Route 31	Primary Evacuation Route	All Hazards & Inland Flooding	1
NH Route 136	Primary Evacuation Route	All Hazards & Inland Flooding	1
Forest Road	Secondary Evacuation Route	All Hazards & Inland Flooding	1
BRIDGES & CULVERTS ON EVACUATION ROUTES (ERFB)			
Greenfield Covered Bridge (Forest Road)	Bridge on Evacuation Route	All Hazards	1
Culvert on Route 136 (Peterborough)	Culvert on Evacuation Route	All Hazards & Inland Flooding	2
Culvert on Route 31	Culvert on Evacuation Route	All Hazards & Inland Flooding (Beaver Dams)	2
Culvert on Route 136 (towards Frankestown)	Culvert on Evacuation Route	All Hazards & Inland Flooding	2
Culvert on Route 31 (near Town Line)	Culvert on Evacuation Route	All Hazards & Inland Flooding	2

TABLE 4.2 – NON-EMERGENCY RESPONSE FACILITIES (NERF)

NON-EMERGENCY RESPONSE FACILITIES (NERF)			
NERF'S are facilities, that although they are critical, they are not necessary for the immediate emergency response efforts. This would include facilities to protect public health and safety and to provide backup emergency facilities.			
Facility	Type of Facility	Hazard Risk	
Crotched Mountain Rehabilitation Center (generator)	Possible Shelter	All Hazards, Wind & Lightning	2
Greenfield Elementary (generator hook-up)	Possible Shelter	All Hazards	1
Stephenson Library	Cooling & Warming Center	All Hazards	1

NON-EMERGENCY RESPONSE FACILITIES (NERF)			
Barbara C. Harris Conference Center (partially generated)	Possible Shelter (may have accessibility issues)	All Hazards	1
Sewer Department	Town sewer & septic field	All Hazards & Inland Flooding	1
Recycling Center	Recycling Center	All Hazards, Wind & Lightning	2

TABLE 4.3 – FACILITIES & POPULATIONS TO PROTECT (FPP)

FACILITIES & PEOPLE TO PROTECT (FPP)			
FPPs are facilities that need to be protected because of their importance to the town and to residents who may need help during a hazardous event.			
Facility	Type of Facility	Hazard Risk	
Crotched Mountain Rehabilitation Center	School	All Hazards, Wind & Lightning	2
Greenfield Elementary School	School	All Hazards	1
Plowshare Farm, Mountain Road	Functional Needs Facility	All Hazards	1
Greenfield Commons Senior Housing	Senior Housing	All Hazards	1
Congregational Covenant Church Ministry Center (Depot Road)	Gathering of People	All Hazards	1
Meeting House (generator hook up for furnaces only)	Meeting House	All Hazards	1
Camp Winamac	Recreation, Camps & Gathering of People	All Hazards	1
Sunset Lake Beach	Recreation, Camps & Gathering of People	All Hazards	1
Otter Lake Beach (campers)	Recreation, Camps & Gathering of People	All Hazards	1
Otter Lake Beach (day)	Recreation, Camps & Gathering of People	All Hazards	1
Greenfield State Park, 252 campsites	Recreation, Camps & Gathering of People	All Hazards	1
Oak Park	Recreation, Camps & Gathering of People	All Hazards	1
Barbara C. Harris Center, Camp & Conference Center	Recreation, Camps & Gathering of People	All Hazards	1
Public Boat Landings (Zephyr Lake, Powder Mill Pond, Sunset, Otter Lake)	Recreation, Camps & Gathering of People; Point of Rescue	All Hazards	1
Brantwood Camp	Recreation, Camps & Gathering of People	All Hazards	1
Town Offices	Historic Building (NH Registry)	All Hazards	1
Meeting House	Historic Building (National Registry)	All Hazards	1
Long Block	Apartment Complexes & Historic	All Hazards	1
Greenfield Corner Properties	Apartment Complexes & Historic	All Hazards	1

FACILITIES & PEOPLE TO PROTECT (FPP)			
Gibbons Apartments	Apartment Complexes	All Hazards	1
American Steel	Hazardous Material Storage-Propane	All Hazards	1
NH DOT	Hazardous Material Storage-Propane	All Hazards	1
Monadnock Warehouse	Hazardous Material Storage-Propane	All Hazards	1

TABLE 4.4 – POTENTIAL RESOURCES (PR)

POTENTIAL RESOURCES (PR)			
PRs are potential resources that could be helpful for emergency response in the case of a hazardous event.			
Facility	Type of Facility	Hazard Risk	
American Steel	Propane & Building Material & Heavy Equipment Suppliers	All Hazards	1
Barbara C. Harris Conference Center	Food & Water & Possible Shelter	All Hazards	1
Brantwood Camp	Food & Water & Possible Shelter	All Hazards	1
Town Gravel Pit (Route 31)	Gravel Pit	All Hazards	1
Congregational Covenant Church Ministry Center (Depot Road)	Food & Water & Possible Shelter	All Hazards	1
Crotched Mountain Rehabilitation Center	Food & Water, Shelter, Medical Supplies, Fuel for Police Department	All Hazards, Wind & Lightning	2
Fran McMan	Building Material & Heavy Equipment Supplier	All Hazards	1
Fracestown Sand & Gravel	Gravel Pits	All Hazards	1
Harvester Market	Food & Water	All Hazards	1
Kemps Trucking & Equipment	Building Material & Heavy Equipment Suppliers	All Hazards	1
Kennebec Lumber Company	Wood Products & Heavy Equipment	All Hazards	1
Merzi Trucking	Building Material, Sand & Heavy Equipment Suppliers	All Hazards	1
NH DOT Garage	Road Materials & Heavy Equipment Suppliers, Emergency Fuel (if needed)	All Hazards	1
Hungry Goats Eatery	Temporary Holding Place for Fatalities	All Hazards	1
Forest Road Welding	Welder	All Hazards	1
Todd Smith	Welder	All Hazards	1
Refer to EOP for Resource Inventory List for other Potential Resources			

Chapter 5: Hazard Effects in Greenfield

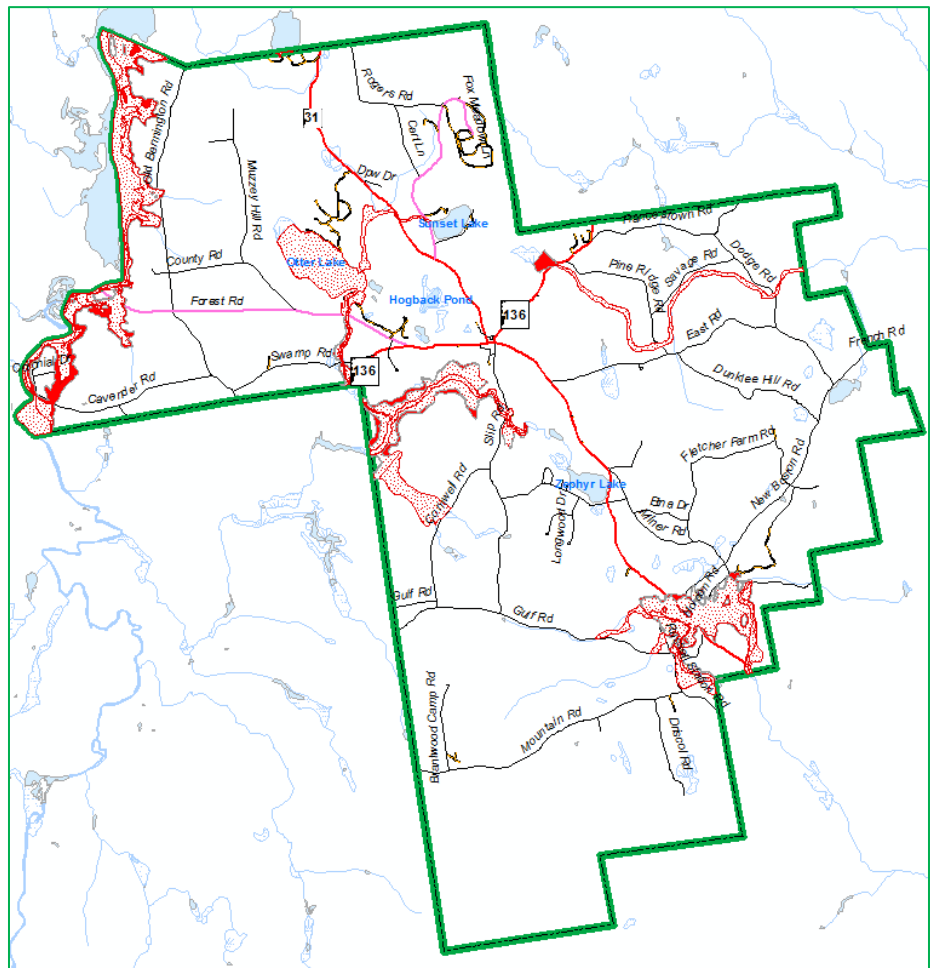
A. IDENTIFYING VULNERABLE CRITICAL INFRASTRUCTURE & KEY RESOURCES (CIKR)

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

All CIKR were identified in Greenfield (see Tables 4.1-4.1). Of the Emergency Response Facilities (ERF) listed in this plan, none are located in the FEMA floodplain. The primary shelter is the Town Office and the primary EOC is located at the Fire Station; neither of these important facilities is located at or near floodwaters.

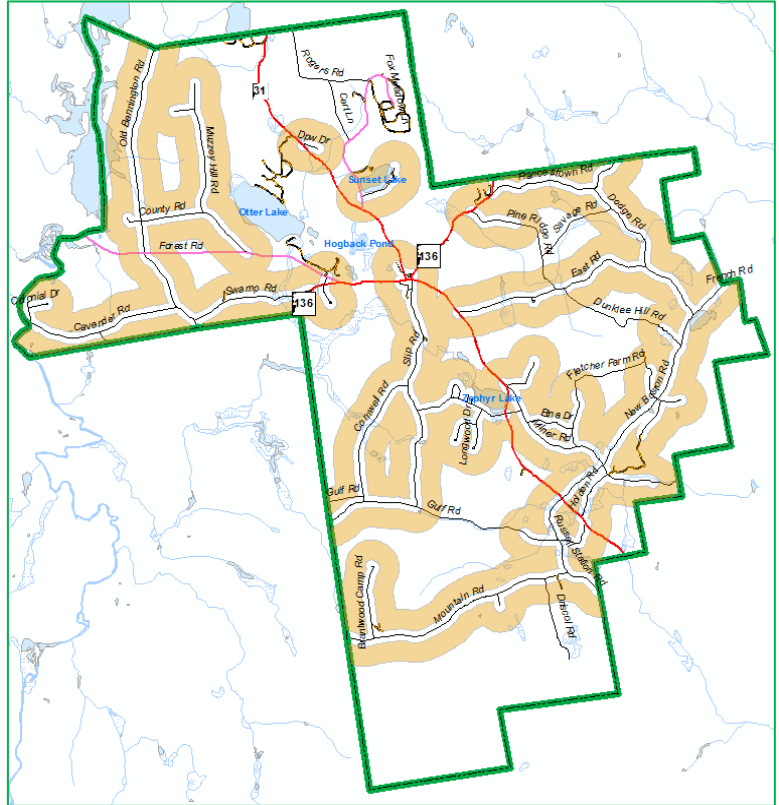
Additional CIKR was identified in the FEMA floodplain; however examples of these primarily include bridges that are expected to be in or near water. Sections of Forest Road, Old Bennington Road, Sawmill Road, Francestown Road, Dodge Road, Swamp Road, Slip Road, New Boston Road, Old Lyndeborough Road, School House Road, Gulf Road and Russell Station Road are in the FEMA floodplain and therefore have potential for flooding. The 100 and 200-year floodplains are indicated in the map below with red symbology; solid red indicates the 200-year floodplain.

It is expected that many non-CIKR structures are within the FEMA floodplain. It is the responsibility of Town Officials to keep all at risk structures in mind when a flood hazard is likely.



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

The Wildland Urban Interface (WUI), represented in light orange symbology in the map to the right, represents the areas of the community that are prone to wildfires. First, a 300 foot buffer (enough for fire hoses to reach) of all Class V roads was determined. Then an additional buffer of 1,320 was added (orange) to indicate where the human environment is most likely to intersect the natural environment, the location where most fires happen in NH.



Many structures were found to be in the traditional WUI; however, the only Emergency Response Facility (ERF) that was found in the WUI was the Fire Station which has adequate defensible space. The Elementary School was also close to the “traditional” WUI, but it too appears to have adequate defensible space.

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 Greenfield, 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.

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

B. CALCULATING THE POTENTIAL LOSS

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

Assessed structure value (2018-MS1)	Value	1% Damage	5% Damage
<i>Residential</i>	\$84,691,700	\$846,917	\$4,234,585
<i>Manufactured Housing</i>	\$1,402,600	\$14,026	\$70,130
<i>Commercial</i>	\$5,453,900	\$54,539	\$272,695
<i>Tax Exempt</i>	\$8,178,700	\$81,787	\$408,935
<i>Utilities</i>	\$3,133,700	\$31,337	\$156,685
<i>Totals</i>	\$102,860,600	\$1,028,606	\$5,143,030

** 2018 Greenfield Annual Report.*

Based on this assumption, the potential loss from any of the identified natural hazards would range from **\$0 to \$1,028,606** or **\$1,028,606 to \$5,143,030** based on the 2018 Greenfield town valuations which lists the assessed value of all structures in Greenfield to be **\$102,860,600** (see chart above).

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

C. NATURAL HAZARDS

Descriptions below represent the “**local impact**” to the community for the hazards that were identified by the team. For the “**extent**” of these hazards, please refer to *Appendix C, The Extent of Hazards*, which includes charts such as the Saffir-Simpson Hurricane Wind Scale, the Beaufort Wind Scale, the National Weather Service Heat Index, the Sperry-Piltz Ice Accumulation Index and the Enhanced Fujita Scale for tornadoes.

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

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



Photo: Greenfield – Aerial View
Photo Credit: Town of Greenfield;
<https://www.greenfield-nh.gov/about-greenfield/slideshows/images->

1) SEVERE WINTER WEATHER

Hazard Identification & Risk Assessment (HIRA)	High
Probability	Moderate
Estimated Structure Loss Value	\$1,028,606 to \$5,143,030

Snowstorms, Blizzards & Nor'easters

Heavy snowstorms typically occur from December through April. New England usually experiences at least one or two heavy snowstorms with varying degrees of severity each year. Power outages, extreme cold and impacts to infrastructure are all effects of winter storms that have been felt in Greenfield in the past. All of these impacts are a risk to the community, including isolation, especially of the elderly (17.0% of the population) and other vulnerable populations. The ability to get in and out of town and emergency service access can be hindered. Damage caused by severe winter snowstorms varies according to wind velocity, snow accumulation, duration and moisture content. Seasonal accumulation can also be as significant as an individual snowstorm. Heavy overall winter accumulations can impact the roof-load of some buildings. Significant snowstorms, nor'easters and blizzards could diminish food supplies within two days.

The winter of 2015 brought heavy snow to all of southern New Hampshire and to Greenfield. A Major Disaster Declaration (DR-4206) issued for the January 26-28 snowstorm provided financial assistance to Greenfield for snow removal. Overall, the winter of 2015 brought such high accumulations that the entire region was mindful of the heavy burden on roofs. Although the DPW was able to handle the snow, there was some difficulty removing the snow due to the volume and size of the snowbanks. No significant snowstorms have struck Greenfield since the last hazard mitigation plan.

More recently, in both March 2017 and March 2018, snowstorms with unusually high spring accumulation received Major Disaster Declarations (DR-4316 and DR-4371). These two declarations were not declared in Hillsborough County; however Greenfield reported heavy snow that was handled by the DPW. As a result of the March 2017 storm, the town officials "election portion" of town meeting was postponed from Tuesday, March 14th to Friday, March 17th and budget voting was held the following day, Saturday, March 18th. There were no postponements for the March 2018 storm.

Although Greenfield's road crew generally handles usual snow amounts without difficulty, Greenfield's roads are often impacted by poor weather conditions and, this combined with traffic on NH Routes 31 and 136 can make travel difficult. Fire and other emergency response may be hindered by poor road conditions.

Ice Storms

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

In Greenfield, no significant damage occurred during the 1979 or 1998 ice storms. In 2010, another ice storm struck southern New Hampshire, causing trees and power lines to once again fall producing power outages in some areas for a few days. It was estimated that over 300,000 homes in the state were without power during this storm, but the damage in Greenfield was not as significant as in other areas of the state.

In December 2008, Greenfield experienced one of the worst ice storms in New Hampshire history (Major Disaster Declaration: DR-1812). Like other communities in southern New Hampshire, extended power outages and fallen trees resulted in hardship for the entire community. Power was out for many in the community for two weeks and work crews were brought in from other communities to assist with the cleanup. The National Guard was activated to come to Greenfield to assist with the cleanup operation. With trees and branches falling all over the community, some structures and vehicles were damaged. In addition, schools were closed for at least a week. FEMA funding was provided to assist with the cost of the cleanup after this devastating ice storm. No significant ice storms have occurred in Greenfield since the 2008 Ice Storm.

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

2) EXTREME TEMPERATURES

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

Extreme Cold & Heat

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

Of concern today are extreme heat conditions, which seem to be more common with climate change. A heat wave with temperatures in excess of 95° for a week or more can have a substantial impact on the elderly and other vulnerable populations. Few residents, particularly vulnerable populations, have air conditioners and are less able to cope with extreme heat. The estimated elderly population in Greenfield is 17.0% and the estimated poverty rate is 7.4% of the total population¹⁵.

Extreme Temperatures combined with Long Term Utility Outage

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

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

¹⁵ US Census Bureau, American Community Survey, ACS, 2013-2017

3) INLAND FLOODING

Hazard Identification & Risk Assessment (HIRA) High
 Probability Moderate
 Estimated Structure Loss Value \$1,028,606 to \$5,143,030

100-Year Flood Events, Riverine Flooding & Ice Jams

Riverine flooding and 100-year flood events can occur as result of hurricanes, tropical and post-tropical cyclones, heavy summer and fall rains as well ice jams. Nearly every spring, rapid snowmelt and heavy rain cause the flooding of the Contoocook River and other small rivers and streams in the community. Fortunately, no Major Disaster Declarations have been declared in Hillsborough County since the heavy rain event in March 2010.

Local Road Flooding

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

Many of the roads in Greenfield are long and winding and subject to some of the most severe weather in the state. The continuous erosion of roads makes for a daunting task of “up-keep” for the Department of Public Works (DPW). Fortunately, two of the town’s major thoroughfares, NH Routes 136 and 31 are the responsibility of the state. The DPW maintains a total of 35 miles of Class V roads in the community, 28-30 miles of which are gravel.

Roads that have been known to flood in the past and that have potential for future flooding

New Boston Road
 Dunklee Road
 Miner Road
 Holden Road
 Slip Road
 Blanchard Hill Road
 Thomas Road & Coach Road
 Cavender Road
 Russell Station Road
 Old Lyndeborough Mountain Road
 Cornwell Road
 Swamp Road
 Old Bennington Road
 Zephyr Lake Road

Fortunately, Greenfield has been very proactive in the maintenance and repairs of culverts and has reduced the incidence of local road erosion and washouts. With the exception of several culverts listed as Action Items in *Table 9.1, The Mitigation Action Items*, Greenfield’s roads are in good condition to handle excessive rain amounts. The DPW Director upgrades and improves roads in town based on the “Gravel Road Plan” which is established as part of the town’s annual budget.

Local Flooding as a result of Beaver Dams

The local beaver population continues to create flooding issues in Greenfield. Areas where this is a particular problem include Dunklee Hill and Zephyr Lake Roads and New Boston Extension, although the beavers and their dams often move around in this area, re-establishing themselves as they go. Mitigation Action Item #11 calls for cooperation between DES, local trappers, authorities and homeowners to address and manage the beaver population.

Local Flooding as a result of Dam Failure

Although Greenfield does not have any high hazard or hydro-electric dams, flooding as a result of an overflow of the MacDowell spillway in Peterborough is a concern. Please refer to #10) Dam Failure in this chapter.

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

4) INFECTIOUS DISEASES

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

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

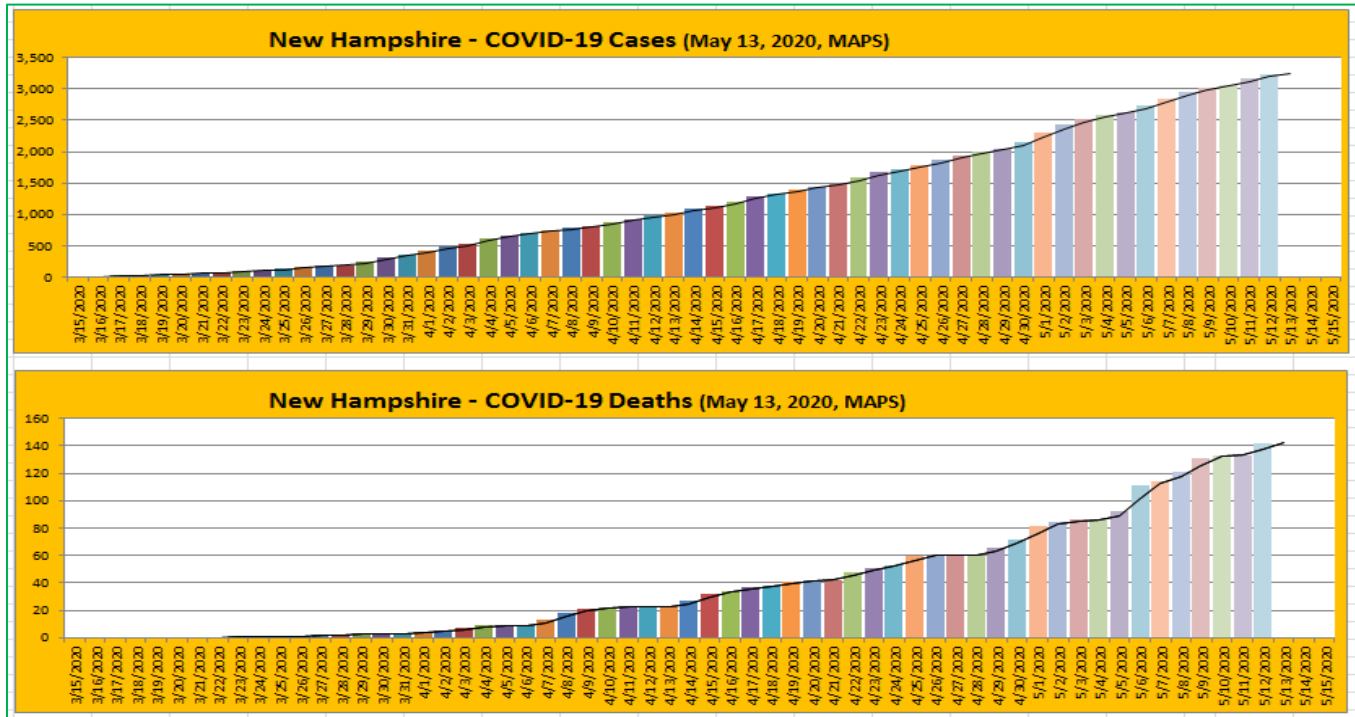
Some infectious diseases can be passed from person to person. Some are transmitted by bites from insects or animals. And others are acquired by ingesting contaminated food or water or being exposed to organisms in the environment.”¹⁶

Greenfield’s unique geography of mountains, rivers and lakes provides summer and winter recreation enthusiasts many opportunities to visit the town. The community’s population shows a significant increase during the summer and on weekends, at times doubling the existing population of about 1,859. In addition, the town’s middle and high school students attend school at the South Meadow Middle School and ConVal High School in Peterborough, along with students from the neighboring towns of Antrim, Bennington, Dublin, Franconia, Hancock, Peterborough, Sharon and Temple, thus enabling infection and viruses to be transmitted from elsewhere. In addition, several camps, beaches, apartment complexes, Greenfield State Park (252 campsites), the Barbara C. Harris Camp & Conference Center and Crotched Mountain Rehabilitation Center bring visitors to the town.

The team decided that infectious diseases and epidemics or pandemics could present a possible threat to Greenfield. With the occurrence of world-wide pandemics such as COVID-19, SARS, H1N1 and Avian Flu, Greenfield could be susceptible to an epidemic and subsequent quarantine. As of the writing of this plan, the entire world is coping with the onset of the COVID-19 pandemic, which has closed all non-essential businesses and schools throughout New Hampshire, and most of the United States. As of May 13, 2020, the state reported 3239 cases of COVID-19 (coronavirus) and 142 deaths, as seen in the charts below¹⁷. In Greenfield, the disease came in two waves, with all cases recorded at Crotched Mountain Rehabilitation Center; these cases included 19 total cases and one death in the first wave and second waves, many involving the staff at this long-term care facility. It is noted that these cases and the single death have not been counted for Greenfield, but rather attributed to their home of record, despite their current residency at Crotched Mountain Rehabilitation Center.

¹⁶ Infectious diseases, Overview, <https://www.mayoclinic.org/diseases-conditions/infectious-diseases/symptoms-causes/syc-20351173>

¹⁷ NH DHHS COVID-19 Updates; <https://www.nh.gov/covid19/news/documents/covid-19-update-05132020.pdf>; chart create by planner



As part of our discussion about infectious disease, it makes sense to discuss the opioid epidemic that is affecting the state and the nation in general. According to the National Institute on Drug Abuse, “*New Hampshire has the second highest rate of opioid-related overdose deaths in the country. In 2016, there were 437 opioid-related overdose deaths...from 2013 through 2016, opioid-related deaths in New Hampshire tripled*”¹⁸.

Many New Hampshire communities are struggling with opioid abuse and Greenfield is no exception; however, no documented opioid deaths were reported by the team. Although the availability and use of NARCAN[®] has helped lower the death rate in New Hampshire, opioid-related overdose deaths are still a common occurrence.

Because infectious disease is unlikely to have an impact on structures within the community, no loss structure value was estimated.

5) HIGH WIND EVENTS

Hazard Identification & Risk Assessment (HIRA) High
 Probability Moderate
 Estimated Structure Loss Value \$0 to \$1,028,606

Isolated High Wind Events

Isolated high winds and down drafts often occur within Greenfield; winds of this type are unpredictable and could fall timber, which in turn could block roadways, down power lines and impair emergency response. Old-growth trees are affected by these unexpected windstorms, particularly in the spring when the water table is high. As with other wind events, emergency response could be difficult.

¹⁸ NH Opioid Summary, National Institute on Drug Abuse; <https://www.drugabuse.gov/drugs-abuse/opioids/opioid-summaries-by-state/new-hampshire-opioid-summary>

The team reported that high winds were prevalent during the first half of 2019 causing trees and power lines to fall. In addition, it was noted that the Contoocook River acts as a wind tunnel and that clear cutting near the DPW garage and recycling center may impact not only wind events but also water runoff. The team reported a significant windstorm in 2016 that caused widespread damage throughout Greenfield. More than five roads were closed due to downed power lines and trees and several transformers were down on Cavender Road causing the shutdown of the road and limited emergency accessibility to the residents in the area. This windstorm caused power to be out for up to several days in parts of Greenfield. Other roads that were affected include New Boston, Riverbend, Colonial and Old Lyndeborough Roads. No other significant high wind events have struck Greenfield since the prior hazard mitigation plan.

Tornadoes & Downbursts

The biggest difference between tornadoes, microbursts and macrobursts is the direction, size and the location that the wind comes from, but all can cause significant damage. A tornado generally covers a large area, perhaps even several miles. It has winds that blow in a circular fashion leaving behind downed trees that lie in a swirling pattern. Straight-line winds and winds that burst downward are indicative of a microburst; the fallen trees that are left behind lay in roughly the same direction. A microburst must be 2.5 miles in width or less, whereas a macroburst is a similar wind event that is greater than 2.5 miles wide and generally lasts longer than a microburst.

In Greenfield, a microburst would be more likely than a tornado. Microbursts are becoming more common and often result in damage. The Greenfield hazard mitigation planning team did not report the occurrence of any microbursts since the last hazard mitigation plan.

The 2014 Greenfield hazard mitigation plan mentions a tornado in 1999 which destroyed one barn and through research, it was determined that multiple tornadoes have struck Hillsborough County since 1956. All of these tornadoes were F1 and F2 tornadoes (see Table 3.2 for complete list); one of which caused damage in Greenfield at American Steel, the DPW Garage and the Recycling Center in 1997.

Although the incidence of downbursts is becoming more common, damaging high wind events are relatively uncommon natural hazards in New Hampshire. On average only about six tornadoes touch down each year. Damage from high wind events largely depends on where the hazard strikes. If a high wind event were to strike a densely populated or commercial area, the impact could be significant and could result in personal injury and property damage. However, due to the rareness of tornadoes and the localized nature of downbursts and high wind events, the potential loss value was determined to be between 0% and 1%.

6) LIGHTNING

Hazard Identification & Risk Assessment (HIRA)	Medium
Probability	Moderate
Estimated Structure Loss Value	\$0 to \$1,028,606

Lightning

Severe lightning as a result of summer storms or as a residual effect from hurricanes and tornadoes has occurred in Greenfield. Some of the town's structures are older and historic buildings, as detailed in Table 4.3 and the town is also host to a variety of recreation and camping venues.

Many vulnerable structures are surrounded by forest. Dry timber on the forest floor, some of which remains from the 2008 Ice Storm, and the age of many buildings and out-buildings combined with lightning strikes can pose a significant disaster threat. Lightning could do damage to specific structures, injure or kill an individual, but the direct damage would not be widespread.

Although lightning is a potential problem, the town reports few occurrences, none of which were severe. During the summer of 2018, while residents were enjoying a concert on the Common, a loud crash was heard and was assumed to be lightning striking somewhere in the community; the result was power outages in parts of town. In another instance in October 2018, lightning struck a tree which caught on fire. Lightning has also struck Crotched Mountain Rehabilitation Center taking out their fire alarm system. Greenfield has no golf courses, reducing the risk that lightning might strike a person. No significant and damaging lightning strikes have occurred in Greenfield since the prior hazard mitigation plan.

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

Hail

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

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

7) WILDFIRES

Hazard Identification & Risk Assessment (HIRA)	Medium
Probability	Low
Estimated Structure Loss Value	\$1,028,606 to \$5,143,030

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

Any wildfire discussion must include a discussion of the Wildland Urban Interface (WUI). The WUI can be determined in a variety of ways; however it basically represents the area in which the forest and human habitation intersect. At times the WUI is defined as the area out of reach of available fire hoses and water resources, while others times it is determined to be areas with substantial tree cover and limited egress. For many New Hampshire communities, entire towns are considered to be in the WUI because of the abundance of hardwood and softwood trees. In more populated areas, the WUI is often determined to be in densely populated neighborhoods where a large canopy of old-growth trees and limited access make people and structures more vulnerable. All structures within the WUI are generally assumed to be at some level of risk and therefore, vulnerable to wildfire. See page 58 for a more detailed description and a map indicating one method of determining the WUI.

The potential exists for wildfires throughout Greenfield; Greenfield State Park and other campgrounds within the community are likely places where human interaction with the forest (WUI) can present the right conditions for out-of-control fires, particularly during drought conditions. Currently available documentation on fires in Greenfield and New Hampshire indicates that the majority of fires are human-caused; however no significant wildfires have occurred in Greenfield since the last hazard mitigation plan. It is noted that the slash that remains on the forest floor since the 2008 Ice Storm provides fuels for fast-burning fires and that as more subdivisions and single homes are constructed, the probability of wildfires increases.

The team described the forests of Greenfield 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.”*¹⁹ Burn permits are required in Greenfield, as they are throughout the state, but often burning takes place without the proper permits. The steep terrain and heavily forested areas of the town are difficult to monitor, therefore the occasional unauthorized burn will take place.

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

Fortunately, large wildfires in New Hampshire have been relatively uncommon; however four large fires have occurred in the state in since 2015, the Stoddard Fire in Stoddard, the Dilly Cliff Fire in Woodstock, the Covered Bridge Fire in Albany and the Bayle Mountain Fire in Ossipee. No large fires have occurred in Greenfield, however, given the right set of conditions (drought, lightning, human interface), the potential for large wildfires is good. Because the Town of Greenfield is heavily forested, the potential loss value was determined to be between 1% and 5% of the total assessed structure value.

8) TROPICAL & POST-TROPICAL CYCLONES

Hazard Identification & Risk Assessment (HIRA)	Medium
Probability	Low
Estimated Structure Loss Value	\$0 to \$1,028,606

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

¹⁹ <http://www.fs.fed.us/nwacfire/home/terminology.html>

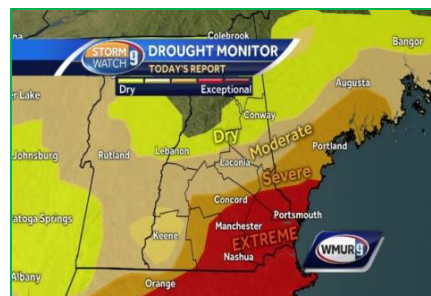
Unlike other parts of New Hampshire and Vermont which received considerable damage during Tropical Storm Irene in 2011, Irene brought heavy rain to Greenfield but no significant flooding or road damage. Tropical Storm Sandy in 2012 also brought significant rainfall to the region, but once again, no significant flooding or road damage was reported.

The probability that a tropical and post-tropical cyclone would remain a Category 1 or greater in this part of the state is low. Therefore, the potential loss value due to tropical and post-tropical cyclones was determined to be between 0% and 1% of the total assessed structure value.

9) DROUGHT

Hazard Identification & Risk Assessment (HIRA)	Medium
Probability	Moderate
Estimated Structure Loss Value	\$0 to \$1,028,606

An extended period without precipitation, or drought, could elevate the risk for wildfire and blow-downs in the forested areas of the community and with an extreme drought, the water supply and aquifer levels could be threatened. All of Greenfield's residents rely on private wells. Fortunately, significant droughts rarely occur in New Hampshire or Greenfield. According to the NH Department of Environmental Services, only seven significant droughts had occurred since 1929²⁰ including the drought of 2016.



WMUR Archives; September 15, 2016

The 2016 drought in New Hampshire was significantly worse in the southern part of the state than in the northern region. The image above from WMUR-TV in September 2016 shows drought conditions in New Hampshire during the summer of 2016²¹. Although the 2016 was more significant in the eastern part of the state, Greenfield and Hillsborough County were at the edge of the most extreme drought region.

The Greenfield hazard mitigation team reported that about 5% of the wells in town, both artesian and dug, went dry during the 2016 drought. In addition, the Fire Department reported a higher incidence of small brush fires as a result of the drought conditions. The team also reported that one artesian well "services" several important structures in Greenfield: the Town Office & Police Department, the Meeting House and the Old Town Office. Greenfield is not a heavily farmed community, but even small hobby farms experienced difficulty during the 2016 drought.

The 2016 drought continued into 2017 with dry conditions throughout the summer in some communities, but the impact was not as significant as the prior year. Fortunately, there are no longer drought conditions in New Hampshire.

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

²⁰ NH DES; <http://des.nh.gov/organization/divisions/water/dam/drought/documents/historical.pdf>

²¹ <https://www.wmur.com/article/extreme-drought-conditions-worsen-in-new-hampshire/5269231>

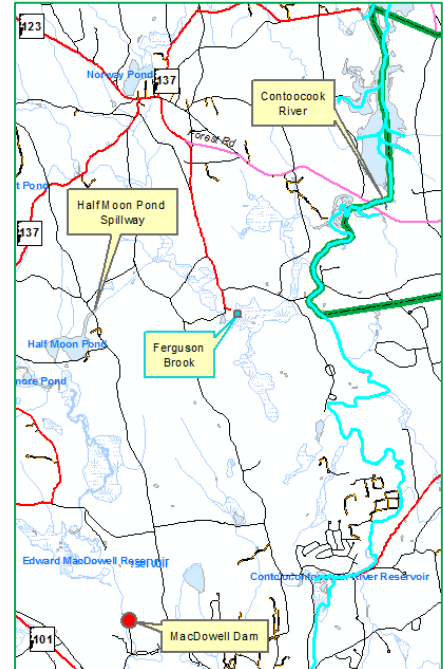
10) DAM FAILURE

Hazard Identification & Risk Assessment (HIRA) Medium
 Probability Very Low
 Estimated Structure Loss Value \$0 to \$1,028,606

NOTE: In the NH State Hazard Mitigation Plan, dam failure is considered a technological hazard. The Greenfield hazard mitigation planning team requested that dam failure be a considered a natural hazard; therefore for this plan, dam failure is in the natural hazards category.

Dam failure is a concern in Greenfield, but primarily because of the MacDowell Dam in Peterborough (red dot on map to the right) which was built and is maintained by the US Army Corps of Engineers (USACE). Construction on the MacDowell Dam began in 1948 and was completed in 1950 as part of a five-dam system of dams to reduce flooding in this area of New Hampshire and along the Contoocook River. As of September 2011, "...The project (MacDowell Dam and Lake), has prevented 20.8 million in flood damages since it was built"²².

As shown in the map to the right by a green boundary line, the Town of Greenfield's northwestern border follows along the Contoocook River (blue line). It appears in the map that the MacDowell Dam is some distance from Greenfield; in fact the spillway for the dam is 3.2 miles northeast of MacDowell at Half Moon Pond. The concern in Greenfield is the overflow of the spillway, which feeds the Ferguson Brook and discharges into the Contoocook River. A substantial overflow and rise of the Contoocook River has the potential to cause flooding in Greenfield and other communities along the Contoocook.



It was noted by the team that the spillway has only been used a few times in recent history and on each occasion the dam and spillway have successfully prevented flooding. Based on the unlikelihood of an overflow of the spillway, the estimated structure loss value was determined to be between 0% and 1% of the total estimated structure value.

11) EARTHQUAKES

Hazard Identification & Risk Assessment (HIRA) Low
 Probability Very Low
 Estimated Structure Loss Value \$1,028,606 to \$5,143,030

Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric and phone lines and are often associated with landslides and flash floods. Two earthquakes with a magnitude greater than 5.0 have occurred in New Hampshire since 1940, both of which occurred in Ossipee in December of 1940 (5.5-5.8). Three earthquakes with a magnitude greater than 4.0 have occurred in the state since 1982, one in Laconia (4.0), one in Berlin in 1988 (4.0) and another in Berlin in 1989 (4.1). The most recent earthquake to be felt by many New Hampshire residents occurred in October 2012 with its epicenter in nearby Hollis Center, ME. The team



²² <https://www.nae.usace.army.mil/Missions/Civil-Works/Flood-Risk-Management/New-Hampshire/Edward-Mac/>

noted that this earthquake was felt in Greenfield but no damage occurred; the team also noted that the septic tank at the fire station in the neighboring town of Lyndeborough cracked as a result of this tremor.

It is well documented that there are fault lines running throughout New Hampshire, but high magnitude earthquakes have not been frequent in New Hampshire history. More recently, many small earthquakes have occurred, but none of these were felt in Greenfield (see Table 3.2) with the exception of the 2012 earthquake in Maine.

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



Photo: Greenfield Fire Department

Photo Credit: Town of Greenfield; <https://www.greenfield-nh.gov/fire-department>

D. TECHNOLOGICAL HAZARDS

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

1) AGING INFRASTRUCTURE

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

*"Infrastructure is the backbone of our community. While we don't always acknowledge it, the condition of our infrastructure has a very real impact on our lives. We all depend on roads and bridges to get us where we are going, water infrastructure that delivers clean on-demand water, electricity to light our home and office, and schools that will facilitate a learning environment."*²³

Aging infrastructure is the continued deterioration of roads, bridges, culverts, ports, railroads, waste water facilities, airports, dams, utilities and public water and sewage systems. The American Society of Civil Engineers gave NH a C- rating overall in its 2017 report card.²⁴ The State Multi-hazard Mitigation Plan states that the average lifespan of a bridge is 50 years; the current average age of state-owned bridges in New Hampshire is 52-56 years.²⁵

²³ <https://www.infrastructurereportcard.org/wp-content/uploads/2016/10/2017-NH-Report-Card-hq-with-cover.pdf>

²⁴ Ibid

²⁵ NH Multi-hazard Mitigation Plan, 2018, page 156

Aging infrastructure is a concern in Greenfield as it is throughout New Hampshire and the United States. In Greenfield, of particular concern are the many culverts throughout the town. Although a couple of bridges in the community have been shut down, there are currently no red-listed bridges or bridges needing repair in Greenfield.

There is however one bridge that warrants some discussion, the Cavender Road Bridge over the Contoocook River. As stated by the Selectmen's Report by Paul F. Brooks, Chairman in the 1983 Annual Report,

"It is with regret that we will have to close the Cavender Road Bridge over the Contoocook River. The State recommended closure in a letter to Greenfield and Hancock dated November 19, 1982. At that time the cost of a replacement bridge built to modern standards was estimated to be \$520,000 which appeared to be too much of a tax burden on these towns. Steps will be taken to investigate the possibility of State and Federal Aid which will make it possible to reopen this landmark."

The Cavender Road Bridge has remained closed since 1983, as no agreement between the towns of Hancock and Greenfield has been reached to fund the replacement of the bridge. The problem that exists is that 15-20 homes or 50-75 people could be left stranded and inaccessible by emergency response should a flood or wildfire event cause the closure of Cavender Road. In addition, residents on Cavender Road have potential for flooding should the MacDowell Dam spillway fail.

One of the difficulties in replacing and repair this bridge, besides the cost, is the importance of this being a two-town solution. A new bridge would provide better access to residents on the Greenfield side of the river but doesn't appear to have an equivalent advantage for Hancock. The team has included Action Item #39 in this plan to attempt to gain support for this effort.



**Cavender Road Bridge &
Neighborhood**

2) HAZARDOUS MATERIALS

Hazard Identification & Risk Assessment (HIRA) High
 Probability Low

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.

Greenfield has several areas that were noted as susceptible to damage from a fixed hazardous material event. These include, but are not limited to American Steel where chemicals, acetylene cylinders and torches, a 10,000 gallon liquid propane tank and a 500-gallon diesel tank are located. An explosion at American Steel would affect both the Greenfield Highway Garage and the town's transfer station. The Department of Public Works also has a 500-gallon diesel tank and the Fire Department maintains two 250-gallon tanks of diesel; however the risk at these locations is minimal.

Other locations in Greenfield which the Fire Department is mindful of include Crotched Mountain Rehabilitation Center, Barbara C. Harris Conference Center and local transformers and switching stations. All Tier II properties within Greenfield have the potential for some sort of hazardous materials incident.

If ignition of hazardous materials took place, entire buildings could be susceptible to explosion and fire. If a large explosion were to occur at American Steel, the disruption to business and traffic control would be significant. The resulting losses could be substantial, not only in terms of structure loss but also loss of business revenue for local merchants.

3) LONG TERM UTILITY OUTAGE

Hazard Identification & Risk Assessment (HIRA) High
 Probability Moderate

Long term utility outages of five or more days have occurred in Greenfield, both as a result of local line damage from high winds and storms and problems with the power grid; some electric poles in Greenfield are accessible only by foot. Greenfield is serviced by one power company, Eversource.

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 (17% of the population), handicapped, or poor (7.4% of the population). The team reported that long term power outages have diminished as a result of continued efforts by public utility companies to trim trees and branches near power lines, but the problem still exists.

As a result of the 2008 ice storm, outages in Greenfield lasted for up to two weeks, depending on the location in town. The continued efforts by Eversource, NH DOT and the Department of Public Works to trim trees and branches near power lines has helped diminish the likelihood of a long term utility outage. The team reported that there have been no outages longer than three days since the 2008 ice storm.

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

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

4) CONFLAGRATION

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

“Conflagration is an uncontrolled burning that threatens human life, health, property or ecology. A conflagration can be accidentally or intentionally created.”²⁶

In Greenfield, the risk of a large uncontrolled fire is particularly threatening in the downtown or village area where there is a higher density of older properties and business facilities. These factors, when combined with high winds and a lack of water resources, could potentially result in a large uncontrolled fire that could spread from building to building across Greenfield Village. A large fire of this sort could result in explosion(s), affect the transportation infrastructure, hamper communication and power systems and shut down the numerous businesses in the area.

The impact to communication, power and transportation would likely be temporary, but damage to homes and businesses could be significant.

5) RADIOLOGICAL

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

New Hampshire has one nuclear power plant, Seabrook Station Nuclear Power Plant in Seabrook. Seabrook Station has a 10-mile Emergency Planning Zone (EPZ) around which emergency planning is concentrated. The EPZ does not include the Town of Greenfield.²⁷

On the other hand, Vermont Yankee is just 50 miles away from Greenfield. Although Vermont Yankee is now closed and has been purchased by a private company, there are still some remaining radiological materials onsite. The hope is that the new owners will clean up the site, turning it into a “model” cleanup site for the rest of the world.

Greenfield is at little risk for a radiological event, but the team felt it worthwhile to mention Vermont Yankee and the cleanup operations that are expected there. If an actual event occurred at Vermont Yankee, the need for evacuation would be driven by weather and wind conditions as advised by both the States of Vermont and New Hampshire and based on the actual damages and threats that occur.

²⁶ Fire Definitions; HotAsBlazes.com

²⁷ NH Department of Safety, HSEM; Nuclear Power Plants; <http://www.nh.gov/safety/divisions/hsem/nuclearpowerplants/index.html>

6) KNOWN & EMERGING CONTAMINATES

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

Known contaminants in drinking water occur naturally or when introduced by man. Emerging contaminants are those that have not been historically monitored due to either lack of laboratory capabilities or an understanding of the risk that may be posed for human health. Contaminates can result in a variety of impacts that include, but are not limited to damage to the environment and local flora and fauna, a reduction in land values, a need for more robust water treatment equipment, restrictions on the use of public water sources and an increase in short and long term health issues.²⁸

Naturally occurring contaminants could include trace elements such as arsenic, lead, manganese and uranium. The most concerning of these to private well water is arsenic, which is naturally occurring and quite common in ground water. The NH State Multi-hazard Mitigation Plan states that “...*health studies of New Hampshire residents have demonstrated the connection between arsenic and the increased prevalence of conditions such as bladder and other cancers and developmental effects on children.*”²⁹

Man-made contaminants generally include compounds such as pesticides and metals that have impacted the groundwater and/or surface water. Hazardous materials spills and other accidental introductions of chemicals into ground and surface water have the potential to significantly affect the safety of public and private water supplies.

Emerging contaminants, such as poly or perfluoroalkyl substances (PFAs) have also been found in ground and surface water in New Hampshire. Additional emerging contaminants, such as Methyl Tertiary Butyl Ether (MtBE) have also been found. Increased public awareness and testing of PFAs and MtBEs is helping to counteract the effects of emerging contaminants.

In Greenfield, contamination of the aquifer with radon or arsenic is a concern as all residents of the community rely on wells for drinking water. Testing by individual homeowners for known and emerging contaminants has been encouraged by the Town of Greenfield.

²⁸ NH Multi-hazard Mitigation Plan-2018

²⁹ Ibid

E. HUMAN-CAUSED HAZARDS

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

1) TRANSPORT ACCIDENTS

Hazard Identification & Risk Assessment (HIRA) High
Probability Moderate

Many of Greenfield's roads are narrow and winding and subject to severe winter weather; when affected by flooding, winter snow conditions and ice they become treacherous. In these conditions, vehicular accidents, wildlife collisions and truck accidents involving hazardous materials are always a possibility. All roadways in Greenfield are susceptible to hazards such as road flooding and high winds leading to downed trees in the roadways and potential hazardous materials spills. A HazMat accident near Greenfield's waterways could also cause contamination of the aquifer and the water supply.



The possibility of vehicular accidents involving hazardous materials is identified as a significant hazard in Greenfield. In particular, NH Route 31, which runs roughly north-south through the entire town, experiences heavy truck and vehicular traffic daily. Factors affecting the likelihood of a vehicular accident involving hazardous material include icy roads, wildlife collisions, snow accumulation, heavy rains and other environmental factors. Trucks and vans carry fuel and other goods to homes throughout Greenfield; the contents of these vehicles are rarely known.

Depending on the location of a hazardous material accident, the losses could be quite high, both in property and structural damage. However, the losses are also expected to be localized and unlikely to happen in a densely populated part of town.

2) MASS CASUALTY INCIDENTS

Hazard Identification & Risk Assessment (HIRA) Medium
Probability Low

A Mass Casualty Incident (MCI) is a situation where the number of casualties exceeds the resources normally available locally. Mass Casualty Incidents have been known to occur as a result of bus, auto, train and aircraft accidents and as a result of natural hazards such as hurricanes, floods, earthquakes and tornadoes. Mass casualty incidents can also occur as a result of the inherent dangers of large crowds, particularly if combined with other hazards, such as windstorms or lightning.

In Greenfield an MCI could happen anywhere, but more likely on NH Routes 31 or 136, both of which are fairly heavily travelled. Routes 31 & 136 are long and winding and are subject to wildlife crossings and poor weather conditions. Also, students in grades 5-12 are transported by bus to the South Meadow School (grades 5-8) and to the ConVal Regional High School (grades 9-12) in Peterborough. In addition, Greenfield is home to Crotched Mountain Rehabilitation Center which uses mass transportation in its daily activities.

Greenfield's roads carry an extra amount of traffic, particularly during the summer months when volume is greater. The Barbara C. Harris Camp & Conference Center, Brantwood Camp, Greenfield State Park and other summer venues add to the risk for mass casualty incidents.

With the influx of tourists both in the summer and the winter, tour bus activity and the transport of children to and from Greenfield, an MCI is a very real possibility for the town.

3) TERRORISM & VIOLENCE

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

Terrorism is a fear throughout our country and the world, but Greenfield is not host to any known soft-targets. However, possible terrorist or violent events could occur in the local school, during disputes at the Greenfield State Park or elsewhere, in drug-related situations or as a result of domestic events. Home-grown violence, though not common, has the potential to take place anywhere in Greenfield.

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.

4) CYBER EVENTS

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

Presidential Policy Directive (PDD-41) describes a cyber incident as *"An event occurring on or conducted through a computer network that actually or imminently jeopardizes the integrity, confidentiality, or availability of computers, information or communications systems or networks, physical or virtual infrastructure controlled by computers or information systems, or information resident thereon. For purposes of this directive, a cyber incident may include vulnerability in an information system, system security procedures, internal controls, or implementation that could be exploited by a threat source."*³⁰

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

The Greenfield planning team did not report any cyber-attacks, but the threat is certainly real. Several communities in the State of New Hampshire have had their data held for ransom. Added security on computer networks and user education on cyber threats is important to protect sensitive town information and data.

³⁰ PDD-41; <https://obamawhitehouse.archives.gov/the-press-office/2016/07/26/presidential-policy-directive-united-states-cyber-incident>

Chapter 6: Current Policies, Plans & Mutual Aid

A. ANALYSIS OF EFFECTIVENESS OF CURRENT PROGRAMS

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

With the knowledge of what regulations Greenfield 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	Responsible Department	Effectiveness	Improvements or Changes Needed
The NH Emergency Notification System (ENS)	The town has established coordination with the NH Emergency Notification System (ENS) to alert residents of upcoming emergencies or hazardous events. The NH Emergency Notification System (ENS) is a reverse calling warning system that uses listed phone numbers. The ENS does not include cell and unlisted numbers or email addresses. The Greenfield Elementary School uses the "Power School" reverse calling system and is used for school activities as well as emergency notification.	Emergency Management Director	Good	Improvements Needed: The NH Emergency Notification System (ENS) 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 the ENS but this is deferred to provide public outreach to encourage all residents to contact NH ENS to add cell numbers, emails, and unlisted numbers and to verify information. Use the website, a possible brochure at the Town Office, social media platforms such the Greenfield Spirit or a sign up at Town Meeting. Action Item #4 (also in Table 7.1)

Current Program or Activity	Description	Responsible Department	Effectiveness	Improvements or Changes Needed
Capital Improvement Program (CIP)	A decision making tool used to plan and schedule town improvements over at least a six-year period. A CIP provides a suggested timeline for budgeting and implementing needed capital improvements.	Planning Board	Excellent	Improvements Needed: A review of the Greenfield Capital Improvement Program is a part of the annual budget review process. The CIP is reviewed to ensure that the goals of the program will be achieved to assist the town's departments with planned purchases or equipment and supplies. The process is working well and keeps the town on task. Deferred to do a complete review and update of the CIP in 2020 and to consider action items from this plan. Action Item #20 (also in Table 7.1)
Culvert & Stormwater Maintenance Plan	A Culvert & Stormwater Maintenance Plan includes an inventory of all culverts and ditches in the community along with a record of location, size, etc. The Greenfield Department of Public Works and the NH DOT cleans the drainage basins once a year and after major flooding events and culverts are repaired as needed.	Department of Public Works	Good (under-manned)	Improvements Needed: Although the Greenfield Department of Public Works does a good job cleaning and repairing drainage basins and culverts, a written Culvert & Stormwater Maintenance Plan should be developed to ensure continuity of actions and efficient stormwater management. This is deferred for continued monitoring and the development of a written Culvert & Stormwater Maintenance Plan detailing such items as the size, material, date of installation, recommended date for improvement, GPS location and any problems associated with the location (i.e. flooding). Several culverts and drainage systems in town need improvement. Action Items #7, #12, #21, #24, #26, #27, #33, #34, #36 & #39 (also in Table 7.1)
Tree Removal Program	Tree Removal Program to reduce damage from fallen trees and limbs to power lines and structures	Department of Public Works & Planning Board	Average	Improvements Needed: As trees become damaged and threaten power lines and structures on town roads, the Department of Public Works removes them. NH DOT and Eversource do this for state and town roads (if on electric lines) as needed. This is deferred to continue local tree removal efforts to help mitigate the effects of high wind events, road icing, wildfires, ice storms and other natural hazards. As part of the weekly road "patrol", inspect and determine if any trees along Greenfield's roads are structurally unsound and endeavor to remove them. Action Items #8 & #9 (also in Table 7.1)

Current Program or Activity	Description	Responsible Department	Effectiveness	Improvements or Changes Needed
Emergency Operations Plan (2017)	The Emergency Operations Plan identifies the response procedures and capabilities of the town in the event of a natural or human-caused disaster.	Emergency Management Director & All Other Departments	Excellent	Improvements Needed: The Greenfield Emergency Operations Plan (EOP) was last updated in 2017 and will need to be updated again in 2022. The new EOP will include an EOC Call Alert List as well as a detailed Resource Inventory List and Player Packets. This is deferred to this plan to update the EOP. Action Item #40 (also in Table 7.1)
Master Plan (2017)	The Master Plan is a planning document used to ensure that overall development in Town is sustainable and that it meets the needs of the citizens by setting forth steps and guidelines for a sound living environment through well-planned growth.	Planning Board	Good	Improvements Needed: The Greenfield Master Plan was last updated in 2017. The recommended complete update of this plan is not due until 2027 which is outside of the scope of this plan. However, this is deferred to consider adding a Natural Hazards Section and mitigation action items from this plan in any future update or annual review. Action Item #17 (also in Table 7.1)
Public Education & Awareness	The Town of Greenfield is very well situated to provide public information and outreach to its citizens through a variety of means.	Emergency Management Director & Other Departments	Good	Improvements Needed: The town has a website with some emergency-related links, but there is no emergency webpage. An emergency webpage 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. This is deferred to this plan to develop and provide robust information and links on an "Emergency Webpage" to educate the public on general and seasonal mitigation techniques. The town also has the ability to get mitigation information out via social media platforms such as Facebook (Library & Fire Department) and the Greenfield Spirit. Action Item #2 (also in Table 7.1)
National Flood Insurance Program (NFIP) & Flood Ordinance	The minimum National Flood Insurance Program (NFIP) requirements (Section 60.3(c)) have been adopted. Greenfield has been a member of the NFIP since May 1, 1980. The Flood Ordinance regulates all new and substantially improved structures located in the 100-year floodplain, as identified on the FEMA Flood Maps dated September 25, 2009.	Building Inspector / Code Enforcement Officer & Planning Board	Good	Improvements Needed: The town's Flood Ordinance works well to successfully prohibit or force compliance to the ordinance for building and substantial improvements to structures within the FEMA flood zone. This is deferred to this plan to continue compliance with the National Flood Insurance Program, obtain NFIP brochures to have available at the Town Office and to provide public outreach regarding the benefits of membership in the NFIP, whether or not properties are in the FEMA floodplain. Also deferred to provide robust information on flood mitigation techniques that can be taken to protect individual homes and properties and links to the NFIP, ready.gov and other pertinent websites. Action Item #5 (also in Table 7.1)

Current Program or Activity	Description	Responsible Department	Effectiveness	Improvements or Changes Needed
Fire Department Training	Fire Department & EMS personnel receive continuous training addressing EMS and all aspects of firefighting including wildfire attack strategies.	Fire Department & the Academy of First Response	Excellent	Improvements Needed: Training of all fire responders is coordinated by the Fire Chief and includes the many aspects of emergency response including EMS. Training is done through the Academy of First Response, Keene Mutual Aid and the Fire Academy, and by the Greenfield Fire Department. This is deferred to this plan for continue training through 2025. Action Items #14 & 15 (also in Table 7.1)
Emergency Generators	The town has emergency back-up power at many of the town's Critical Infrastructure & Key Resources (CIKR) including the Fire Station, the Town Office and the Police Station. The town would benefit from a permanent generator for the Elementary School (generator hook-up), the Library and the DPW garage (portable generator).	Emergency Management Director	Average	Improvements Needed: Although Greenfield has emergency backup power at many of the town's Critical Infrastructure & Key Resources (CIKR), the Elementary School (secondary shelter) only has a generator hook-up, the DPW only has a portable generator and the Library does not have a generator (possible shelter). This is deferred to obtain and install emergency generators at the Elementary School, the Library and the DPW garage to improve the effectiveness of these facilities during a disaster. Action Items #37, #38 and #41
Fire Pond/Dry Hydrant Management Plan Pressurized, Dry Hydrants & other Water Resources	Greenfield does not maintain public water; residents must rely on wells. There are pressurized hydrants at Crotched Mountain and dry hydrants are located in the community as well as multiple locations available for water drafting.	Fire Department	Good	Improvements Needed: Although the Fire Department does a good job maintaining hydrants and fire ponds, a written maintenance plan has not been established. This is deferred to this plan to not only continue maintenance of water resources but also to create a written inventory and plan for hydrant and fire pond maintenance in order to ensure water availability during wildfires. Note that Crotched Mountain maintains its own hydrants. Action Item #13
Town Portable Radio Systems	Narrow band radios. There is a disaster frequency that all departments use when there is an emergency.	Highway, Fire and Police Departments	Good	Improvements Needed: The Fire Department is working with Keene Mutual Aid to identify dead spots in town. The Police Department also has experienced dead spots in the community. Once identified, repeaters may be needed to increase coverage. Deferred to this plan to continue to explore dead spots and install repeaters where necessary to improve communications. Action Item #32

Current Program or Activity	Description	Responsible Department	Effectiveness	Improvements or Changes Needed
Burning Index	New Hampshire Forests & Lands (DNCR) has a burning index which measures the risk for wildfires and how likely fires are to start on a given day. It also evaluates the potential damages wildfires can create, the number of people that will be needed to fight it and the type of equipment that might be needed as well.	NH Hampshire Forests & Lands (DNCR) & Fire Warden	Good	Improvements Needed: The Fire Warden receives regular notification of the burning index via email from NH Forests & Lands. This is deferred to provide a daily update to the Fire Danger Sign located at the Fire Station. Action Item #30
Multi-Hazard Mitigation Plan (2014)	Identifies all known potential hazards, natural, man-made and wildland fires	Emergency Management Director	Excellent	Improvements Needed: The Greenfield Hazard Mitigation Plan (2014) is being updated with this plan. This is deferred to review this Hazard Mitigation Plan (2020) on an annual basis, to monitor the progress of "Action Items" and to fully update the plan again in 2025. Action Item #18
E- 911 Signage Compliance	E-911 signage compliance includes markers at driveway entrances that identify residence locations in conjunction with the E-911 alerting system.	Fire & Police Departments	Poor	Improvements Needed: The town is about 20% compliant with E-911 signage. This is deferred to this plan to consider ways to get this signage more compliant so that emergency responders can better assist the public at the time of need. Use public outreach opportunities such as the website or social media to promote better compliance or develop other means of establishing more compliance. Consider the creation of an ordinance or purchase and installation of signs by the town. Action Item #1
Zoning Ordinances (2017)	Regulations dealing with land use including rural, residential and agriculture and follow best practices for timber management. Constantly updated, they are considered current. Include drainage and infrastructure provisions.	Selectboard, Planning Board & Building Inspector / Code Enforcement Officer	Good	Improvements Needed: The Zoning Ordinance was last updated in 2017. The Zoning Ordinance is a working document that is reviewed and updated whenever an issue arises that needs the attention of the Planning or Selectboards. This is deferred for the Planning Board to review the Zoning Ordinance after the completion of this plan to integrate concepts, ideas and mitigation action items from this plan to diminish the impact from future hazards. Action Item #29

Current Program or Activity	Description	Responsible Department	Effectiveness	Improvements or Changes Needed
NH Amateur Radio Emergency Service	Amateur radio (ham radio) operators can be of great assistance to the town during emergency situations as an augment to the town's own communication resources.	Emergency Management Director	Poor	Improvements Needed: There is at least one ham radio operator in town who may be willing and able to assist Emergency Responders when needed. This is deferred to make contact with ham radio operator(s) to ensure to their availability to assist during an emergency. Action Item #31
NIMS & ICS Training	The National Incident Management System (NIMS) and the Incident Command System (ICS) provide training that can help ensure effective command, control, and communications during emergencies	Emergency Management Director	Average	Improvements Needed: NIMS & ICS training has been done by most first responders. Although this is preparedness, this is deferred 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
School Emergency Operations Plan (SEOP)	Ensures preparedness and response for school personnel and town emergency personnel in the instance of a major disaster in the school	Police, Fire & Emergency Management Director & School Board	Average	Improvements Needed: The Greenfield Elementary School's EOP has been updated to include current state terminology and will continue to be updated annually and to collaborate with the school on an annual basis with the development and training. Action Item #16
Hazardous Materials Response Team	A Hazardous Materials Response Team is a specialized team of individuals who have the skill and expertise to successfully manage HazMat related incidents.	Fire Department	Good	Improvements Needed: Although Greenfield does not have a HazMat Team, firefighters are trained in the basic response to a HazMat incident and are adept at maintaining perimeters until specialized teams arrive. Depending on the situation, the Greenfield Fire Department or EMD would call Keene Mutual Aid who would then contact the state to request an available HazMat Response Team. Although this is preparedness, the team chose to defer this to this plan to continue to provide HazMat training to emergency personnel. Action Item #15
MacDowell Dam (Peterborough) Emergency Operations Plan	Dam Emergency Operations Plans are designed to provide notification and evacuation procedures should a dam failure occur.	Army Corp of Engineers (USACE)	Excellent	No Improvements Needed: The town does have an updated copy of the MacDowell Dam Plan. Members of the team attended a workshop regarding the MacDowell Dam on May 17, 2019 and have obtained a copy of the dam plan and an update on floodplain mapping. (also in Table 7.1)

Current Program or Activity	Description	Responsible Department	Effectiveness	Improvements or Changes Needed
The Shoreland Water Quality Protection Act (SWQPA)	The Shoreland Water Quality Protection Act establishes minimum standards for the use and development of shorelands adjacent to the state's public water bodies. The Shoreland Water Quality Protection Act includes changes to vegetation requirements within the natural woodland and waterfront buffers, the impervious surface limitations and includes a new shoreland permit by notification process. The town requires 25-foot disturbance setback from all wetland soils in town and adheres to the SWQPA.	Building Inspector / Code Enforcement Officer & Planning Board	Good	No Improvements Needed: Greenfield has established regulations within the Zoning Ordinance (2017) which comply with the Shoreland Water Quality Protection Act (SWQPA) and which include setbacks as required by the state. The wetlands regulations work well and comply with current state and federal laws. (also in Table 7.1)
Mutual Aid Agreements (Fire, Police, Highway & EMS)	Mutual Aid agreements provide communications capabilities and cooperative assistance between area cities and towns; mutual aid provides access to resources that are appropriate to the scope of the emergency.	Fire/EMS, Police, & Highway Departments	Excellent	No Improvements Needed: The Greenfield Fire Department has a mutual aid agreement with the Keene Mutual Aid Association. The Police Department has agreements with the Hillsborough County Sheriff's Office, NH Fish & Game and the NH State Police (Troop B, Merrimack) if available along with other towns in Hillsborough County. The Department of Public Works is a member of the NH Public Works Mutual Aid Association. The Fire Department provides Emergency Medical Services and medical transportation is provided by Wilton Ambulance. All mutual aid systems in Greenfield work very well.
Life Safety & Fire Codes	The National Fire Protection Association (NFPA) life safety and fire codes provide life safety and fire guidance for all buildings in the community.	Fire Department & Building Inspector / Code Enforcement Officer	Good	No Improvements Needed: The National Fire Protection Association (NFPA) along with NH safety and fire codes provide guidance to Greenfield's Fire Department and Building Inspector/Code Enforcement Officer for inspection of all commercial and rental properties (3 units or more) in the community. The Fire Department and the Building Inspector/Code Enforcement Officer do the best they can to provide timely inspections based on available manpower.

Current Program or Activity	Description	Responsible Department	Effectiveness	Improvements or Changes Needed
State Health Department Public Health Plan	The "Influenza, Pandemic, Public Health Preparedness and Response Plan" written by State health department is designed to prepare for any public health emergency. The town is part of the Greater Monadnock Regional Public Health Network.	Greater Monadnock Regional Public Health Network, the Emergency Management Director & Health Officer	Good	No Improvements Needed: The Public Health Plan does what it is meant to do. The Health Officer and other town officials participate in regional public health meetings whenever possible.
Building Codes	The town has adopted International Building Codes (IBC) and requires builders to follow the codes for new construction to meet national standards for flood, wind, earthquake, fire and snow load.	Building Inspector / Code Enforcement Officer	Good	No Improvements Needed: The Town of Greenfield has a Building Inspector /Code Enforcement Officer. Building permits are required and the permitting process requires builders to abide by the International Building Codes (IBC) and the International Residential Codes (IRC) which have been adopted by the town. The system that is in place works as intended.
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 are set aside to ensure adequate funding to at least partially finance future projects, equipment and other expenditures.	Selectboard	Good	No Improvements Needed: The town's Capital Reserve Funds are set aside each year at budget time to assist the town's departments with planned purchases of equipment and supplies or in emergency situations. The Greenfield Capital Reserve Funds work well and are part of the town warrant at the annual Town Meeting.
Local Road and Driveway Design Standards ----- Steep Slopes Protection	Local standards are based on Average Daily Traffic (ADT) and provide specifications for the construction of new roads. New roads are built to state and town specifications. Driveway standards address slope and access to roadways. Greenfield is a member of the NH Public Works Mutual Aid Association.	Planning Board, Building Inspector / r & 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. The town will not assume ownership of substandard roads. Private roads to be taken over by the town must meet town specs and be approved through petition at Town Meeting. Greenfield's Road Design Standards work as intended.

Current Program or Activity	Description	Responsible Department	Effectiveness	Improvements or Changes Needed
Subdivision Regulations (2016)	The purpose of subdivision regulations is to provide for the orderly present and future development of the town by promoting the public health, safety, convenience and welfare of the town's residents.	Planning Board & Building Inspector / Code Enforcement Officer	Good	No Improvements Needed: The Greenfield Subdivision Regulations, most recently updated in 2016 are in good shape. The Subdivision Regulations address set-backs, road frontage, driveway steepness, stormwater flow and size of the lot. The regulations also address the availability of water resources for fire suppression. The Subdivision Regulations do what they are meant to do.
NH Forest and Lands & Fire Permits	NH Forest & Lands, a division of the NH Department of Natural & Cultural Resources (DNCR) regulates open burning and permits.	NH Forests & Lands (DNCR) & Local Fire Warden	Good	No Improvements Needed: The system that is in place with NH Forests & Lands (DNCR) and the local fire warden works well. The public is aware of fire permitting requirements and the ability to get permits online (\$3.00 fee required).
Site Plan Review Regulations	Regulations that ensure that uses permitted by zoning are constructed on a site in such a way that they fit into the area in which they are being constructed without causing drainage, traffic or lighting problems.	Selectboard, Planning Board & Building Inspector / Code Enforcement Officer	Good	No Improvements Needed: The town's stringent site plan review regulations apply to all residential, non-residential and multi-family homes; these regulations do what they are meant to do.



Photo: Greenfield Town Offices and Police Station

Photo Credit: Town of Greenfield; <https://www.greenfield-nh.gov/about-greenfield/slideshows/images-around-town>

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Chapter 7: Last Mitigation Plan

A. DATE OF LAST PLAN

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

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

COMPLETED

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

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

DELETED

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

DEFERRED

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

TABLE 7.1: ACCOMPLISHMENTS SINCE THE LAST PLAN

In *Table 7.1: Accomplishments since the Last Plan*, the team was able to assess what had been accomplished and to determine what additional work may be needed. Items in **red font** were extracted word-for-word from the 2014 Hazard Mitigation Plan and do not represent a time frame for this plan. Two additional columns that are not shown here – *Funding or Support* and *Time Frame* – can be found in the 2014 Hazard Mitigation Plan.

New Mitigation Project	Responsibility or Oversight	Completed, Deleted or Deferred
Continue to comply with the NFIP (floodplain management, outreach & education)	Selectmen, Planning Board	Partially Completed & Deferred: The town's Flood Ordinance works well to successfully prohibit or force compliance to the ordinance for building and substantial improvements to structures within the FEMA flood zone. This is deferred to this plan to comply with the National Flood Insurance Program, obtain NFIP brochures to have available at the Town Office and to provide public outreach regarding the benefits of membership in the NFIP, whether or not properties are in the FEMA floodplain. Also deferred to provide robust information on flood mitigation techniques that can be taken to protect individual homes and properties and links to the NFIP, ready.gov and other pertinent websites. Action Item #5 (also in Table 6.1)

New Mitigation Project	Responsibility or Oversight	Completed, Deleted or Deferred
The town will continue to update the CIP and zoning to provide protection for new buildings from flooding and other relevant hazards where necessary	Selectmen, Planning Board	Completed & Deferred: A review of the Greenfield Capital Improvement Program is a part of the annual budget review process. The CIP is reviewed to ensure that the goals of the program will be achieved to assist the town's departments with planned purchases or equipment and supplies. The process is working well and keeps the town on task. Deferred to do a complete review and update of the CIP in 2020 and to consider action items from this plan. Action Items #20 & #29 (also in Table 6.1)
Cornwell Road- Raise the Road	Department of Public Works	Deferred: The raising of Cornwell Road was not done due to oversight, funding and lack of time and manpower. A low section on Cornwell floods even though two culverts (36" x 35') are in place; the team felt that replacing culverts won't work. This is deferred again to engineer, fund and complete the raising of Cornwell Road to ensure that is passable all times. Action Item #26
Russell Station Rd- Replace the Culvert with a larger one	Department of Public Works	Completed & Deleted: Eleven culverts on Russell Station Road have been replaced and the road has been paved. This is deleted as this project has been completed using local money at a cost of approximately \$150K.
Dunklee Hill Rd- Replace culvert and raise the road	Department of Public Works	Deferred: This was not done due to oversight, time and funding. All the necessary permits are in to improve the culvert on Dunklee Road. The DPW is a replacing a 36" concrete/stone culvert with a new concrete 48" round culvert with fabricated headwalls, per state requirements. This will be completed using local funding at an estimated cost of \$25,000. Deferred to complete this project to improve the flow of stormwater. Action Item #24
County Road Reconstruction	Department of Public Works	Partially Completed & Deferred: The complete reconstruction of County Road was not done due to oversight, time and manpower. This is deferred to begin work towards reconstruction by reconstructing ditch-lines along the entire road. The town has begun the initial work to get this project started. It is anticipated that this project will cost more than the \$42,000 that was estimated in the 2014 plan. Action Item #27
Cavender Road – elevate road	Department of Public Works	Partially Completed & Deferred: Although elevation of Cavender Road has not started, the DPW ditched the entire road in 2018 to improve stormwater flow. This is deferred to continue to elevate the road by hauling in gravel. The town has an annual budget for "gravel" which will determine the priority of projects such as these. It is anticipated that this project will cost more than the \$15,000 that was estimated in the 2014 plan. Action Item #34
Swamp Road- elevate approximately 1,550' of road	Department of Public Works	Partially Completed & Deferred: A large culvert was replaced several years ago, but more work needs to be done on Swamp Road. This is deferred for the DPW to re-ditch the road, trim the brush and add gravel to elevate the road. Action Item #35
New Boston Road- culvert near Forest Road-	Department of Public Works	Completed & Deleted: The culvert on New Boston Road near Forest Road has been cleaned out, the headwall has been replaced and the area no longer floods. This is deleted as the project is complete.

New Mitigation Project	Responsibility or Oversight	Completed, Deleted or Deferred
Old Bennington Road (from Country Rd. to Forest Rd.) elevate	Department of Public Works	Partially Completed & Deferred: Although elevation of Old Bennington Road has not started, the DPW has done some work based on the gravel budget. This is deferred to continue to elevate Old Bennington Road by hauling in gravel. The town has an annual budget for "gravel" which will determine the priority of projects such as these. Action Item #33
School House Road-elevate	Department of Public Works	Partially Completed & Deferred: Although elevation of School House Road has not started, the DPW has done some work based on the gravel budget. This is deferred to continue to elevate School House Road by hauling in gravel. The town has an annual budget for "gravel" which will determine the priority of projects such as these. Action Item #36
Informational outreach for hazard mitigation and emergency management	Emergency Management Director & Emergency Personnel	Partially Completed & Deferred: The town has a website with some emergency-related links, but there is no emergency webpage. An emergency webpage 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. This is deferred to this plan to develop and provide robust information and links on an "Emergency Webpage" to educate the public on general and seasonal mitigation techniques. The town also has the ability to get mitigation information out via social media platforms such as Facebook (Library & Fire Department) and the Greenfield Spirit. Action Item #2 (also in Table 6.1)
Slash monitoring to prevent fires	Board of Selectmen, Town Forester	Partially Completed & Deferred: Although slash monitoring has been done in the past, this is deferred to this plan to continue to monitor slash on the forest floor. Utilize available resources including any assistance that can be gained from DNCR based on this plan's status as a Community Wildfire Protection Plan (CWPP). Action Item #23
Private culvert maintenance education program	Department of Public Works	Completed & Deferred: The town has an ordinance that requires homeowners to maintain their own culverts; the DPW will speak with homeowners who need to repair or maintain their culverts. This is deferred to continue to provide public education on the importance of maintaining privately owned culverts, perhaps using "The Greenfield Spirit", on the town's website or other social media platforms. Action Item #21
Campfire education	Fire Chief & Fire Warden	Partially Completed & Deferred: Although some campfire education has been done in the past, this is deferred to this plan to continue to provide public education to those persons requesting burn permits in person. Obtain and maintain a supply of Firewise® brochures or other pertinent fire-prevention documents at the Town Offices and the Fire Station and to be supplied by the Fire Warden. Add information to the town's website and through social media platforms that provides fire techniques residents can use to mitigate wildfires. Action Item #6
Have ample supplies and continue operation-level training of Fire and Police	Fire Chief & Police Chief	Partially Completed & Deferred: The Fire and Police Departments continue to maintain ample supplies for emergency response and continue training per recommendations. This is deferred for continued Fire, EMS and Police Training for this life of this plan. Action Item #14 (also in Table 6.1)

New Mitigation Project	Responsibility or Oversight	Completed, Deleted or Deferred
Continue all flooding hazard mitigation strategies	Department of Public Works	Completed & Deferred: The Greenfield Department of Public Works does a good job cleaning and repairing drainage basins and culverts, a written Culvert & Stormwater Maintenance Plan should be developed to ensure continuity of actions and efficient stormwater management. This is deferred for continued maintenance and the development of a written Culvert & Stormwater Maintenance Plan detailing such items as the size, material, date of installation, recommended date for improvement, GPS location and any problems associated with the location (i.e. flooding). Several culverts and drainage systems in town need improvement. Action Items #7, #12, #21, #24, #26, #27, #33, #34, #36 & #39 (also in Table 6.1)
Maintain emergency warning system for Town-wide notification	Emergency Management Director	Completed & Deferred: The NH Emergency Notification System (ENS) is an excellent warning system but it only stores resident phone numbers that are listed in the phone book. The town has provided information to residents on the ENS but this is deferred to continue to provide public outreach to encourage all residents to contact NH ENS to add cell numbers, emails, unlisted numbers and to verify information. Use the website, a possible brochure at the Town Office, social media platforms such the Greenfield Spirit or a sign up at Town Meeting. Action Item #4 (also in Table 6.1)
Add the Hazard Mitigation Plan Update as an appendix in the Master Plan.	Emergency Management Director	Completed & Deferred: The Greenfield Master Plan was last updated in 2017. The recommended complete update of this plan is not due until 2027 which is outside of the scope of this plan. However, this is deferred to consider adding a Natural Hazards Section and mitigation action items from this plan in any future update or annual review. Action Item #17 (also in Table 6.1)
Update the Emergency Operations Plan	Emergency Management Director	Completed & Deferred: The Greenfield Emergency Operations Plan (EOP) was last updated in 2017 and will need to be updated again in 2022. The new EOP will include an EOC Call Alert List as well as a detailed Resource Inventory List and Player Packets. This is deferred to this plan to update the EOP. Action Item #40 (also in Table 6.1)
Barbara C. Harris Center: Investigate hazards & property use during an event; obtain map of the grounds	Fire Chief	Deferred: The Fire Department has not investigated the Barbara C. Harris Center for potential hazards and has not obtained a floor plan. This is deferred to this plan to maintain annual inspections and to obtain a floor plan of the facilities to use in an emergency. Action Item #19
Beaver population control and monitoring plan	Department of Public Works/ Conservation Commission	Partially Completed & Deferred: The beaver population in Greenfield has increased and continues to cause flood problems in parts of the town. This is deferred for the DPW to continue to manage the beaver population using various methods that are available to them. Action Item #11
Obtain information from Peterborough on the MacDowell Dam	Emergency Management Director	Completed & Deleted: The town does have an updated copy of the MacDowell Dam Plan. Members of the team attended a workshop regarding the MacDowell Dam on May 17, 2019 and have obtained a copy of the dam plan and an update on floodplain mapping. (also in Table 6.1)

New Mitigation Project	Responsibility or Oversight	Completed, Deleted or Deferred
Wetlands protection regulations- revisit them to see if changes are necessary	Conservation /Planning Board	Completed & Deleted: Greenfield has established regulations within the Zoning Ordinance (2017) which comply with Shoreland Water Quality Protection Act (SWQPA) which include setbacks as required by the state. The wetlands regulations work well and comply with current state and federal laws. (also in Table 6.1)
Improve ditching along roads to improve stormwater management	Department of Public Works	Completed & Deferred: The Greenfield Department of Public Works re-ditches roughly ten roads per year to mitigate stormwater problems. This is deferred to this plan to continue to maintain a ditch maintenance program for the life of this plan. Action Items #7
Open roads to sunlight to prevent icing (pruning)	Department of Public Works/ Board of Selectmen	Completed & Deleted: Although the reason for this strategy from the prior plan was directed towards ice prevention, tree trimming as discussed in Action Item #8 in the plan also addresses ice prevention on Greenfield's roads. This is deleted as it is addressed in another action item. (also in Table 6.1)
Tree pruning near powerlines, roads, public structures	Department of Public Works/	Completed & Deferred: As trees become damaged and threaten power lines and structures on town roads, the Department of Public Works removes them. NH DOT and Eversource do this for state and town roads (if on electric lines) as needed. This is deferred to continue local tree removal efforts to help mitigate the effects of high wind events, road icing, wildfires, ice storms and other natural hazards. As part of the weekly road "patrol", inspect and determine if any trees along Greenfield's roads are structurally unsound and endeavor to remove them. Action Items #8 & #9 (also in Table 6.1)
Recommend to the Planning Board to consider requiring underground utilities for new subdivisions or site plans	Emergency Management Director	Deleted: This action item from the prior plan was discussed and determined that there was no appetite in town for requiring underground utilities. Most towns want less, not more, regulations. This is deleted as it is very doubtful this change in the subdivision regulations will ever be done.

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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

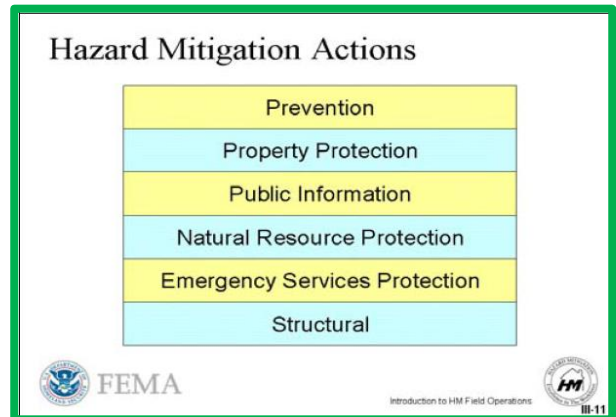
- Forest fire fuel reduction programs
- Special management regulations
- Fire Protection Codes NFPA 1
- Firewise® landscaping
- Culvert and hydrant maintenance
- Planning and zoning regulations
- Building Codes
- Density controls
- Driveway standards
- Slope development regulations
- Master Plan
- Capital 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
- National Flood Insurance Program (NFIP) awareness
- Public hazard notification
- Defensible space brochures

Emergency Service Protection

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



Property Protection

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

Natural Resource Protection

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

Structural Projects

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

B. POTENTIAL MITIGATION STRATEGIES BY HAZARD

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

Strategies that may apply to more than one hazard

Type of Project

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

Flood Mitigation Ideas

Type of Project

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

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

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

Thunderstorms & Lightning

- Building Construction Property Protection

Tornado & Severe Wind

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

Wildfire

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

Extreme Temperatures

- Warming & Cooling Stations Prevention

Winter Weather Snowstorms

- Snow Load Design Standards Property Protection

Subsidence

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

Earthquake

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

Drought

- Water Use Ordinances Prevention

C. STAPLEE METHODOLOGY

Table 8.1, *Potential Mitigation Items & the STAPLEE*, reflects the newly identified potential hazard mitigation action items as well as the results of the STAPLEE evaluation as explained below. It should also be noted that although some areas are identified as “All Hazards”, many of these would apply indirectly to wildfire response and capabilities. Many of these potential mitigation action items overlap.

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

The STAPLEE method analyzes the Social, Technical, Addministrative, Political, Legal, Economic and Environmental aspects of a project and is commonly used by public administration officials and planners for making planning decisions. The following questions were asked about the proposed mitigation action items discussed in Table 8.1.

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

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

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

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

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

Economic: What are the costs and benefits of this action item? Does the cost seem reasonable for the size of the problem and the likely benefits?

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

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

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

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

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

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

D. TEAM'S UNDERSTANDING OF HAZARD MITIGATION ACTION ITEMS

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

Also, it should be noted that the town understands that the action items for a town of 200 are not the same as the action items for a town of 30,000. In addition, the action items for a town in the middle of predominantly hardwood forests, are not the same as the action items for a town on the Jersey Shore. Therefore the Town of Greenfield 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.

Potential mitigation action items in Table 8.1 are listed in numerical order and indicate if they were derived from prior tables in this plan, i.e., (Table 7.1).

Items in green such as (MU14) represent mitigation action items taken from Mitigation Ideas, A Resource for Reducing Risk to Natural Hazards, FEMA, January 2013; see Appendix F: *Potential Mitigation Ideas*, for more information.

TABLE 8.1: POTENTIAL MITIGATION ACTION ITEMS & THE STAPLEE

Action Items are listed in numerical order.

Proposed Mitigation Action Items	Affected Location Type of Activity	S	T	A	P	L	E	E	TTL
Action Item #1: Improve 911 signage compliance so that emergency responders can better assist the public at the time of need. Possible ways to increase compliance may be through the purchase and possible installation of signs by the town, the creation of an ordinance with an associated fine or expanding public outreach opportunities via the town's website, the Greenfield Spirit and available social media platforms. (MU14) (Table 6.1)	Affected Location Townwide Type of Activity Prevention Public Education & Awareness Emergency Service Protection Property Protection Natural Resource Protection	3	3	2	2	2	2	3	17
		Administrative: Will need staff to do this Political: Some people do not want signs on their properties Legal: The town cannot require signs on private property Economical: Budget constraints if town purchases and installs signs							

Proposed Mitigation Action Items	Affected Location Type of Activity	S	T	A	P	L	E	E	TTL
Action Item #2: Provide robust information on a town emergency webpage, within the Greenfield Spirit and other social media platforms for educating the public on hazard mitigation and preparedness measures (MU14). Add an emergency preparedness webpage to the town's website a 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). Provide public education on healthy living to prevent infectious disease and links to public health websites. Develop ways to provide notification to citizens. (Tables 6.1 & 7.1)	Affected Location Townwide Type of Activity Prevention Public Education & Awareness	3	3	3	3	3	3	3	21
		No apparent difficulty with this action item							
Action Item #3: The Emergency management Director (EMD) to encourage all town officials who may be required to respond to an emergency and any new emergency responders to take NIMS 700 (S-700) & ICS (ISC100 & ISC200); additional, the EMD and other vital emergency responders to learn about and become adept with WEB-EOC. (Table 6.1)	Affected Location Townwide Type of Activity Prevention Emergency Service Protection Property Protection Natural Resource Protection	3	3	3	3	3	3	3	21
		No apparent difficulty with this action item							
Action Item #4: Provide public outreach to encourage all residents to contact the NH Emergency Notification System (ENS) (CodeRED) to add cell numbers, unlisted numbers, emails and to verify information; use the website, a possible brochure, the Greenfield Spirit, available social media platforms or a sign up at Town Meeting. (MU14) (Tables 6.1 & 7.1)	Affected Location Townwide Type of Activity Prevention Public Education & Awareness Emergency Service Protection Property Protection Natural Resource Protection	3	3	3	3	3	3	3	21
		No apparent difficulty with this action item							

Proposed Mitigation Action Items	Affected Location Type of Activity	S	T	A	P	L	E	E	TTL
Action Item #5: Advise the public about the local flood hazard, flood insurance and flood protection measures (F10) by obtaining and keeping on hand a supply of NFIP brochures to have available in the Town Offices; give NFIP materials to homeowners and builders when proposing new development or substantial improvements; encourage property owners to purchase flood insurance (F22), whether or not they are in the flood zone and provide appropriate links to the NFIP and Ready.gov on the Emergency webpage or available Facebook pages; through Public Outreach, educate homeowners regarding the risks of building in the flood zone and measures that can be taken to reduce the chance of flooding, such as securing debris, propane tanks, yard items or stored objects that may otherwise be swept away, damaged, or pose a hazard if picked up and washed away by floodwaters; add links and info to website and available Facebook pages as well as the Greenfield Spirit; actively work with residents to ensure they are in compliance with the town's Floodplain Ordinance. (F23) (Tables 6.1 & 7.1)	Affected Location Townwide Type of Activity Prevention Public Education & Awareness Emergency Service Protection Property Protection Natural Resource Protection	3	3	3	3	3	3	3	21
No apparent difficulty with this action item									
Action Item #6: Post important information on the town's Emergency website and/or the Greenfield Spirit regarding red flag burning days. Obtain and have available Firewise® brochures to educate homeowners on methods to reduce fire risk around their homes (WF10) and provide a link to Firewise® on the Emergency page of the town's website. Provide Firewise® brochures to those residents seeking burn permits (if not obtained on-line). 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)	Affected Location Townwide Type of Activity Prevention Public Education & Awareness Emergency Service Protection Property Protection Natural Resource Protection	3	3	3	3	3	3	3	21
No apparent difficulty with this action item									
Action Item #7: Proactively develop a ditch repair program to mitigate stormwater problems before they arise; add water bars to roadways, or cut-outs, were necessary to improve the flow of stormwater. (F5, F13 & F14) (Table 7.1)	Affected Location Townwide Type of Activity Prevention Emergency Service Protection Property Protection Natural Resource Protection	3	3	3	3	3	3	3	21
No apparent difficulty with this action item									

Proposed Mitigation Action Items	Affected Location Type of Activity	S	T	A	P	L	E	E	TTL
Action Item #8: In addition to work that is done by and with local utility companies, monitor brush cutting, drainage system maintenance and tree removal as part of a tree removal program and create defensible space around power lines, oil and gas lines and other infrastructure; work to reduce wildfire risk by clearing dead vegetation, cutting high grass and other fuel loads in the community. Assess and manage areas of the town that could benefit from a canopy reduction to allow more sunlight to prevent icy roadways. (SW4, WF7, WF9 & F14) (Tables 6.1 & 7.1)	Affected Location Townwide Type of Activity Prevention Public Education & Awareness Emergency Service Protection Property Protection Natural Resource Protection	3	3	3	3	3	3	3	21
		No apparent difficulty with this action item							
Action Item #9: Lobby the state to trim not only under and around power lines but also on the opposite side of roads in an effort to mitigate power loss during hazard events. (SW4, WF7, WF9 & F14)	Affected Location Townwide Type of Activity Prevention	3	3	3	2	3	3	3	20
		Political: Some will not want trees to be removed							
Action Item #10: Lobby the state to mitigate the dangerous situation on NH Route 136 at the railroad crossing; the area could use more signage at this time but a long term solution would involve an engineering study and rebuild of the crossing.	Affected Location Railroad Crossing on NH Route 136 Type of Activity Prevention	3	3	3	3	3	3	3	21
		No apparent difficulty with this action item							
Action Item #11: Work with homeowners, DES, local trappers and other authorities to improve the flow of stormwater in locations where beavers have created flood issues; "manage" the beaver population by removal or relocation. (F13) (Table 7.1)	Affected Location Townwide Type of Activity Prevention Emergency Service Protection Property Protection Natural Resource Protection	3	3	3	3	3	3	2	20
		Environmental: Some may feel that the beaver population should be left alone							
Action Item #12: Repair and upgrade culverts and ditches in the community and develop a written stormwater maintenance plan in order to ensure more efficient stormwater management. This inventory should include the location, date of installation, GPS coordinates, material, type, size, age and expected replacement date of all culverts, catch basins and drainage ditches in the community. (F5) (Tables 6.1 & 7.1)	Affected Location Townwide Type of Activity Prevention Public Education & Awareness Emergency Service Protection Property Protection Natural Resource Protection	3	3	2	3	3	2	3	19
		Administrative: Possible staffing problems, may have to hire additional staff or outside contractors Economical: Budget constraints if hiring is needed to complete project							

Proposed Mitigation Action Items	Affected Location Type of Activity	S	T	A	P	L	E	E	TTL
Action Item #13: Monitor Greenfield's available water resources for fire suppression including any drafting sites, fire ponds and dry hydrants and create and keep a written inventory and plan for hydrant and fire pond maintenance in order to ensure water availability during wildfires. In addition, identify locations in the town that would benefit from the installation of dry hydrants, cisterns or fire ponds. Work with local land owners to gain access to available water resources for drafting and/or dry hydrants. (WF8, MU12 & MU13) (Table 6.1)	Affected Location Townwide Type of Activity Prevention Emergency Service Protection Property Protection Natural Resource Protection	3	3	3	3	3	3	3	21
No apparent difficulty with this action item									
Action Item #14: Train all Greenfield Emergency Responders (Fire, DPW, EMD & Police) according to recommended training schedules from mutual aid departments, NH training academies and by the respective chief of each department. Although this is preparedness, not mitigation, training was felt to be important enough to keep in this plan. (Tables 6.1 & 7.1)	Affected Location Townwide Type of Activity Prevention Emergency Service Protection Property Protection Natural Resource Protection	3	3	3	3	3	3	3	21
No apparent difficulty with this action item									
Action Item #15: Provide HazMat training for the members of the Greenfield Fire Department and others who may respond to a HazMat incident. Although this is preparedness, not mitigation, training was felt to be important enough to keep in this plan.	Affected Location Townwide Type of Activity Prevention Emergency Service Protection Property Protection Natural Resource Protection	3	3	3	3	3	3	3	21
No apparent difficulty with this action item									
Action Item #16: Work with the Greenfield Elementary School to update the School's EOP on an annual basis and to provide training and/or drills with school personnel to ensure the emergency response. (MU6) (Table 6.1)	Affected Location Greenfield Elementary School Type of Activity Prevention Emergency Service Protection Property Protection Natural Resource Protection	3	3	2	3	3	3	3	20
Administrative: The school EOP needs additional input from Greenfield emergency responders									
Action Item #17: Review this Hazard Mitigation Plan whenever an annual review of the Master Plan is done and consider the incorporation of a Natural Hazards section and mitigation action items from this plan. (MU6) (Tables 6.1 & 7.1)	Affected Location Townwide Type of Activity Prevention	3	3	3	3	3	3	3	21
No apparent difficulty with this action item									
Action Item #18: Provide an annual review of the Greenfield Hazard Mitigation Plan Update 2020 including a review of the status of "Action Items" listed in this plan to encourage completion; get approval from the local elected body on an annual basis. (MU11) (Table 6.1)	Affected Location Townwide Type of Activity —Prevention	3	3	3	3	3	3	3	21
No apparent difficulty with this action item									

Proposed Mitigation Action Items	Affected Location Type of Activity	S	T	A	P	L	E	E	TTL
Action Item #19: Perform annual inspections and obtain floor plans for facilities in Greenfield, such as the Barbara C. Harris Center, American Steel, Crotched Mountain, Plowshare Farm and NE Forest Products, that may store or use hazardous materials or be subject to emergency conditions. Encourage good practices and recommend steps these facilities can take to prevent future disasters and/or eliminate the risk. (MU16) (Table 7.1)	Affected Location Barbara C. Harris Type of Activity Emergency Service Protection Property Protection	3	3	3	3	3	3	3	21
No apparent difficulty with this action item									
Action Item #20: Upon completion and FEMA approval, review this Hazard Mitigation Plan (provided by the EMD) and the Greenfield Capital Improvement Plan to determine if action items from this plan should be integrated into the CIP. (MU6) (Tables 6.1 & 7.1)	Affected Location Townwide Type of Activity Prevention	3	3	3	3	3	3	3	21
No apparent difficulty with this action item									
Action Item #21: Provide public education on the importance of maintaining privately owned culverts, perhaps using "The Greenfield Spirit", on the town's website and/or other social media platforms. (F23) (Table 7.1)	Affected Location Townwide Type of Activity Prevention Public Education & Awareness Emergency Service Protection Property Protection	3	3	3	3	3	3	3	21
No apparent difficulty with this action item									
Action Item #22: Create a database to track those individuals at high risk of death, such as the elderly, homeless, etc. by developing a new and updated survey of the functional needs population and a method of maintaining the data. (ET3 & WW6)	Affected Location Townwide Type of Activity Prevention Emergency Service Protection	3	3	2	2	3	3	3	19
Administrative: There may be difficulty maintaining the list due to time and personnel. Political: Some people will not be willing to participate in a functional needs list.									
Action Item #23: Utilizing available resources including any assistance that can be gained from DNCR based on this plan's status as a Community Wildfire Protection Plan (CWPP) monitor and reduce the amount of slash on the forest flood to help mitigate the likelihood of wildfires. (WF9) (Table 7.1)	Affected Location Townwide Type of Activity Prevention Emergency Service Protection Property Protection	3	3	3	3	3	3	3	21
No apparent difficulty with this action item									
Action Item #24: Using local funding, replace the 36" concrete/stone culvert on Dunklee Hill Road with a new 48" round concrete culvert with fabricated headwalls, per state requirements. The estimated cost of the project is \$25,000. All the necessary permits are in to improve the culvert and go forward with this project to improve the flow of stormwater. (F13) (Table 7.1)	Affected Location Dunklee Hill Road Type of Activity Prevention Emergency Service Protection Property Protection Natural Resource Protection Structural Project	3	3	3	3	3	3	3	21
No apparent difficulty with this action item									

Proposed Mitigation Action Items	Affected Location Type of Activity	S	T	A	P	L	E	E	TTL
Action Item #25: Apply for an EMPG grant to purchase computers for use by Greenfield Emergency Services.	Affected Location Townwide Type of Activity Emergency Service Protection	3	3	3	3	3	3	3	21
		No apparent difficulty with this action item							
Action Item #26: Engineer, fund and complete the raising of Cornwell Road to mitigate flooding that continues to occur at the "low section" and to improve the flow of stormwater. (F13 & F17) (Table 7.1)	Affected Location Cornell Road Type of Activity Prevention Emergency Service Protection Property Protection Natural Resource Protection Structural Project	3	3	3	3	3	3	3	21
		No apparent difficulty with this action item							
Action Item #27: Begin the work of reconstruction on County Road to mitigate flooding, by first reconstructing ditch-lines along the entire road followed by eventually adding gravel and/or fabric according to priorities set by the Gravel Roads Plan. (F13 & F17) (Table 7.1)	Affected Location County Road Type of Activity Prevention Emergency Service Protection Property Protection Natural Resource Protection Structural Project	3	3	3	3	3	3	3	21
		No apparent difficulty with this action item							
Action Item #28: Consider the installation of lightning protection for town buildings including: the Meeting House, the Fire Station, the Library, the Transfer Station and the Town Office buildings to protect the electronics and to help ensure continued power at these critical facilities. Consult with professional contacts in this industry to determine the best plan of action. (L1)	Affected Location Town-owned facilities Type of Activity Prevention Emergency Service Protection Property Protection Natural Resource Protection Structural Project	3	3	3	3	3	2	3	20
		Economical: Budget Constraints							
Action Item #29: Review the Zoning Ordinance after the completion of this plan to integrate concepts, ideas and mitigation action items from this plan to help diminish the impact of future hazards. (MU6) (Table 6.1)	Affected Location Townwide Type of Activity Prevention	3	3	3	2	3	3	3	20
		Political: Some people may not want an open space ordinance; people do not want to be told what to do with their properties							
Action Item #30: Assign responsibility to an individual or individuals who will ensure that the Fire Danger Sign at the Fire Station is updated daily according to the burning index provided by NH Forests & Lands. (WF11) (Table 6.1)	Affected Location Fire Station Type of Activity Prevention Public Education & Awareness Emergency Service Protection Property Protection Natural Resource Protection	3	3	3	3	3	3	3	21
		No apparent difficulty with this action item							

Proposed Mitigation Action Items	Affected Location Type of Activity	S	T	A	P	L	E	E	TTL
Action Item #31: Make contact with ham radio operator(s) to ensure to their availability to assist during an emergency. (Table 6.1)	Affected Location Townwide Type of Activity Prevention Emergency Service Protection Property Protection Natural Resource Protection	3	3	3	3	3	3	3	21
No apparent difficulty with this action item									
Action Item #32: Work with Keene Mutual Aid and the Greenfield Police Department to identify locations in the town that could benefit from the installation of "repeaters". Once identified, obtain and install repeaters to improve townwide communications. Consider the addition of more portable radios for the Fire Department. (Table 6.1)	Affected Location Townwide Type of Activity Prevention Emergency Service Protection Property Protection Natural Resource Protection	3	3	3	2	3	2	3	19
Political: If towers are needed, some people may have an objection to the installation of them Economical: Budget constraints									
Action Item #33: Elevate Old Bennington Road by hauling in gravel based on the town's "Gravel Road Plan (budget)" and the priority of projects such as these. Replace culverts and provide additional ditching as necessary. (F13 & F17) (Table 7.1)	Affected Location Old Bennington Road Type of Activity Prevention Emergency Service Protection Property Protection Natural Resource Protection Structural Project	3	3	3	3	3	3	3	21
No apparent difficulty with this action item									
Action Item #34: Elevate Cavender Road by hauling in gravel based on the town's "Gravel Road Plan (budget)" which will determine the priority of projects such as these. (F13 & F17) (Table 7.1)	Affected Location Cavender Road Type of Activity Prevention Emergency Service Protection Property Protection Natural Resource Protection Structural Project	3	3	3	3	3	3	3	21
No apparent difficulty with this action item									
Action Item #35: The Greenfield Public Works Department to re-ditch the Swamp Road, trim the brush in and around the area and add gravel to elevate the road to improve the flow of stormwater, as prioritized in the "Gravel Road Plan (budget)". (F13) (Table 7.1)	Affected Location Swamp Road Type of Activity Prevention Emergency Service Protection Property Protection Natural Resource Protection Structural Project	3	3	3	3	3	3	3	21
No apparent difficulty with this action item									
Action Item #36: Elevate School House Road by hauling in gravel based on the town's annual and "Gravel Road Plan (budget)" and the priority of projects such as these. Replace culverts and provide additional ditching as necessary. (F13 & F17) (Table 7.1)	Affected Location School House Road Type of Activity Prevention Emergency Service Protection Property Protection Natural Resource Protection Structural Project	3	3	3	3	3	3	3	21
No apparent difficulty with this action item									

Proposed Mitigation Action Items	Affected Location Type of Activity	S	T	A	P	L	E	E	TTL
Action Item #37: Obtain funding and install a permanent generator at the Greenfield Public Library in order to ensure the facility's use during long term utility outages as a secondary shelter or cooling and warming center. Consider adding protective measures to mitigate losses from fire and/or humidity to protect important documents and manuscripts located at the Library. (MU13) (Table 6.1)	Affected Location Library Type of Activity Prevention Emergency Service Protection	3	3	3	2	3	3	3	20
		Political: Some may not want to spend money on this project.							
Action Item #38: Work with SAU to obtain funding and install a permanent generator at the Greenfield Elementary School so that it may be used as the primary shelter in the future. (MU13) (Table 6.1)	Affected Location Greenfield Elementary School Type of Activity Prevention Emergency Service Protection	3	3	1	2	1	2	3	15
		Administrative: With the cooperation of the School Board Political: Some people may not see the need for the generator at the school Legal: Needs cooperation of the School Board Economical: Budget constraints							
Action Item #39: Gain support for the replacement of the Cavender Road Bridge from the Greenfield community and the Town of Hancock. Seek funding and explore all funding options (State Bridge Fund, EMPG, etc.) to replace the bridge. 15-20 homes and 50-75 people could be left stranded and inaccessible by Emergency Response at the time of a flood or wildfire event if Cavender Road becomes impassable.	Affected Location Cavender Road Bridge Type of Activity Prevention Emergency Service Protection	2	2	3	1	1	1	1	11
		Social: Some will in neighborhood may not want the bridge open; others may not see why money should be spent on this road Technical: Will need engineering support to get this done Political: The neighboring Town of Hancock may not want it at all Legal: Will need participation from Hancock. Economical: Budget constraints Environmental: DES approvals will be needed							
Action Item #40: Update the Greenfield Emergency Operations Plan to coincide with the state 15-ESF format; include an analysis of the impact of natural hazards on Critical Infrastructure and Key Resources that may be needed during an emergency; like the current EOP, the new EOP will include an EOC Call Alert List as well as a detailed Resource Inventory List and Player Packets; deferred to this plan to update the EOP. (MU6) (Tables 6.1 & 7.1)	Affected Location Townwide Type of Activity Prevention Emergency Service Protection	3	3	3	3	3	3	3	21
		No apparent difficulty with this action item							
Action Item #41: Obtain funding and install a permanent generator at the Greenfield Department of Public Works Garage in order to ensure this critical facility's use during an emergency or disaster that disrupts power. (MU13) (Table 6.1)	Affected Location DPW Garage Type of Activity Prevention Emergency Service Protection Property Protection Natural Resource Protection	3	3	3	3	3	3	3	21
		No apparent difficulty with this action item							

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Chapter 9: Implementation Schedule for Prioritized Action Items

A. PRIORITY METHODOLOGY

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

CATEGORY 0

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

CATEGORY 1

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

CATEGORY 2

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

CATEGORY 3

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

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

The team also considered the following criteria while ranking and prioritizing each action item:

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

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

B. WHO, WHEN, HOW?

Once this was completed, the team developed an action plan that outlined who is responsible for implementing each action item, as well as when and how the actions will be implemented. The following questions were asked in order to develop a schedule for the identified mitigation action items.

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

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

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

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

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

TABLE 9.1: THE MITIGATION ACTION PLAN

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

The estimated cost was determined using the following criteria:

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

The time frame was determined using the following criteria:

- **Short Term** Ongoing for the life of the plan
- **Short Term** Less than 1 year (0-12 months)
- **Medium Term** 1-3 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 F: Potential Mitigation Ideas*, for more information.

Mitigation Action Items are listed in order of priority.

Final Rank	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
0-1	<p>Problem Statement: <i>The town has continuously used public outreach to advise residents of the need for proper 911 signage; however, the town is currently only about 20% compliant with the proper 911 signage.</i></p> <p>Action Item #1: Improve 911 signage compliance so that emergency responders can better assist the public at the time of need. Possible ways to increase compliance may be through the purchase and possible installation of signs by the town, the creation of an ordinance with an associated fine or expanding public outreach opportunities via the town's website, the Greenfield Spirit and available social media platforms. (MU14) (Table 6.1)</p>	All Hazards	Emergency Management Director, Fire Chief, Department of Public Works & Selectboard	Local	Short Term Ongoing (For the life of the plan)	<p>Low Cost (\$0 - \$1,000 or staff time only) (for public outreach only)</p> <p>High Cost (>\$10,000) (for purchase/installation of signs)</p>
0-2	<p>Problem Statement: <i>Although the town has made a good effort in providing public education, more can be done to provide not only emergency preparedness but also hazard mitigation techniques that residents can take to protect their homes and properties.</i></p> <p>Action Item #2: Provide robust information on a town emergency webpage, within the Greenfield Spirit and other social media platforms for educating the public on hazard mitigation and preparedness measures (MU14). Add an emergency preparedness webpage to the town's website a 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). Provide public education on healthy living to prevent infectious disease and links to public health websites. Develop ways to provide notification to citizens. (Tables 6.1 & 7.1)</p>	All Hazards including: Severe Wind, Drought, Earthquake, Extreme Temperatures, Hail, Lightning, Severe Winter Weather, Tornado, Infectious Disease & Wildfire	Selectboard, the Emergency Management Director & other Department Heads	Local	Short Term Ongoing (For the life of the plan)	Low Cost (\$0 - \$1,000 or staff time only)

Final Rank	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
0-3	<p>Problem Statement: Although first responders including firefighters have received NIMS & ICS training, not all of Greenfield's town officials have.</p> <p>Action Item #3: The Emergency management Director (EMD) to encourage all town officials who may be required to respond to an emergency and any new emergency responders to take NIMS 700 (S-700) & ICS (ISC100 & ISC200); additionally, the EMD and other vital emergency responders to learn about and become adept with WEB-EOC. (Table 6.1)</p>	All Hazards	Emergency Management Director, Selectboard, Police Chief, Department of Public Works & Fire Chief	Local	Short Term Ongoing (For the life of the plan)	Low Cost (\$0 - \$1,000 or staff time only)
0-4	<p>Problem Statement: The NH Emergency Notification System (ENS) 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 #4: Provide public outreach to encourage all residents to contact the NH Emergency Notification System (ENS) (CodeRED) to add cell numbers, unlisted numbers, emails and to verify information; use the website, a possible brochure, the Greenfield Spirit, available social media platforms or a sign up at Town Meeting. (MU14) (Tables 6.1 & 7.1)</p>	All Hazards	Emergency Management Direct & Selectboard	Local	Short Term Ongoing (For the life of the plan)	Low Cost (\$0 - \$1,000 or staff time only)
0-5	<p>Problem Statement: Residents and Builders may not be aware of flood regulations & the availability of flood insurance through the NFIP and they also may not be aware of the risk of building in the floodplain and the steps they can take to reduce flooding.</p> <p>Action Item #5: Advise the public about the local flood hazard, flood insurance and flood protection measures (F10) by obtaining and keeping on hand a supply of NFIP brochures to have available in the Town Offices; give NFIP materials to homeowners and builders when proposing new development or substantial improvements; encourage property owners to purchase flood insurance (F22), whether or not they are in the flood zone and provide appropriate links to the NFIP and Ready.gov on the Emergency webpage or available Facebook pages; through Public Outreach, educate homeowners regarding the risks of building in the flood zone and measures that can be taken to reduce the chance of flooding, such as securing objects that may otherwise be swept away, damaged, or pose a hazard if picked up and washed away by floodwaters; add links and info to website and available Facebook pages as well as the Greenfield Spirit; actively work with residents to ensure they are in compliance with the town's Floodplain Ordinance. (F23) (Tables 6.1 & 7.1)</p>	Inland Flooding	Emergency Management Director & Selectboard	Local	Short Term Ongoing (For the life of the plan)	Low Cost (\$0 - \$1,000 or staff time only)

Final Rank	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
0-6	<p>Problem Statement: <i>Although the town does a great job promoting preparedness, residents may not be aware of the steps they can take to reduce the risk of fire at their homes and when building campfires, either at home or on forested lands.</i></p> <p>Action Item #6: Post important information on the town's Emergency website and/or the Greenfield Spirit regarding red flag burning days. Obtain and have available Firewise® brochures to educate homeowners on methods to reduce fire risk around their homes (WF10) and provide a link to Firewise® on the Emergency page of the town's website. Provide Firewise® brochures to those residents seeking burn permits (if not obtained on-line). 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)</p>	Wildfire	Emergency Management Director, Fire Department & Selectboard	Local	Short Term Ongoing (For the life of the plan)	Low Cost (\$0 - \$1,000 or staff time only)
0-7	<p>Problem Statement: <i>The Greenfield Department of Public Works does a great job maintaining ditches to prevent stormwater problems and flooding, by re-ditching approximately ten ditches per year. These efforts need to continue.</i></p> <p>Action Item #7: Develop a ditch repair program to mitigate stormwater problems before they arise; add water bars to roadways, or cut-outs, were necessary to improve the flow of stormwater. (F5, F13 & F14) (Table 7.1)</p>	Inland Flooding	Department of Public Works	Local	Short Term Ongoing (For the life of the plan)	Low Cost (\$0 - \$1,000 or staff time only)
0-8	<p>Problem Statement: <i>As tree limbs fall and/or encroach roadways and water systems and as vegetation grows around utilities, there is a need to continue to work to keep this hazard to a minimum.</i></p> <p>Action Item #8: In addition to work that is done by and with local utility companies, monitor and manage brush cutting, drainage system maintenance and tree removal as part of a tree removal program and create defensible space around power lines, oil and gas lines and other infrastructure; work to reduce wildfire risk by clearing dead vegetation, cutting high grass and other fuel loads in the community. Assess and manage areas of the town that could benefit from a canopy reduction to allow more sunlight to prevent icy roadways. (SW4, WF7, WF9 & F14) (Tables 6.1 & 7.1)</p>	Severe Wind, Wildfire, Ice Storms & Flooding	Department of Public Works	Local	Short Term Ongoing (For the life of the plan)	Low Cost (\$0 - \$1,000 or staff time only)

Final Rank	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
0-9	<p>Problem Statement: The state has established a program to trim trees around power lines and in some places has also trimmed trees on the opposing side of the road to mitigate power loss during hazard events. This work needs to continue.</p> <p>Action Item #9: Lobby the state to trim not only under and around power lines but also on the opposite side of roads in an effort to mitigate power loss during hazard events. (SW4, WF7, WF9 & F14)</p>	Severe Wind, Wildfire, Ice Storms & Flooding	Selectboard & NH DOT	Local	Short Term Ongoing (Annually for the life of the plan)	Low Cost
0-10	<p>Problem Statement: The state has repaved the railroad crossing on NH Route 136 (Forest Road) but the camber of the road still causes problems for motorists.</p> <p>Action Item #10: Lobby the state to mitigate the dangerous situation on NH Route 136 at the railroad crossing; the area could use more signage at this time but a long term solution would involve an engineering study and rebuilding of the crossing.</p>	Aging Infrastructure	Selectboard & NH DOT	Local	Short Term Ongoing (Annually for the life of the plan)	Low Cost
0-11	<p>Problem Statement: The beaver population in Greenfield continues to create flooding and issues with stormwater flow.</p> <p>Action Item #11: Work with homeowners, DES, local trappers and other authorities to improve the flow of stormwater in locations where beavers have created flood issues by "managing" the beaver population through removal or relocation. (F13) (Table 7.1)</p>	Inland Flooding	Department of Public Works	Local	Short Term Ongoing (For the life of the plan)	Low Cost (\$0 - \$1,000 or staff time only)
0-12	<p>Problem Statement: Although the Greenfield Public Works Department works to clean and repair drainage basins and culverts, a written stormwater maintenance plan should be developed to ensure continuity of actions and efficient stormwater management.</p> <p>Action Item #12: Repair and upgrade culverts and ditches in the community and develop a written stormwater maintenance plan in order to ensure more efficient stormwater management. This inventory should include the location, date of installation, GPS coordinates, material, type, size, age and expected replacement date of all culverts, catch basins and drainage ditches in the community. (F5) (Tables 6.1 & 7.1)</p>	Inland Flooding	Department of Public Works & Emergency Management Director	Local & Grants	Short Term Ongoing (For the life of the plan to continue to build inventory over the next five years)	<p>Low Cost (\$0 - \$1,000 or staff time only)</p> <p>High Cost (\$10,000 or more, if the need arises to hire additional personnel or outside contractors)</p>

Final Rank	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
0-13	<p>Problem Statement: Although the Fire Department does a good job maintaining hydrants and fire ponds, a written maintenance plan has not been established.</p> <p>Action Item #13: Monitor Greenfield's available water resources for fire suppression including any drafting sites, fire ponds and dry hydrants and create a written inventory and plan for hydrant and fire pond maintenance in order to ensure water availability during wildfires. In addition, identify locations in the town that would benefit from the installation of dry hydrants, cisterns or fire ponds. Work with local land owners to gain access to available water resources for drafting and/or dry hydrants. (WF8, MU12 & MU13) (Table 6.1)</p>	Wildfire	Fire Department & Department of Public Works	Local	Short Term Ongoing (For the life of the plan)	Low Cost (\$0 - \$1,000 or staff time only)
0-14	<p>Problem Statement: Training of all Emergency Responders including Fire, EMS, DPW and Police is coordinated through mutual aid departments and NH academies. Training includes the many aspects of emergency response, wildfire response, hazmat response, violent intruder, terrorism, health education and all other aspects of emergency response. This training needs to continue into the future.</p> <p>Action Item #14: Train all Greenfield Emergency Responders (Fire, DPW, EMD & Police) according to recommended training schedules from mutual aid departments, NH training academies and by the respective chief of each department. Although this is preparedness, not mitigation, training was felt to be important enough to keep in this plan. (Tables 6.1 & 7.1)</p>	All Hazards	Fire/EMS, DPW & Police Chiefs	Local	Short Term Ongoing (For the life of the plan)	Low Cost (\$0 - \$1,000 or staff time only)
0-15	<p>Problem Statement: Although Greenfield does not have a HazMat Team, firefighters are trained in the basic response to HazMat incidents and are adept at maintaining perimeters until specialized teams arrive; the Greenfield EMD or the Fire Officer in charge would most likely call dispatch who would then contact the state to request an available HazMat Response Team. Although this is preparedness, this is deferred to this plan to continue HazMat training for the members of the Greenfield Fire Department.</p> <p>Action Item #15: Provide HazMat training for the members of the Greenfield Fire Department and others who may respond to a HazMat incident. Although this is preparedness, not mitigation, training was felt to be important enough to keep in this plan.</p>	Hazardous Materials Transport	Fire Chief	Local	Short Term Ongoing (For the life of the plan)	Low Cost (\$0 - \$1,000 or staff time only)

Final Rank	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
0-16	<p>Problem Statement: Although the Greenfield Elementary School updates its Emergency Operations Plan annually according to state requirements, this practice as well as drills with emergency response should continue.</p> <p>Action Item #16: Work with the Greenfield Elementary School to update the School's EOP on an annual basis and to provide training and/or drills with school personnel to ensure the emergency response. (MU6) (Table 6.1)</p>	All Hazards	Emergency Management Director, Police Chief, Department of Public Works & Fire Chief	Local	Short Term Ongoing (For the life of the plan)	Low Cost (\$0 - \$1,000 or staff time only)
0-17	<p>Problem Statement: The Greenfield Master Plan (2017) will not be in need of an update, based on the recommended ten year guidelines, until 2027 which is outside the scope of this plan. The Master Plan should be reviewed upon completion of this plan to see if a natural hazards section and action items from this plan should be integrated into future reviews.</p> <p>Action Item #17: Review this Hazard Mitigation Plan whenever an annual review of the Master Plan is done and consider the incorporation of a discussion on climate change, a natural hazards section and mitigation action items from this plan. (MU6) (Tables 6.1 & 7.1)</p>	All Hazards	Planning Board	Local	Short Term Ongoing (For the life of the plan)	Low Cost (\$0 - \$1,000 or staff time only)
0-18	<p>Problem Statement: This plan, the Greenfield Hazard Mitigation Plan Update 2020, will require an annual review and a complete update in five years.</p> <p>Action Item #18: Provide an annual review of the Greenfield Hazard Mitigation Plan Update 2020 including a review of the status of "Action Items" listed in this plan to encourage completion; get approval from the local elected body on an annual basis. (MU11) (Table 6.1)</p>	All Hazards	Emergency Management Director, Town Administrator & Selectboard	Local	Short Term Ongoing (For the life of the plan)	Low Cost (\$0 - \$1,000 or staff time only)
0-19	<p>Problem Statement: Although Tier II reporting data is available for some facilities in Greenfield, the Fire Department does not have floor plans for all facilities in town that could store hazardous materials or be subject to emergency conditions.</p> <p>Action Item #19: Perform annual inspections and obtain floor plans for facilities in Greenfield, such as the Barbara C. Harris Center, American Steel, Crotched Mountain, Plowshare Farm and NE Forest Products, that may store or use hazardous materials or be subject to emergency conditions. Encourage good practices and recommend steps these facilities can take to prevent future disasters and/or eliminate the risk. (MU16) (Table 7.1)</p>	All Hazards	Emergency Management Director & Fire Department	Local	Short Term Ongoing (For the life of the plan)	Low Cost (\$0 - \$1,000 or staff time only)

Final Rank	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
0-20	<p>Problem Statement: Although a review of the Greenfield Capital Improvement Plan (CIP) is done annually, it should be reviewed upon completion of this plan to see if action items from this plan should be integrated in the CIP.</p> <p>Action Item #20: Upon completion and FEMA approval, review this Hazard Mitigation Plan (provided by the EMD) and the Greenfield Capital Improvement Plan to determine if action items from this plan should be integrated into the CIP (MU6) (Tables 6.1 & 7.1)</p>	All Hazards	Planning Board, the Emergency Management Director & other Department Heads	Local	Short Term Ongoing (For the life of the plan)	Low Cost (\$0 - \$1,000 or staff time only)
0-21	<p>Problem Statement: The town has an ordinance that requires homeowners to maintain their own culverts and the DPW will speak with homeowners who need to repair or maintain their culverts. However, reminders should be sent to residents on the importance of maintaining private culverts to mitigate stormwater flooding.</p> <p>Action Item #21: Provide public education on the importance of maintaining privately owned culverts, perhaps using "The Greenfield Spirit", on the town's website and/or other social media platforms. (F23) (Table 7.1)</p>	Inland Flooding	Emergency Management, Selectboard & Department of Public Works	Local	Short Term Ongoing (For the life of the plan)	Low Cost (\$0 - \$1,000 or staff time only)
0-22	<p>Problem Statement: A survey was not done to identify the functional needs population in Greenfield, a survey needs to be completed.</p> <p>Action Item #22: Create a database to track those individuals at high risk of death, such as the elderly, homeless, etc. by developing a new and updated survey of the functional needs population and a method of maintaining the data. (ET3 & WW6)</p>	Extreme Temperatures, Severe Winter Weather & All Hazards	Fire & Police Departments	Local	Short Term Ongoing (Annually for the life of the plan)	Low Cost
0-23	<p>Problem Statement: An abundance of slash on the forest floor, that was remains after ice, snow and windstorms, adds to the fire risk in the community.</p> <p>Action Item #23: Utilizing available resources including any assistance that can be gained from DNCR based on this plan's status as a Community Wildfire Protection Plan (CWPP) monitor and reduce the amount of slash on the forest floor to help mitigate the likelihood of wildfires. (WF9) (Table 7.1)</p>	Wildfire	Fire Department	Local & Grants (CWPP)	Short Term Ongoing (For the life of the plan)	Low Cost (\$0 - \$1,000 or staff time only) Medium Cost (\$1,000 - \$10,000) High Cost (\$10,000 or more)

Final Rank	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
1-1	<p>Problem Statement: Flooding can occur at the site of the overwhelmed and aging culvert on Dunklee Hill Road.</p> <p>Action Item #24: Using local funding, replace the 36" concrete/stone culvert on Dunklee Hill Road with a new 48" round concrete culvert with fabricated headwalls, per state requirements. The estimated cost of the project is \$25,000. All the necessary permits are in to improve the culvert and go forward with this project to improve the flow of stormwater. (F13) (Table 7.1)</p>	Inland Flooding	Department of Public Works	Local	Short Term (1 year or less: 0-12 months)	High Cost (\$10,000 or more)
1-2	<p>Problem Statement: Greenfield Emergency Services is in need of better computer technology.</p> <p>Action Item #25: Apply for an EMPG grant to purchase computers for use by Greenfield Emergency Services.</p>	All Hazards	Emergency Management Director	Local & Grants	Short Term (1 year or less: 0-12 months)	Medium Cost (\$1,000 - \$10,000)
1-3	<p>Problem Statement: A low section on Cornwell Road floods even though two culverts (36" x 35") are in place; the team felt that replacing culverts will not work to prevent flooding.</p> <p>Action Item #26: Engineer, fund and complete the raising of Cornwell Road to mitigate flooding that continues to occur at the "low section" and to improve the flow of stormwater. (F13 & F17) (Table 7.1)</p>	Inland Flooding	Department of Public Works	Local & Grants	Short Term (1 year or less: 0-12 months)	Medium Cost (\$1,000 - \$10,000)
1-4	<p>Problem Statement: Parts of County Road are in poor condition and need complete reconstruction. The town has begun the initial work to get this project started with an anticipated cost of more than \$42,000 which was the project estimate in the 2014 Hazard Mitigation Plan which included complete reconstruction.</p> <p>Action Item #27: Begin the work of reconstruction on County Road to mitigate flooding, by first reconstructing ditch-lines along the entire road followed by eventually adding gravel and/or fabric according to priorities set by the Gravel Roads Plan. (F13 & F17) (Table 7.1)</p>	Inland Flooding	Department of Public Works	Local	Short Term (1 year or less: 0-12 months)	High Cost (\$10,000 or more)

Final Rank	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
1-5	<p>Problem Statement: <i>Lightning has the potential to strike town buildings which can cause damage to electronics and power outages.</i></p> <p>Action Item #28: Consider the installation of lightning protection for town buildings including: the Meeting House, the Fire Station, the Library, the Transfer Station and the Town Office buildings to protect the electronics and to help ensure power at these critical facilities. Consult with professional contacts in this industry to determine the best plan of action. (L1)</p>	Lightning	Selectboard, EMD, Fire Department	Local & Grants	<p>Short Term (1 year or less: 0-12 months)</p> <p>Long Term get it done</p>	High Cost (\$10,000 or more, depending on the number of systems that are needed to be installed)
1-6	<p>Problem Statement: <i>The Zoning Ordinance was last updated in 2017. However, the Zoning Ordinance should be reviewed after the completion of this plan to integrate concepts, ideas and mitigation action items from this plan to diminish the impact from future hazards.</i></p> <p>Action Item #29: Review the Zoning Ordinance after the completion of this plan to integrate concepts, ideas and mitigation action items from this plan to help diminish the impact of future hazards. (MU6) (Table 6.1)</p>	All Hazards	Planning Board	Local	<p>Short Term (1 year or less: 0-12 months)</p>	Low Cost (\$0 - \$1,000 or staff time only)
1-7	<p>Problem Statement: <i>Although NH Forests & Lands provides the Fire Warden with the daily "burning index", the Fire Danger Sign at the Fire Station does not always reflect the report.</i></p> <p>Action Item #30: Assign responsibility to an individual or individuals who will ensure that the Fire Danger Sign at the Fire Station is updated daily according to the burning index provided by NH Forests & Lands. (WF11) (Table 6.1)</p>	Wildfire	Fire Warden & Fire Department	Local	<p>Short Term (1 year or less: 0-12 months)</p>	Low Cost (\$0 - \$1,000 or staff time only)
1-8	<p>Problem Statement: <i>Local Ham Radio Operators have not been contacted to assess their availability to assist the town should all other viable means of communication have stopped.</i></p> <p>Action Item #31: Make contact with ham radio operator(s) to ensure to their availability to assist during an emergency. (Table 6.1)</p>	All Hazards	Emergency Management Director	Local	<p>Short Term (1 year or less: 0-12 months)</p>	Low Cost (\$0 - \$1,000 or staff time only)

Final Rank	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
2-1	<p><i>Problem Statement: Although the town's radio systems are fairly good, there are still some areas of the community in which "dead spots" can be found.</i></p> <p>Action Item #32: Work with Keene Mutual Aid and the Greenfield Police Department to identify locations in the town that could benefit from the installation of "repeaters". Once identified, obtain and install repeaters to improve townwide communications. Consider the addition of more portable radios for the Fire Department. (Table 6.1)</p>	All Hazards	Fire & Police Departments & Keene Mutual Aid	Local & Grants	Medium Term (1-3 years: 13-36 months)	High Cost (\$10,000 or more)
2-2	<p><i>Problem Statement: Although elevation of Old Bennington Road has not started, the DPW has done some work based on the "Gravel Road Plan (budget)".</i></p> <p>Action Item #33: Elevate Old Bennington Road by hauling in gravel based on the town's "Gravel Road Plan (budget)" and the priority of projects such as these. Replace culverts and provide additional ditching as necessary. (F13 & F17) (Table 7.1)</p>	Inland Flooding	Department of Public Works	Local	Medium Term (1-3 years: 13-36 months)	High Cost (\$10,000 or more)
2-3	<p><i>Problem Statement: Although elevation of Cavender Road has not started, the DPW ditched the entire road in 2018 to improve stormwater flow. Additional elevation of the road is required to mitigate issues with stormwater flow. It is anticipated that this project will cost more than the \$15,000 that was estimated in the 2014 Hazard Mitigation Plan.</i></p> <p>Action Item #34: Elevate Cavender Road by hauling in gravel based on the town's "Gravel Road Plan (budget)" which will determine the priority of projects such as these. (F13 & F17) (Table 7.1)</p>	Inland Flooding	Department of Public Works	Local	Medium Term (1-3 years: 13-36 months)	High Cost (\$10,000 or more)
2-4	<p><i>Problem Statement: A large culvert was replaced several years ago, but more work needs to be done on Swamp Road.</i></p> <p>Action Item #35: The Greenfield Public Works Department to re-ditch the Swamp Road, trim the brush in and around the area and add gravel to elevate the road to improve the flow of stormwater, as prioritized in the "Gravel Road Plan (budget)". (F13) (Table 7.1)</p>	Inland Flooding	Department of Public Works	Local	Medium Term (1-3 years: 13-36 months)	Medium Cost (\$1,000 - \$10,000)

Final Rank	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
2-5	<p>Problem Statement: Although elevation of School House Road has not started, the DPW has done some work based on the "Gravel Road Plan (budget)". The road still needs more gravel to elevate the road to eliminate stormwater flow issues.</p> <p>Action Item #36: Elevate School House Road by hauling in gravel based on the town's annual and "Gravel Road Plan (budget)" and the priority of projects such as these. Replace culverts and provide additional ditching as necessary. (F13 & F17) (Table 7.1)</p>	Inland Flooding	Department of Public Works	Local	Medium Term (1-3 years: 13-36 months)	High Cost (\$10,000 or more)
2-6	<p>Problem Statement: Although Greenfield has emergency backup power at many of the town's Critical Infrastructure & Key Resources (CIKR) there are still some CIKR that do not have backup emergency power including the Greenfield Library.</p> <p>Action Item #37: Obtain funding and install a permanent generator at the Greenfield Public Library in order to ensure the facility's use during long term utility outages as a secondary shelter or cooling and warming center. Consider adding protective measures to mitigate losses from fire and/or humidity to protect important documents and manuscripts located at the Library. (MU13) (Table 6.1)</p>	All Hazards	Emergency Management Director, Selectboard & Library Trustees	Local & Grants	Medium Term (1-3 years: 13-36 months)	High Cost (\$10,000 or more)
2-7	<p>Problem Statement: Although Greenfield has emergency backup power at many of the town's Critical Infrastructure & Key Resources (CIKR) there are still some CIKR that do not have backup emergency power including the Greenfield Elementary School.</p> <p>Action Item #38: Work with SAU1 to obtain funding and install a permanent generator at the Greenfield Elementary School so that it may be used as the primary shelter in the future. (MU13) (Table 6.1)</p>	All Hazards	Emergency Management Director, Selectboard & School Board	Local & Grants	Medium Term (1-3 years: 13-36 months)	High Cost (\$10,000 or more)

Final Rank	Problem Statement New Mitigation Action Item	Type of Hazard	Managing Department	Funding or Support	Time Frame	Est. Cost
3-1	<p>Problem Statement: More than 30 years ago, the steel bridge on Cavender Road over the Contoocook River was closed by the Selectboard because of lack of funding and an agreement with Hancock to share the cost of rebuilding. The closure of this bridge has left multiple homes (15-20) on Cavender Road subject to possible isolation and lack of egress should a natural hazard such as a flood or a wildfire occur in this location. This area is also in the inundation path for MacDowell Dam.</p> <p>Action Item #39: Gain support for the replacement of the Cavender Road Bridge from the Greenfield community and the Town of Hancock. Seek funding and explore all funding options (State Bridge Fund, EMPG, etc.) to replace the bridge. 15-20 homes and 50-75 people could be left stranded and inaccessible by Emergency Response at the time of a flood or wildfire event if Cavender Road becomes impassable.</p>	Inland Flooding & Wildfire	Selectboard	Local & Grants	Long Term (3-5 years: 37-60 months)	High Cost (\$10,000 or more)
3-2	<p>Problem Statement: The Greenfield Emergency Operations Plan (EOP) was last updated in 2017 and will need to be updated again in 2022.</p> <p>Action Item #40: Update the Greenfield Emergency Operations Plan to coincide with the state 15-ESF format; include an analysis of the impact of natural hazards on Critical Infrastructure and Key Resources that may be needed during an emergency; like the current EOP, the new EOP will include an EOC Call Alert List as well as a detailed Resource Inventory List and Player Packets; deferred to this plan to update the EOP. (MU6) (Tables 6.1 & 7.1)</p>	All Hazards	Emergency Management Director	Local & Grants	Long Term (3-5 years: 37-60 months)	Medium Cost (\$1,000 - \$10,000)
3-3	<p>Problem Statement: Although Greenfield has emergency backup power at many of the town's Critical Infrastructure & Key Resources (CIKR), the Department of Public Works only has a portable generator.</p> <p>Action Item #41: Obtain funding and install a permanent generator at the Greenfield Department of Public Works Garage in order to ensure this critical facility's use during an emergency or disaster that disrupts power. (MU13) (Table 6.1)</p>	All Hazards	Emergency Management Director, Selectboard & Department of Public Works	Local & Grants	Long Term (3-5 years: 37-60 months)	Medium Cost (\$1,000 - \$10,000)

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

A. HAZARD MITIGATION PLAN MONITORING, EVALUATION AND UPDATES

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

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

- *First, as a minimum, it will be reviewed annually or after any emergency event to assess whether the existing and suggested mitigation action items were successful. This review will focus on the assessment of the plan's effectiveness, accuracy and completeness in monitoring of the implementation action items. The review will also address recommended improvements to the plan as contained in the FEMA plan review checklist and address any weaknesses the town identified that the plan did not adequately address.*
- *Second, the plan will be thoroughly updated every five years.*
- *Third, if the town adopts any major modifications to its land use planning documents, the jurisdiction will conduct a plan review and make changes as applicable.*

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

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

B. INTEGRATION WITH OTHER PLANS

This plan will only enhance mitigation if balanced with all other town plans. Greenfield completed its last hazard mitigation plan in 2014 and has completed many of projects from that plan. Examples of these can be found in Table 7.1 and include items such as completing the installation of eleven culverts on Russell Station Road, providing ongoing fire and flood education and updating the Emergency Operations Plan. The town was able to integrate these actions into other town activities, budgets, plans and mechanisms.

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

GREENFIELD MASTER PLAN (2017)

Traditionally, Master Plans are updated every 5 to 10 years and detail the use of capital reserves funds and capital improvements within the town. A complete update of the Greenfield's Master Plan was completed in 2017 and is due for a recommended update in 2027. Future updates of the Master Plan should include a discussion on climate change and a natural hazards section and shall integrate concepts, ideas and action items from this hazard mitigation plan. **(Action Item #17)**

GREENFIELD EMERGENCY OPERATIONS PLAN 2017 (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 Greenfield EOP was completed in 2017. An update for the Emergency Operations Plan is expected to be completed in 2022. The new EOP will include elements from this hazard mitigation plan. **(Action Item #40)**

TOWN BUDGET, CAPITAL IMPROVEMENT PLAN & CAPITAL RESERVE FUNDS

The Town of Greenfield maintains a Capital Improvement Plan and also maintains Capital Reserve Funds for major expenditures. The Capital Reserve Fund is adjusted annually in coordination with the Selectboard and the town's department heads at budget time. The budget is then voted on at the annual Town Meeting. During the annual budget planning process, specific mitigation actions identified in this plan that require town fiscal support will be reviewed for incorporation into the budget. **Refer to those Action Items that require local money or match money or address the CIP and CRF (Action Item #20 and others).**

THE GREENFIELD ORDINANCES & SUBDIVISION REGULATIONS

As time goes by and the needs of the town change, the town's planning mechanisms will be reviewed and updated. In coordination with these actions, the Planning Board will review this plan and incorporate any changes that help mitigate the susceptibility of the community and its citizens to the dangers of natural or human-caused disasters. Examples of this integration can be seen in this plan's mitigation action item. **(Action Items #20 & #29)**

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

C. PLAN APPROVAL & ADOPTION

This plan was completed in a series of open meetings beginning on January 8 2019. The plan was presented to the town for review, submitted to HSEM for Conditional Approval (*APA, Approved Pending Adoption*), formally adopted by the Selectboard and resubmitted to HSEM for Final Approval. Once Final Approval from HSEM was met, copies of the plan were distributed to the town, HESM, FEMA, DNCR and the USDA-FS; the plan was then distributed as these entities saw fit. Copies of the plan remain on file at Mapping and Planning Solutions (MAPS) in both digital and paper format.

Chapter 11: Signed Community Documents and Approval Letters

A. PLANNING SCOPE OF WORK & AGREEMENT

HAZARD MITIGATION PLAN UPDATE



PARTIES TO THE AGREEMENT

Mapping and Planning Solutions
Town of Greenfield, NH

Current Plan Expiration: 12/10/19
PDM Grant Expiration: 1/30/2021

This agreement between the Town of Greenfield (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 2020 Hazard Mitigation Plan Update (the plan).

Agreement

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

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

The plan created as a result of this agreement will be presented to the town for adoption once conditional approval is received from FEMA. When adopted, the plan provides guidance to the town, commissions, and departments; adopted plans serve as a guide and do not include any financial commitments by the town. Additionally, all adopted plans should address mitigation strategies for reducing the risk of natural, man-made, and wildfire disasters on life and property and written so that they may be integrated within other town planning initiatives.

Scope of Work

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

- MAPS will collect data that is necessary to complete the plan and meet the requirements of the FEMA plan Review Tool by working with the planning team (the team) and taking public input from community members.
- With the assistance of the team, MAPS will coordinate and facilitate meetings and provide any materials, handouts and maps necessary to provide a full understanding of each step in the planning process.
- MAPS will assist the team in the development of goals, objectives and implementation strategies and clearly define the processes needed for future plan monitoring, educating the public and integrating the plan with other town plans and activities.
- MAPS will coordinate and collaborate with other federal, state and local agencies throughout the process.

- MAPS will explain and delineate the town's Wildland Urban Interface (WUI) and working with the team, will establish a list of potential hazards and analyze the risk severity of each.
- MAPS will author, edit and prepare the plan for review by the team prior to submitting the plan to FEMA for conditional approval. Upon conditional approval by FEMA, MAPS will assist the planning team as needed with presentation of the plan to the Greenfield Selectboard and/or Planning Board and continue to work with the town until final approval and distribution of the plan is complete, unless extraordinary circumstances prevail.
- MAPS shall provide, at its office, all supplies and space necessary to complete the Greenfield Hazard Mitigation Plan.
- After final approval is received from FEMA, MAPS will provide the town with a two copies of the plan containing all signed documents, approvals and GIS maps along with CDs containing these same documents in digital form, for distribution by the town as it sees fit. Additional CDs may be requested at no additional cost. CD copies of the plan will be distributed by MAPS to collaborating agencies including, but not limited to, NH Homeland Security (HSEM) and FEMA.
- MAPS will provide plan maintenance reminders and assistance on an annual basis leading up to the next five-year plan update at no cost to the town, if requested by the town.

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

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

Terms

- **Fees & Payment Schedule:** The contract price is limited to \$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\$3,700.00
 - 2. Second payment upon plan submittal to FEMA for Conditional Approval\$3,600.00
 - 3. Final payment upon project completion and receipt of final plan copy\$200.00
 - Total Fees.....\$7,500.00

- **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 Greenfield 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. Matching funds are the responsibility of the Town of Greenfield, not MAPS. Mapping and Planning Solutions will however assist the town with attendance tracking by asking meeting attendees to “sign in” at all meetings and to “log” any time spent outside of the meetings working on this project. MAPS will provide the town with final attendance records in spreadsheet form at project’s end for the town to use in its match fulfillment.
- **Project Period:** This project shall begin upon signing this agreement by both parties and continue through a date yet to be determined or whenever the planning process is complete. The project period may be extended by mutual written agreement between the town, MAPS and Homeland Security if required. The actual project end date is dependent upon timely adoptions and approvals which may be outside of the control of MAPS and the town. It is anticipated that five or six two-hour meetings will be required to gather the necessary information to create the updated the plan.

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

- **Ownership of Material:** All maps, reports, documents and other materials produced during the project period shall be owned by the town; each party may keep file copies of any generated work. MAPS shall have the right to use work products collected during the planning process; however, MAPS shall not use any data in such a way as to reveal personal or public information about individuals or groups which could reasonably be considered confidential.
- **Termination:** This agreement may be terminated if both parties agree in writing. In the event of termination, MAPS shall forward all information prepared to date to the town. MAPS shall be entitled to recover its costs for any work that was completed.
- **Limit of Liability:** MAPS agrees to perform all work in a diligent and efficient manner according to the terms of this agreement. MAPS’ responsibilities under this agreement depend upon the cooperation of the Town of Greenfield. 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 Greenfield and Mapping and Planning Solutions.
- **About Mapping and Planning Solutions:** Mapping and Planning Solutions provides hazard mitigation and emergency operations planning throughout New Hampshire. Mapping and Planning Solutions has developed more than forty Hazard Mitigation Plans, more than forty five Emergency Operations Plans and has completed the following FEMA courses in Emergency Planning and Operations:
 - Introduction to Incident Command System, IS-100.a
 - ICS Single Resources and Initial Action Incidents, IS-200.a
 - National Incident Management System (NIMS) An Introduction, IS-700.a
 - National Response Framework, An Introduction, IS 800.b
 - Emergency Planning, IS-235
 - Homeland Security Exercise & Evaluation Program (HSEEP)
 - IS-547.a – Introduction to Continuity Operations
 - IS-546.a – Continuity of Operations (COOP) Awareness Course
 - G-318; Preparing & Review Hazard Mitigation Plans
 - Climate Change Adaptation Planning, AWR-347
 - ALICE; School Shooting Workshop, Littleton High School

➤ **Contacts:**

For Mapping & Planning Solutions

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

For the Town

Dave Martin, EMD
Town of Greenfield
7 Sawmill Road
Greenfield, NH 03047
emddavemartin@greenfieldfire.org
(603) 547-6897

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

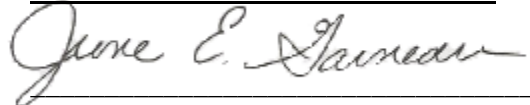
FOR THE TOWN OF GREENFIELD, NH

Signature

Printed Name/Title

Date

FOR MAPPING AND PLANNING SOLUTIONS



Signature
June Garneau, Owner
January 10, 2019

Signatures are scanned facsimiles, original signatures are on file.

B. APPROVED PENDING ADOPTION (APA) & FORMAL APPROVAL EMAILS FROM HSEM**APA FROM HSEM****Greenfield, NH - Approvable Pending Adoption**

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

Sent: Fri 8/7/2020 1:47 PM

To: June Garneau; 'riverqueen@pobox.com'; 'emddavemartin@greenfieldfire.org'

Cc: Gilboy, Elizabeth; Wells, Meghan

Good afternoon,

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

Sincerely,

Kayla J. Henderson

Signatures are scanned facsimile, original signatures are on file.


FORMAL APPROVAL FROM HSEM**Greenfield, NH - Local Hazard Mitigation Plan - Formal Approval**

Hazard Mitigation Planning <hazmitplanning@DOS.NH.GOV>

Sent: Thu 11/5/2020 12:45 PM

To: June Garneau; 'riverqueen@pobox.com'; 'emddavemartin@greenfieldfire.org'

Cc: Wells, Meghan; Gilboy, Elizabeth

Message  Greenfield NH Final Local Mitigation Plan Review Tool.pdf (743 KB)

Good afternoon,

Congratulations! The Town of Greenfield's Local Hazard Mitigation Plan has received **Formal Approval** as of today, **November 5, 2020**. This State Formal Approval is based upon the New Hampshire Department of Safety, Division of Homeland Security & Emergency Management's (HSEM) determination that the community's Local Hazard Mitigation Plan successfully met the requirements of 44 C.F.R Pt. 201. A copy of the adopted plan has been submitted to the Federal Emergency Management Agency (FEMA) for their records.

Please find the Final Local Mitigation Plan Review Tool attached. The Town of Greenfield 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**State of New Hampshire, Department of Safety****Division of Homeland Security & Emergency Management**Meghan Wells, State Hazard Mitigation Officer / Meghan.K.Wells@dos.nh.gov / (603) 223-4395Kayla Henderson, State Hazard Mitigation Planner / Kayla.J.Henderson@dos.nh.gov / (603) 223 3650Whitney Welch, Assistant Chief of Planning / Whitney.A.Welch@dos.nh.gov / (603) 223-3667

Signatures are scanned facsimile, original signatures are on file

C. SIGNED CERTIFICATE OF ADOPTION

CERTIFICATE OF ADOPTION

GREENFIELD, NH

SELECTBOARD

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

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

WHEREAS, public and committee meetings were held between January 8, 2019 and August 6, 2019 regarding the development and review of the Hazard Mitigation Plan Update 2020 and

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

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

RESOLVED by the Selectboard:

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

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

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

Adopted this day, the 8th of October, 2020

Chairman of the Selectboard

Margaret A. Charig Bliss

Signature

Margaret Charig Bliss

Print Name

Member of the Selectboard

Karen Day

Signature

Karen Day

Print Name

Member of the Selectboard

Robert Marshall

Signature

Robert Marshall

Print Name

Emergency Management Director

David Martin

Signature

David Martin

Print Name

IN WITNESS WHEREOF, the undersigned has affixed his/her signature and the corporate seal of the Town of Greenfield on this day, 10/8, 2020

Aaron K. Patt

Notary D.P.

8/25/22

Expiration

10/8/2020


Date



Signatures are scanned facsimile, original signatures are on file.

D. FORMAL APPROVAL LETTER FEMA

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



FEMA

November 6, 2020

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

Dear Ms. Wells:

As outlined in the FEMA-State Agreement for FEMA-DR-4457, your office has been delegated the authority to review and approve local mitigation plans under the Program Administration by States Pilot Program. Our Agency has been notified that your office completed its review of the Greenfield Hazard Mitigation Plan Update 2020 and approved it effective **November 5, 2020** through **November 4, 2025** in accordance with the planning requirements of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended, the National Flood Insurance Act of 1968, as amended, and Title 44 Code of Federal Regulations (CFR) Part 201.

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

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

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

Sincerely,

PAUL F FORD Digitally signed by PAUL F FORD
Date: 2020.11.06 08:35:18 -05'00'

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

WRW:ms

cc: Fallon Reed, Chief of Planning, New Hampshire

Signatures are scanned facsimile, original signatures are on file.

E. CWPP APPROVAL LETTER FROM DNCR

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

Several public meetings and committee meetings were held between January 8, 2019 and August 6, 2019 regarding the development and review of the Greenfield Hazard Mitigation Plan Update 2020. The Greenfield Hazard Mitigation Plan Update 2020 contains potential future projects to mitigate hazard and wildfire damage in the Town of Greenfield.

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

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

For the Town of Greenfield

APPROVED and SIGNED this day, 10/8, 2020.

Margaret A. Charig Bliss

Margaret Charig Bliss

Chairman of the Selectboard

Printed Name

Richard L. McQuade

Richard L. McQuade

Fire Chief

Printed Name

David M. Moore

David M. Moore

Emergency Management Director

Printed Name

For the Department of Natural & Cultural Resources (DNCR)

APPROVED and SIGNED this day, 16 Nov., 2020.

Adrian Reyes
 Forest Ranger – NH Division of Forest and Lands, DNCR

APPROVED and SIGNED this day, Nov. 16, 2020.

Patricia A. Hawley
 Director – NH Division of Forest and Lands, DNCR

Signatures are scanned facsimile, original signatures are on file.

F. ANNUAL REVIEW OR POST HAZARD CONCURRENCE FORMS

YEAR ONE

CHECK ALL THAT APPLY

- ☐ Annual Review & Concurrence - **Year One**: _____ (Date)
- ☐ Annual Review & Concurrence – Post Hazardous Event: _____ (Event/Date)
- ☐ Annual Review & Concurrence – Post Hazardous Event: _____ (Event/Date)

The Town of Greenfield, 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.

Greenfield, NH
Hazard Mitigation Plan Update

REVIEWED AND APPROVED

DATE: _____

SIGNATURE: _____

PRINTED NAME: _____

Emergency Management Director

CONCURRENCE OF APPROVAL

SIGNATURE: _____

PRINTED NAME: _____

Chairman of the Selectboard

Changes and notes regarding the 2020 Hazard Mitigation Plan Update

Please use reverse side for additional notes 

Additional Notes – Year One:

[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 Greenfield, 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.

Greenfield, NH
Hazard Mitigation Plan Update

REVIEWED AND APPROVED

DATE: _____

SIGNATURE: _____

PRINTED NAME: _____

Emergency Management Director

CONCURRENCE OF APPROVAL

SIGNATURE: _____

PRINTED NAME: _____

Chairman of the Selectboard

Changes and notes regarding the 2020 Hazard Mitigation Plan Update

Please use reverse side for additional notes 

Additional Notes – Year Two:

[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 Greenfield, 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.

Greenfield, NH
Hazard Mitigation Plan Update

REVIEWED AND APPROVED

DATE: _____

SIGNATURE: _____

PRINTED NAME: _____

Emergency Management Director

CONCURRENCE OF APPROVAL

SIGNATURE: _____

PRINTED NAME: _____

Chairman of the Selectboard

Changes and notes regarding the 2020 Hazard Mitigation Plan Update

Please use reverse side for additional notes 

Additional Notes – Year Three:

[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 Greenfield, 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.

Greenfield, NH
Hazard Mitigation Plan Update

REVIEWED AND APPROVED

DATE: _____

SIGNATURE: _____

PRINTED NAME: _____

Emergency Management Director

CONCURRENCE OF APPROVAL

SIGNATURE: _____

PRINTED NAME: _____

Chairman of the Selectboard

Changes and notes regarding the 2020 Hazard Mitigation Plan Update

Please use reverse side for additional notes 

Additional Notes – Year Four:

[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: MAJOR DISASTER & EMERGENCY DECLARATIONS
- APPENDIX E: ACRONYMS
- APPENDIX F: POTENTIAL MITIGATION IDEAS

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APPENDIX A: BIBLIOGRAPHY**Documents**

- **Local Hazard Mitigation Planning Review Guide**, FEMA, October 2011
- **Local Hazard Mitigation Planning Handbook**, FEMA, March 2013
- **Mitigation Ideas, A Resource for Reducing Risk to Natural Hazards**, FEMA, January 2013
- **Hazard Mitigation Unified Guidance**, FEMA, July 12, 2013
- **Hazard Mitigation Assistance Guidance**, FEMA, February 27, 2015
- **Hazards Mitigation Plans**
 - Greenfield Hazard Mitigation Plan, 2014
 - Haverhill Hazard Mitigation Plan, 2017
 - Tamworth Hazard Mitigation Plan, 2019
 - Kingston Hazard Mitigation Plan, 2019
- **NH State Multi-Hazard Mitigation Plan**, 2018
 - https://prd.blogs.nh.gov/dos/hsem/wp-content/uploads/2015/11/State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018_FINAL.pdf
- **NH Division of Forests and Lands Quarterly Update**
 - <http://www.nhdfi.org/fire-control-and-law-enforcement/fire-statistics.aspx>
- **Disaster Mitigation Act (DMA) of 2000**, Section 101, b1 & b2 and Section 322a
 - <http://www.fema.gov/library/viewRecord.do?id=1935>
- **Economic & Labor Market Information Bureau**, NH Employment Security, July 2019; Community Response for Greenfield, Received, 6/5/18, Census 2000 and Revenue Information derived from this site;
 - <http://www.nhes.nh.gov/elmi/products/cp/profiles-htm/Greenfield.htm>

Photos

- Photos taken by MAPS unless otherwise noted.

Wildfire Links

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

Additional Websites

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

APPENDIX B: TECHNICAL & FINANCIAL ASSISTANCE FOR HAZARD MITIGATION

FEMA's Hazard Mitigation Assistance (HMA) grant programs provide funding FEMA's Hazard Mitigation Assistance (HMA) grant programs provide funding for eligible mitigation activities that reduce disaster losses and protect life and property from future disaster damages. Currently, FEMA administers the following HMA grant programs³¹:

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

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

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

HMA Grant Programs

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

A. Hazard Mitigation Grant Program (HMGP)

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

Table 3: Eligible Activities by Program

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

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

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

³¹ Information in Appendix B is taken from the following website and links to specific programs unless otherwise noted http://www.fema.gov/media-library-data/1424983165449-38f5dfc69c0bd4ea8a161e8bb7b79553/HMA_Guidance_022715_508.pdf

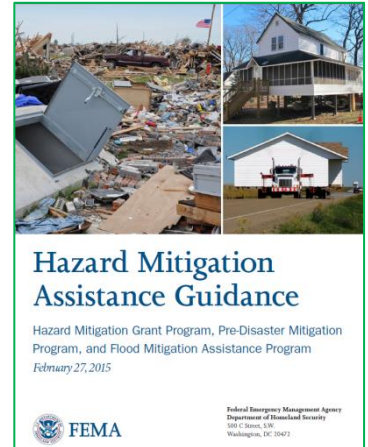
What is the Hazard Mitigation Grant Program?

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

Who is eligible to apply?

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

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



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

How are potential projects selected and identified?

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

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

B. Pre-Disaster Mitigation (PDM)

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

Program Overview

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

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

C. Flood Mitigation Assistance (FMA)

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

Program Overview

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

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

Types of FMA Grants

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

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

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

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

D. Repetitive Flood Claims (RFC)

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

Program Overview

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

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

Federal / Non-Federal Cost Share

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

E. Severe Repetitive Loss (SRL)

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

Program Overview

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

Definition

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

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

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

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

Purpose

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

Federal / Non-Federal cost share

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

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

http://www.fema.gov/media-library-data/1424983165449-38f5dfc69c0bd4ea8a161e8bb7b79553/HMA_Guidance_022715_508.pdf

APPENDIX C: THE EXTENT OF NATURAL HAZARDS

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

*SEVERE WINTER WEATHER

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

Snowstorms

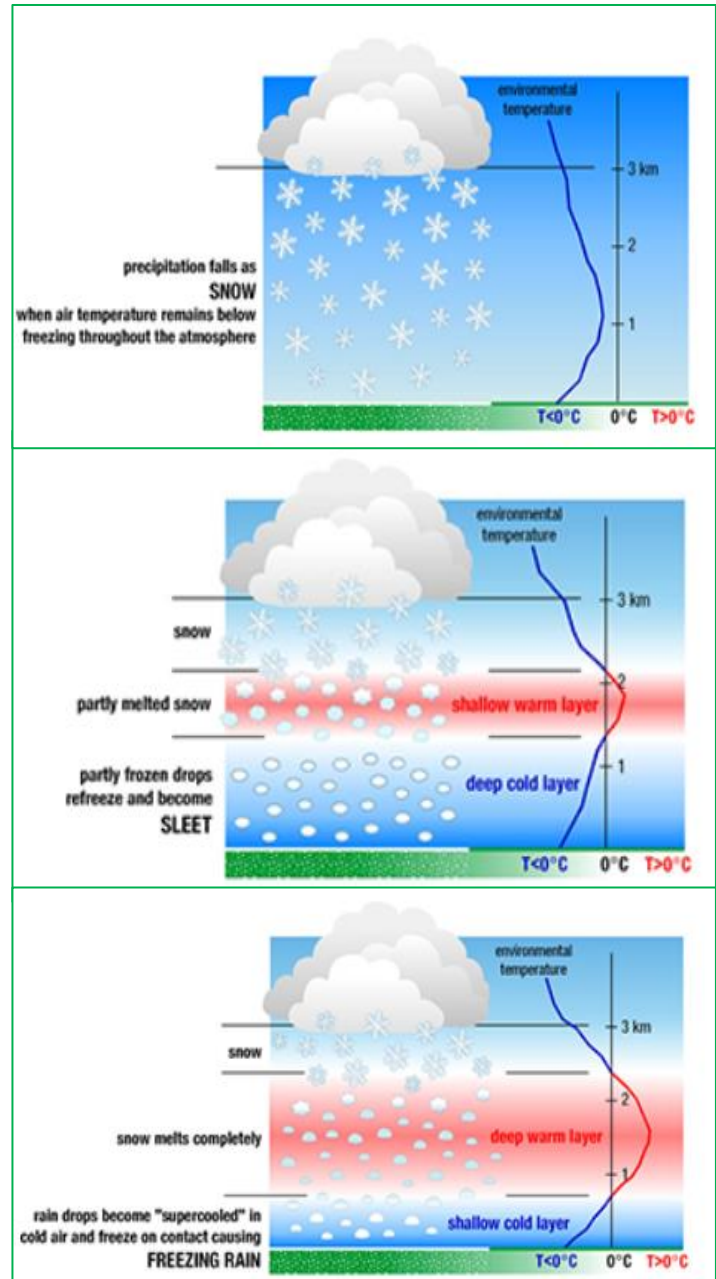
A winter storm can range from moderate snow to blizzard conditions. Blizzard conditions are considered blinding wind-driven snow over 35 mph that lasts several days. A severe winter storm deposits four or more inches of snow during a 12-hour period or six inches of snow during a 24-hour period.

Sleet

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

Freezing Rain & Ice Storms

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



Types of Severe Winter Weather
NOAA – National Severe Storms Laboratory

³² 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.³³

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	

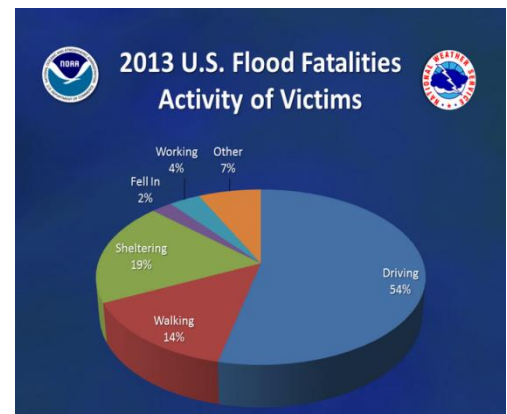
(Categories of damage are based upon combinations of precipitation totals, temperatures and wind speeds/directions.)

*INLAND FLOODING

General Flooding Conditions

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

Inland floods are most likely to occur in the spring due to the increase in rainfall and melting of snow; however, floods can occur at any time of the year. A sudden thaw in the winter or a major downpour in the summer can cause flooding because there is suddenly a lot of water in one place with nowhere to go; warm temperatures and heavy rains cause rapid snowmelt producing prime conditions for flooding. In addition, rising waters in early spring often breaks ice into chunks that float downstream and pile up, causing flooding behind them. Small rivers and streams pose special flooding risks because they are easily blocked by jams. Ice in riverbeds and against structures presents a significant flooding threat to bridges, roads and the surrounding lands.



³³ The Weather Channel, <http://www.weather.com/news/weather-winter/rating-ice-storms-damage-sperry-piltz-20131202>

Flooding (Dam Failure)

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

A “Dam” means any artificial barrier, including appurtenant works, which impounds or diverts water, and which has a height of 4 feet or more, or a storage capacity of 2 acre-feet or more, or is located at the outlet of a great pond^[1]. A dam failure occurs when water overtops the dam, or there is structural failure of the dam which causes there to be a breach and an unintentional release of water. Dams are classified in the following manner³⁴:

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

³⁴ <http://des.nh.gov/organization/commissioner/pip/factsheets/db/documents/db-15.pdf>

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". Flooding is often associated with hurricanes, heavy rains, ice jams and rapid snowmelt in the spring.

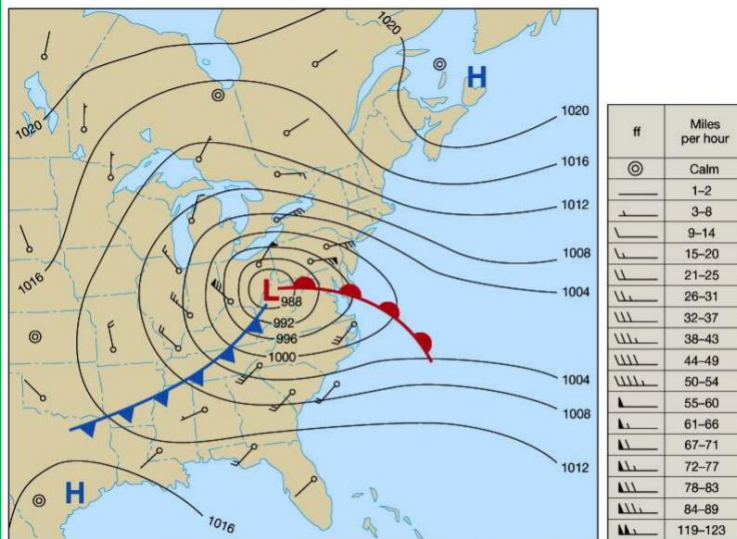
***HIGH WIND EVENTS**

Windstorm

As stated by NOAA (National Oceanic & Atmospheric Administration), wind is defined as "The horizontal motion of the air past a given point. Winds begin with differences in air pressures. Those pressures which are higher at one place than another place set up a force pushing from the high pressure toward the low pressure; the greater the difference in pressures, the stronger the force. The distance between the area of high pressure and the area of low pressure also determines how fast the moving air is accelerated. Meteorologists refer to the force that starts the wind flowing as the "pressure gradient force." High and low pressures are relative. There's no set number that divides high and low pressure. Wind is used to describe the prevailing direction from which the wind is blowing with the speed given usually in miles per hour or knots." In addition, NOAA's issuance of a Wind Advisory takes place when sustained winds reach 25 to 39 mph and/or gusts to 57 mph.^{35 36}

Pressure Gradient Force, PGF

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



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

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

³⁵ NOAA; <http://www.nws.noaa.gov/glossary/index.php?letter=w>

³⁶ Pressure Gradient Force Chart "snipped" from *Air Pressure and Wind*; https://www.weather.gov/media/zhz/ZHU_Training_Page/winds/pressure_winds/pressure_winds.pdf

Tornado

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

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

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

“Dr. T. Theodore Fujita developed the Fujita Tornado Damage Scale (F-Scale) to provide estimates of tornado strength based on damage surveys. Since it's practically impossible to make direct measurements of tornado winds, an estimate of the winds based on damage is the best way to classify a tornado. The new Enhanced Fujita Scale (EF-Scale) addresses some of the limitations identified by meteorologists and engineers since the introduction of the Fujita Scale in 1971. The new scale identifies 28 different free standing structures most affected by tornadoes taking into account construction quality and maintenance. The range of tornado intensities remains as before, zero to five, with 'EF-0' being the weakest, associated with very little damage and 'EF-5' representing complete destruction, which was the case in Greensburg, Kansas on May 4th, 2007, the first tornado classified as 'EF-5'. The EF scale was adopted on February 1, 2007.”³⁷ The chart (right), adapted from wunderground.com, shows a comparison of the Fujita Scale to the Enhanced Fujita Scale.

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

³⁷ 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.³⁸

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.³⁹

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	

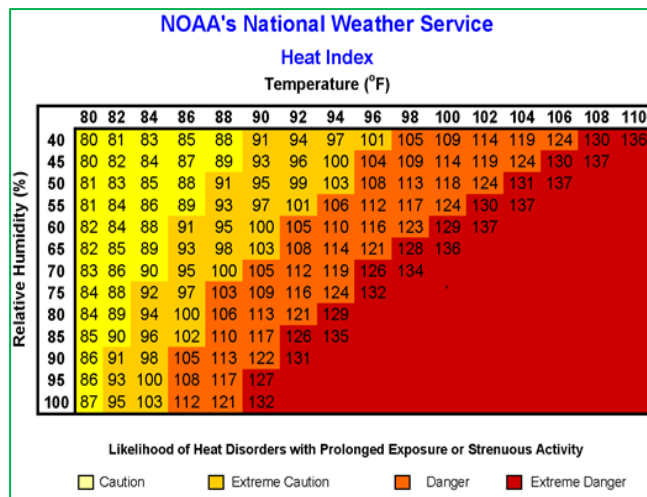
³⁸ NOAA - <http://www.srh.noaa.gov/jetstream/tstorms/wind.html>

³⁹ NOAA, Storm Prediction Center, <http://www.spc.noaa.gov/faq/tornado/beaufort.html>

EXTREME TEMPERATURES*Extreme Heat**

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

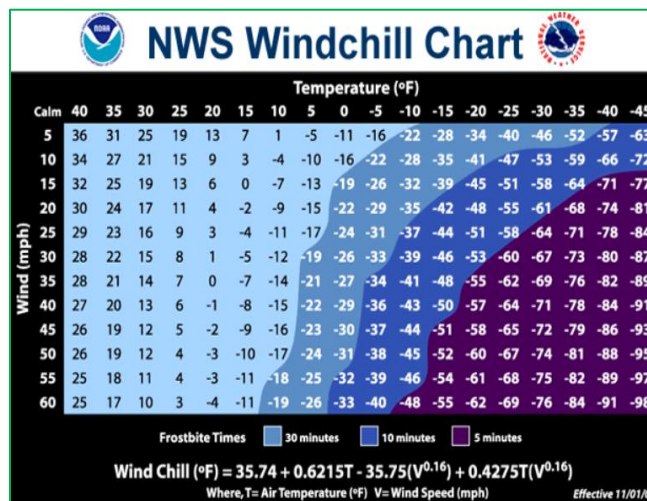
Most heat disorders occur because the victim has been overexposed to heat or has over-exercised for his or her age and physical condition. Older adults, young children and those who are sick or overweight are more likely to succumb to extreme heat.



Conditions that can induce heat-related illnesses include stagnant atmospheric conditions and poor air quality. Consequently, people living in urban areas may be at greater risk from the effects of a prolonged heat wave than those living in rural areas. Also, asphalt and concrete store heat longer and gradually release heat at night, which can produce higher nighttime temperatures known as the "urban heat island effect."⁴⁰ The chart above explains the likelihood of heat disorders that may result from high heat.⁴¹

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.⁴² The National Weather Service Chart (to the right) shows windchill as a result of wind and temperature.⁴³



⁴⁰ NOAA, Index/Heat Disorders; <http://www.srh.noaa.gov/ssd/html/heatwv.htm>

⁴¹ NOAA; <http://www.nws.noaa.gov/os/heat/index.shtml>

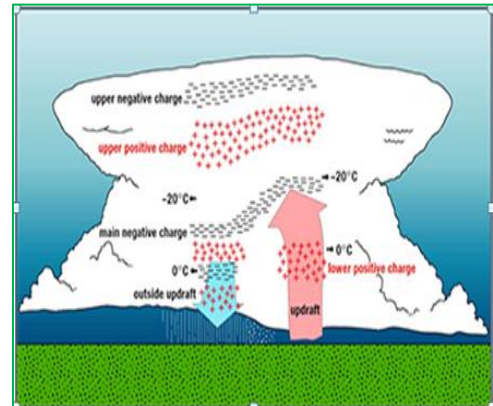
⁴² CDC; <http://www.bt.cdc.gov/disasters/winter/guide.asp>

⁴³ National Weather Service; <http://www.nws.noaa.gov/om/windchill/>

LIGHTNING*Lightning**

As stated by the NOAA National Severe Storms Laboratory (NSSL) “Lightning is a giant spark of electricity in the atmosphere between clouds, the air, or the ground. In the early stages of development, air acts as an insulator between the positive and negative charges in the cloud and between the cloud and the ground. When the opposite charges build up enough, this insulating capacity of the air breaks down and there is a rapid discharge of electricity that we know as lightning. The flash of lightning temporarily equalizes the charged regions in the atmosphere until the opposite charges build up again.”⁴⁴

Thunder, a result of lightning, is created when the “lightning channel heats the air to around 18,000 degrees Fahrenheit...”⁴⁵ 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; they may even occur during a winter snowstorm. Trees, tall buildings and mountains are often the targets of lightning because their tops are closer to the cloud; however, lightning is unpredictable and does not always strike the tallest thing in the area.

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

In general, lightning decreases across the U.S. mainland toward the northwest. Over the entire year, the highest frequency of cloud-to-ground lightning is in Florida between Tampa and Orlando. This is due to the presence, on many days during the year, of a large moisture content in the atmosphere at low levels (below 5,000 feet), as well as high surface temperatures that produce strong sea breezes along the Florida coasts. The western mountains of the U.S. also produce strong upward motions and contribute to frequent cloud-to-ground lightning. There are also high frequencies along the Gulf of Mexico coast, the Atlantic coast and in the southeast United States. US Regions along the Pacific west coast have the least cloud-to-ground lightning.”⁴⁶

⁴⁴ NOAA National Severe Storms Laboratory, <https://www.nssl.noaa.gov/education/svrwx101/lightning>

⁴⁵ Ibid

⁴⁶ Ibid

Lightning Activity Level (LAL) Grid

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

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

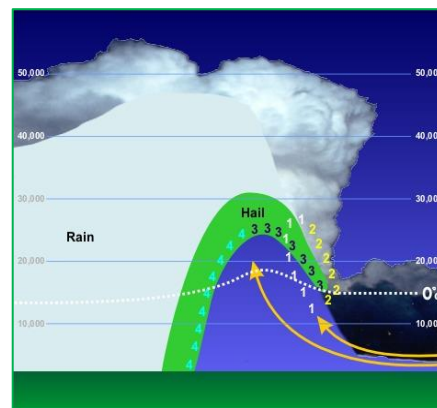
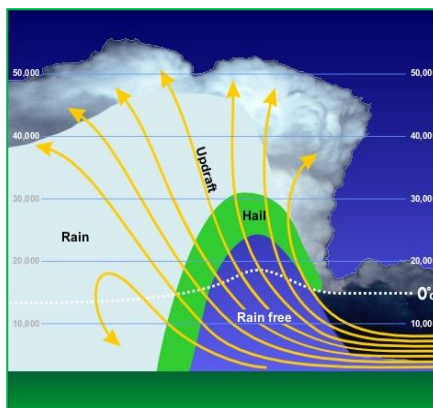
<http://www.prh.noaa.gov/hnl/pages/LAL.php>

Hailstorm

Hailstones are balls of ice that grow as they're held up by winds, known as updrafts that blow upwards in thunderstorms. The updrafts carry droplets of supercooled water, water at a below-freezing temperature that is not yet ice. The supercooled water droplets freeze into balls of ice and grow to become hailstones. The faster the updraft, the bigger the stones can grow. Most hailstones are smaller in diameter than a dime, but stones weighing more than a pound have been recorded. "The largest hailstone recovered in the US fell in Vivian, SD on June 23, 2010 with a diameter of 8 inches and a circumference of 18.62 inches. It weighed 1 lb. 15 oz."⁴⁷

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.⁴⁸ The charts to the right show how hail is formed.⁴⁹



⁴⁷ NOAA National Severe Storms Laboratory; <https://www.nssl.noaa.gov/education/svrwx101/hail/>

⁴⁸ <http://www.pinterest.com/pin/126171227030590678/>

⁴⁹ <http://oceanservice.noaa.gov/education/yos/resource/JetStream/tstorms/hail.htm#hail>

***WILDFIRES**

As stated by the National Wildfire Coordinating Group (NWCG), wildfires are designated in seven categories as seen in the top chart to the right.⁵⁰ For the purpose of statistical analysis, the US Forest Service recognizes the cause of fires according to the bottom chart to the right.⁵¹

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.”⁵²

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.

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

TROPICAL & POST-TROPICAL CYCLONES**Cyclones (Hurricanes)***

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

“The Saffir-Simpson Hurricane Wind Scale” (on the following page⁵³) is a 1 to 5 rating based on a hurricane's sustained wind speed. This scale estimates potential property damage. Hurricanes reaching Category 3 and higher are considered major hurricanes because of their potential for significant loss of life and damage. Category 1 and 2 storms are still dangerous and require preventative measures. In the western North Pacific, the term “super typhoon” is used for tropical cyclones with sustained winds exceeding 150 mph.”⁵⁴

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

Post-Tropical Cyclones

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

⁵⁰ <http://www.nwcg.gov/pms/pubs/glossary/s.htm>

⁵¹ https://www.fs.fed.us/cgi-bin/Directives/get_dirs/fsh?5109.14

⁵² International Wildland-Urban Interface Code, 2012, International Code Council, Inc.

⁵³ National Hurricane Center; <http://www.nhc.noaa.gov/aboutsshws.php>

⁵⁴ National Hurricane Center, NOAA; <http://www.nhc.noaa.gov/aboutsshws.php>

Rainfall from tropical storms has been reported at rates of up to 6 inches per hour; 43 inches of rain in a 24 hour period was reported in Alvin, TX as a result of Tropical Storm Claudette.⁵⁵

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

*EARTHQUAKES

An earthquake is a rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric and phone lines and often cause landslides, flash floods, fires and avalanches. Larger earthquakes usually begin with slight tremors but rapidly take the form of one or more violent shocks and end in vibrations of gradually diminishing force called aftershocks. The underground point of origin of an earthquake is called its focus; the point on the surface directly above the focus is the epicenter. The magnitude and intensity of an earthquake is widely determined by the use of two scales, the more commonly used Richter scale (measures strength or magnitude) and the Mercalli Scale (measures intensity or severity). The chart to the right shows the two scales relative to one another. The Richter Scale measures earthquakes starting at 1 as the lowest with each successive unit being about 10 times stronger and more severe than the previous one.⁵⁶

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

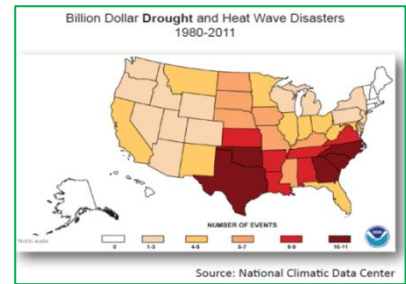
Modified Mercalli Scale		Richter Magnitude Scale
I	Detected only by sensitive instruments	1.5
II	Felt by few persons at rest, especially on upper floors; delicately suspended objects may swing	2
III	Felt noticeably indoors, but not always recognized as earthquake; standing autos rock slightly, vibration like passing truck	2.5
IV	Felt indoors by many, outdoors by few, at night some may awaken; dishes, windows, doors disturbed; autos rock noticeably	3
V	Felt by most people; some breakage of dishes, windows, and plaster; disturbance of tall objects	3.5
VI	Felt by all, many frightened and run outdoors; falling plaster and chimneys, damage small	4
VII	Everybody runs outdoors; damage to buildings varies depending on quality of construction; noticed by drivers of autos	4.5
VIII	Panel walls thrown out of frames; fall of walls, monuments, chimneys; sand and mud ejected; drivers of autos disturbed	5
IX	Buildings shifted off foundations, cracked, thrown out of plumb; ground cracked; underground pipes broken	5.5
X	Most masonry and frame structures destroyed; ground cracked, rails bent, landslides	6
XI	Few structures remain standing; bridges destroyed, fissures in ground, pipes broken, landslides, rails bent	6.5
XII	Damage total; waves seen on ground surface, lines of sight and level distorted, objects thrown up in air	7
		7.5
		8

⁵⁵ http://www.wpc.ncep.noaa.gov/research/mcs_web_test_test_files/Page1637.htm

⁵⁶ Modified Mercalli Scale/Richter Scale Chart; MO DNR, http://www.dnr.mo.gov/geology/geosrv/geores/richt_mercalli_relation.htm

***DROUGHT**

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



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

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

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

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

LANDSLIDE

Erosion is the wearing 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.⁵⁷

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

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

There are also multiple types of landslides:

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

Like flooding, landslides are unique in how they affect different geographic, topographic, and geologic areas. Therefore, consideration of a multitude of measurements is required to determine the severity of the landslide event.⁵⁸

*INFECTIOUS DISEASES

Bacterial & Viral Infections

There are many organisms that live inside our bodies and on our skin. These organisms are generally harmless and sometimes may even be helpful, they can cause illnesses. Infectious diseases can be transmitted from one person to another, by bites from animals or insects (zoonotic), from the environment or by consuming food or water that has been contaminated. Infectious diseases may be caused by bacteria, viruses, fungi and parasites.⁵⁹

Some of the more common infectious diseases include Lyme disease, HIV/AIDS, Tuberculosis, Rabies, West Nile Virus, Eastern Equine Encephalitis (EEE), Ebola, Avian Flu, Enterovirus D-68, Influenza, Hepatitis A, Zika Virus, Meningitis, Legionella, Sexually Transmitted Diseases (STD), Hepatitis C, Salmonella, SARS and Staph.⁶⁰

⁵⁷ Mitigation Ideas, A Resource for Reducing Risk to Natural Hazards, FEMA, January 2013

⁵⁸ State of New Hampshire Multi-Hazard Mitigation Plan Update 2018 & <https://oas.org/dsd/publications/Unit/oea66e/ch10.htm>

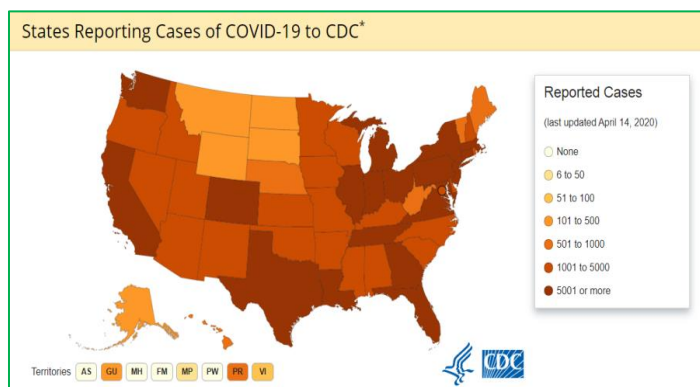
⁵⁹ <https://www.mayoclinic.org/diseases-conditions/infectious-diseases/symptoms-causes/syc-20351173>

⁶⁰ <https://www.dhhs.nh.gov/dphs/cdcs/index.htm>

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

Bacterial and viral infections can cause similar symptoms such as coughing and sneezing, fever, inflammation, vomiting, diarrhea, fatigue, and cramping – all of which are ways the immune system tries to rid the body of infectious organisms. But bacterial and viral infections are dissimilar in many other important respects, most of them due to the organisms’ structural differences and the way they respond to medications.”⁶¹

In early 2020, a novel coronavirus emerged in China which then spread worldwide to become the worst pandemic since the 1918 Spanish Flu. Known as COVID-19, this novel coronavirus had infected 1,956,077 people and caused the deaths of 125,123 individuals worldwide as of April 14, 2020. In the US, 589,048 cases were reported along with 23,163 deaths⁶² as of this date. The majority of US residents have been advised to “stay-at-home” by State Governors; businesses have been closed in an effort to “flatten” the rising curve of confirmed cases through mitigation. As of April 2020, mitigation efforts appear to be working; however, nationwide testing and an effective vaccine have not been developed. Stay-at-home orders are expected to remain in place until it is determined by Governors and health experts that a gradual return-to-work can take place. This is an evolving worldwide crisis, effecting millions of workers in the United States and presenting massive economic results. Although most people who have been confirmed with COVID-19 eventually recover, the virus has had a particular impact on the elderly and compromised individuals, particularly those in confined living quarters such as nursing homes and prisons.



The extent of infectious diseases is generally described by the level and occurrence of a particular disease as follows⁶³:

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

⁶¹ <https://www.webmd.com/a-to-z-guides/bacterial-and-viral-infections#1>

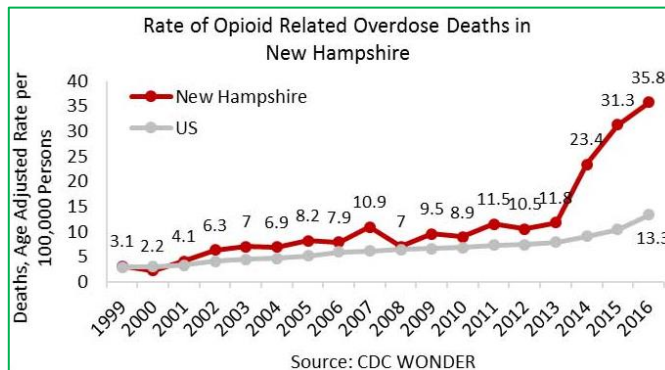
⁶² Johns Hopkins University, <https://coronavirus.jhu.edu/map.html>

⁶³ <https://www.cdc.gov/ophss/csels/dsepd/ss1978/lesson1/section11.html>

Opioid Crisis

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

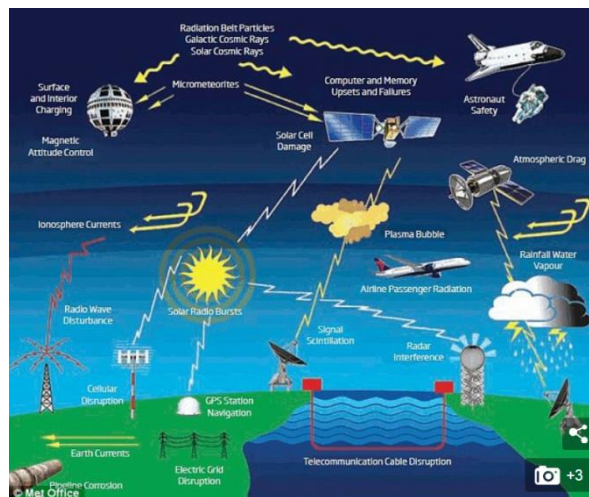
According to the National Institute on Drug Abuse, “New Hampshire has the second highest rate of opioid-related overdose deaths – a rate of 35.8 deaths per 100,000 persons – nearly 3 times higher than the national rate of 13.2 deaths per 100,000. From 2013 through 2016, opioid-related deaths in New Hampshire tripled. This increase was mainly driven by the number of deaths related to synthetic opioids (predominately fentanyl), which increased more than tenfold, from 30 to 363 deaths, during this time.”⁶⁴ The chart to the right shows the increase in opioid-related overdose deaths in New Hampshire compared to those in the US overall.⁶⁵



SOLAR STORM & SPACE WEATHER

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

Charged magnetic particles can produce their own magnetic field which can disrupt navigation and communication systems and GPS satellites and can potentially produce Geomagnetic Induced Currents (GICs) which can affect the power grid and pipelines. An electromagnetic surge from a solar storm has potential to produce an Electromagnetic Pulse (EMP) which could cause significant damage to infrastructure such as nuclear power plants, banking systems, the electrical grid, sewage treatment facilities, cell phones, landlines and even vehicles. The image above shows the potential impacts from solar storm and space weather.⁶⁶



⁶⁴ <https://www.drugabuse.gov/drugs-abuse/opioids/opioid-summaries-by-state/new-hampshire-opioid-summary>

⁶⁵ Ibid

⁶⁶ <https://www.dailymail.co.uk/sciencetech/article-3764842/A-solar-storm-destroy-planet-unless-create-massive-magnetic-shield-protect-Earth-warns-expert.html>

Solar Storm & Space Weather Extent⁶⁷

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

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

⁶⁷ Extent charts taken from <https://www.weather.gov/akq/SpaceWeather>

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

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

AVALANCHES

According to the National Snow & Ice Data Center “An avalanche is a rapid flow of snow down a hill or mountainside. Although avalanches can occur on any slope given the right conditions, certain times of the year and certain locations are naturally more dangerous than others. Wintertime, particularly from December to April, is when most avalanches tend to happen. However, avalanche fatalities have been recorded for every month of the year.”⁶⁸



“All that is necessary for an avalanche is a mass of snow and a slope for it to slide down...A large avalanche in North America might release 230,000 cubic meters (300,000 cubic yards) of snow. That is the equivalent of 20 football fields filled 3 meters (10 feet) deep with snow. However, such large avalanches are often naturally released, when the snowpack becomes unstable and layers of snow begin to fail. Skiers and recreationalists usually trigger smaller, but often more deadly avalanches.”

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

There are three main parts to an avalanche (see image above). The first and most unstable is the “starting zone”, where the snow can “fracture” and slide. “Typical starting zones are higher up on slopes. However, given the right conditions, snow can fracture at any point on the slope.”⁶⁹

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.”⁷⁰

⁶⁸ Copyright Richard Armstrong, NSIDC, <http://nsidc.org/cryosphere/snow/science/avalanches.html>

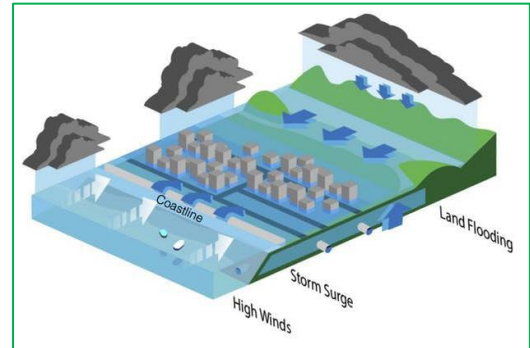
⁶⁹ NSIDC, <http://nsidc.org/cryosphere/snow/science/avalanches.html>; image credit: Betsy Armstrong

⁷⁰ Copyright Richard Armstrong, NSIDC, <http://nsidc.org/cryosphere/snow/science/avalanches.html>

When the possibility of an avalanche is evident, an “avalanche advisory” is issued. This preliminary notification warns hikers, skiers, snowmobilers and responders that conditions may be favorable for the development of avalanches. The chart above shows avalanche danger as determined by likelihood, size & distribution.⁷¹

COASTAL FLOODING

Coastal areas are particularly susceptible to the hazards such as flooding, erosion, storm surge and sea-level rise as a result of tropical and post-tropical cyclones, heavy rain events and gale-force winds and other natural phenomena. The flooding that results is “*determined by a combination of several factors such as storm intensity, forward speed, storm area size, coastline characteristics, angle of approach to the coast, tide height.*”⁷²



The severity of the flooding can vary depending on “*both the speed of onset (how quickly the floodwaters rise) and the flood duration. Nor’easters can impact the region for several days and produce storm surge with or without the addition of inland runoff from heavy precipitation.*”⁷³ As shown in the image above, not only storm surge but also inland flooding can affect the severity of flooding along the shore.⁷⁴

⁷¹ http://www.avalanche.org/danger_card.php

⁷² NH Multi-hazard Mitigation Plan-2018, page 55

⁷³ Ibid

⁷⁴ Ibid, page 53, “Understanding compound flooding from land and ocean sources”, Theodore Scontras, University of Maine)

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APPENDIX D: NH MAJOR DISASTER & EMERGENCY DECLARATIONS**Major Disaster (DR) & Emergency Declarations (EM)**

This list includes one Fire Management Assistance Declaration (FM)
 Declarations are arranged chronologically, the most recent disaster is listed first

Number	Hazard	Date of Event	Counties	Description
DR-4516	Infectious Disease	January 20, 2020 – ongoing	All Ten NH Counties	Major Disaster Declaration, DR-4516: The Federal Emergency Management Agency ("FEMA") within the US Department of Homeland Security is giving public notice of its intent to provide assistance to the State of New Hampshire, local and tribal governments, and certain private nonprofit organizations under the major disaster declaration issued by the President on April 3, 2020, as a result of the Coronavirus Disease 2019 ("COVID-19").
EM-3445	Infectious Disease	January 20, 2020 – ongoing	All Ten NH Counties	Emergency Declaration EM-3445: Ten county declaration to provide individual assistance and public assistance as a result of the impact of COVID-19
DR-4457	Severe Storm & Flooding	July 11-12, 2019	Grafton	Major Disaster Declaration, DR-4457: The Federal Emergency Management Agency announced a major disaster declaration for a period of severe storms and flooding from July 11-12, 2019 in one New Hampshire County.
DR-4371	Severe Winter Storm & Snowstorm	March 13-14, 2018	Carroll, Strafford & Rockingham	Major Disaster Declaration, DR 4371: The Federal Emergency Management Agency announced a major disaster declaration on June 8, 2018 for a period of a severe winter storm from March 13-14, 2018.
DR-4370	Severe Storm & Flooding	March 2-8, 2018	Rockingham	Major Disaster Declaration, DR 4370: The Federal Emergency Management Agency announced a major disaster declaration on June 8, 2018 for a period of severe storms and flooding from March 2-8, 2018.
DR-4355	Severe Storms, Flooding	October 29-November 1, 2017	Sullivan, Grafton, Coos, Carroll, Belknap & Merrimack	Major Disaster Declaration, DR-4355: The Federal Emergency Management Agency (FEMA) announced that federal disaster assistance is available to the state of New Hampshire to supplement state and local recovery efforts in the areas affected by severe storms and flooding from October 29-November 1, 2017 in five New Hampshire Counties.
DR-4329	Severe Storms, Flooding	July 1-2, 2017	Grafton & Coos	Major Disaster Declaration DR-4329: The Federal Emergency Management Agency (FEMA) announced that federal disaster assistance is available to the state of New Hampshire to supplement state and local recovery efforts in the areas affected by severe storms and flooding from July 1, 2017 to July 2, 2017 in Grafton County
DR-4316	Severe Winter Storm and Snowstorm	March 14-15, 2017	Belknap & Carroll	Major Disaster Declaration DR-4316: Severe winter storm and snowstorm in Belknap & Carroll Counties; disaster aid to supplement state and local recovery efforts.
FM-5123	Forest Fire	April 21-23, 2016	Cheshire	Fire Management Assistance Declaration, FM-5123: Stoddard, NH
DR-4209	Severe Winter Storm and Snowstorm	January 26-28, 2015	Hillsborough, Rockingham & Stafford	Major Disaster Declaration DR-4209: Severe winter storm and snowstorm in Hillsborough, Rockingham and Strafford Counties; disaster aid to supplement state and local recovery efforts.

Number	Hazard	Date of Event	Counties	Description
DR-4139	Severe Storms, Flooding	July 9-10, 2013	Cheshire, Sullivan & Grafton	Major Disaster Declaration DR-4139: Severe storms, flooding, and landslides during the period of June 26 to July 3, 2013 in Cheshire, Sullivan and southern Grafton Counties.
DR-4105	Severe Winter Storm	February 8, 2013	All Ten NH Counties	Major Disaster Declaration DR-4105: Nemo; heavy snow in February 2013.
DR-4095	Hurricane Sandy	October 26-November 8, 2012	Belknap, Carroll, Coos, Grafton, Rockingham & Sullivan	Major Disaster Declaration DR-4095: The declaration covers damage to property from the storm that spawned heavy rains, high winds, high tides and flooding over the period of October 26-November 8, 2012.
EM-3360	Hurricane Sandy	October 26-31, 2012	All Ten NH Counties	Emergency Declaration EM-3360: Hurricane Sandy came ashore in NJ and brought high winds, power outages and heavy rain to NH. Declared in all ten counties in the State of New Hampshire.
DR-4065	Severe Storm & Flooding	May 29-31, 2012	Cheshire	Major Disaster Declaration DR-4065: Severe Storm and Flood Event May 29-31, 2012 in Cheshire County.
DR-4049	Severe Storm & Snowstorm	October 29-30, 2011	Hillsborough & Rockingham	Major Disaster Declaration DR-4049: Severe Storm and Snowstorm Event October 29-30, 2011 in Hillsborough and Rockingham Counties.
EM-3344	Severe Snowstorm	October 29-30, 2011	All Ten NH Counties	Emergency Declaration EM-3344: Severe storm during the period of October 29-30, 2011; all ten counties in the State of New Hampshire. (Snowtober)
DR-4026	Tropical Storm Irene	August 26-September 6, 2011	Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, & Sullivan	Major Disaster Declaration DR-4026: Tropical Storm Irene Aug 26th- Sept 6, 2011 in Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, & Sullivan Counties.
EM-3333	Tropical Storm Irene	August 26-September 6, 2011	All Ten NH Counties	Emergency Declaration EM-3333: Emergency Declaration for Tropical Storm Irene for in all ten counties.
DR-4006	Severe Storm & Flooding	May 26-30, 2011	Coos & Grafton Counties	Major Disaster Declaration DR-4006: May Flooding Event, May 26th-30th 2011 in Coos & Grafton County. (Memorial Day Weekend Storm)
DR-1913	Severe Storms & Flooding	March 14-31, 2010	Hillsborough & Rockingham	Major Disaster Declaration DR-1913: Flooding to two NH counties including Hillsborough and Rockingham counties.
DR-1892	Severe Winter Storm, Rain & Flooding	February 23 - March 3, 2010	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan	Major Disaster Declaration: DR-1892: Flood and wind damage to most of southern NH including six counties; 330,000 homes without power; more than \$2 million obligated by June 2010.
DR-1812	Severe Winter Storm & Ice Storm	December 11-23, 2008	All Ten NH Counties	Major Disaster Declaration DR-1812: Damaging ice storms to entire state including all ten NH counties; fallen trees and large scale power outages; five months after December's ice storm pummeled the region, nearly \$15 million in federal aid had been obligated by May 2009.

Number	Hazard	Date of Event	Counties	Description
EM-3297	Severe Winter Storm	December 11, 2008	All Ten NH Counties	Emergency Declaration EM-3297: Severe winter storm beginning on December 11, 2008.
DR-1799	Severe Storms & Flooding	September 6-7, 2008	Hillsborough	Major Disaster Declaration: DR-1799: Severe storms and flooding beginning on September 6, 2008.
DR-1787	Severe Storms & Flooding	July 24-August 14, 2008	Belknap, Carroll & Grafton & Coos	Major Disaster Declaration DR-1787: Severe storms, tornado, and flooding on July 24, 2008.
DR-1782	Severe Storms, Tornado, & Flooding	July 24, 2008	Belknap, Carroll, Merrimack, Strafford & Rockingham	Major Disaster Declaration DR-1782: Tornado damage to several NH counties.
DR-1695	Nor'easter, Severe Storms & Flooding	April 15-23, 2007	All Ten NH Counties	Major Disaster Declaration DR-1695: Flood damages; FEMA & SBA obligated more than \$27.9 million in disaster aid following the April nor'easter. (Tax Day Storm)
DR-1643	Severe Storms & Flooding	May 12-23, 2006	Belknap, Carroll, Grafton, Hillsborough, Merrimack, Rockingham & Strafford	Major Disaster Declaration DR-1643: Flooding in most of southern NH; May 12-23, 2006. (aka: Mother's Day Storm)
DR-1610	Severe Storms & Flooding	October 7-18, 2005	Belknap, Cheshire, Grafton, Hillsborough, Merrimack & Sullivan	Major Disaster Declaration DR-1610: To date, state and federal disaster assistance has reached more than \$3 million to help residents and business owners in New Hampshire recover from losses resulting from the severe storms and flooding in October 2005.
EM-3258	Hurricane Katrina Evacuation	August 29-October 1, 2005	All Ten NH Counties	Emergency Declaration EM-3258: Assistance to evacuees from the area struck by Hurricane Katrina and to provide emergency assistance to those areas beginning on August 29, 2005, and continuing; The President's action makes federal funding available to the state and all 10 counties of the State of New Hampshire.
EM-3211	Snow	March 11-12, 2005	Carroll, Cheshire, Hillsborough, Rockingham & Sullivan	Emergency Declaration EM-3211: March snowstorm; more than \$2 million has been approved to help pay for costs of the snow removal; Total aid for the March storm is \$2,112,182.01 (Carroll: \$73,964.57; Cheshire: \$118,902.51; Hillsborough: \$710,836; Rockingham: \$445,888.99; Sullivan: \$65,088.53; State of NH: \$697,501.41)
EM-3208	Snow	February 10-11, 2005	Carroll, Cheshire, Coos, Grafton & Sullivan	Emergency Declaration EM-3208: FEMA had obligated more than \$1 million by March 2005 to help pay for costs of the heavy snow and high winds; Total aid for the February storm is \$1,121,727.20 (Carroll: \$91,832.72; Cheshire: \$11,0021.18; Coos: \$11,6508.10; Grafton: \$213,539.52; Sullivan: \$68,288.90; State of NH: \$521,536.78)

Number	Hazard	Date of Event	Counties	Description
EM 3208-002	Snow	January, February, March 2005	Belknap, Carroll, Cheshire, Grafton, Hillsborough, Rockingham, Merrimack, Strafford & Sullivan	Emergency Declaration EM 3208-002: The federal Emergency Management Agency (FEMA) has obligated more than \$6.5 million to reimburse state and local governments in New Hampshire for costs incurred in three snowstorms that hit the state earlier this year, according to disaster recovery officials. Total aid for all three storms is \$6,892,023.87 (January: \$3,658,114.66; February: \$1,121,727.20; March: \$2,113,182.01)
EM-3207	Snow	January 22-23, 2005	Belknap, Carroll, Cheshire, Grafton, Hillsborough, Rockingham, Merrimack, Strafford & Sullivan	Emergency Declaration EM-3207: More than \$3.5 million has been approved to help pay for costs of the heavy snow and high winds; Total aid for the January storm is \$3,658,114.66 (Belknap: \$125,668.09; Carroll: \$52,864.23; Cheshire: \$134,830.95; Grafton: \$137,118.71; Hillsborough: \$848,606.68; Merrimack: \$315,936.55; Rockingham: \$679,628.10; Strafford: \$207,198.96; Sullivan: \$48,835.80; State of NH: \$1,107,426.59)
EM-3193	Snow	December 6-7, 2003	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack & Sullivan	Emergency Declaration EM-3193: The declaration covers jurisdictions with record and near-record snowfall that occurred over the period of December 6-7, 2003
DR-1489	Severe Storms & Flooding	July 21-August 18, 2003	Cheshire & Sullivan	Major Disaster Declaration DR-1489: Floods stemming from persistent rainfall and severe storms that caused damage to public property occurring over the period of July 21 through August 18, 2003.
EM-3177	Snowstorm	February 17-18, 2003	Cheshire, Hillsborough, Merrimack, Rockingham & Strafford	Emergency Declaration EM-3177: Declaration covers jurisdictions with record and near-record snowfall from the snowstorm that occurred February 17-18, 2003
EM-3166	Snowstorm	March 5-7, 2001	Cheshire, Coos, Grafton, Hillsborough, Merrimack, Rockingham & Strafford	Emergency Declaration EM-3166: Declaration covers jurisdictions with record and near-record snowfall from the late winter storm that occurred March 2001
DR-1305	Tropical Storm Floyd	September 16-18, 1999	Belknap, Cheshire & Grafton	Major Disaster Declaration DR-1305: The declaration covers damage to public property from the storm that spawned heavy rains, high winds and flooding over the period of September 16-18.
DR-1231	Severe Storms & Flooding	June 12-July 2, 1998	Belknap, Carroll, Grafton, Hillsborough, Merrimack & Rockingham	Major Disaster Declaration DR-1231:
DR-1199	Ice Storm	January 7-25, 1998	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, Strafford & Sullivan	Major Disaster Declaration DR-1199:

Number	Hazard	Date of Event	Counties	Description
DR-1144	Severe Storms/Flooding	October 20-23, 1996	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan	Major Disaster Declaration DR-1144:
DR-1077	Storms/Floods	October 20-November 15, 1995	Carroll, Cheshire, Coos, Grafton, Merrimack & Sullivan	Major Disaster Declaration DR-1077:
EM-3101	High Winds & Record Snowfall	March 13-17, 1994	All Ten NH Counties	Emergency Declaration EM-3101:
DR-923	Severe Coastal Storm	October 30-31, 1991	Rockingham	Major Disaster Declaration DR-923:
DR-917	Hurricane Bob, Severe Storm	August 18-20, 1991	Carroll, Hillsborough, Rockingham & Strafford	Major Disaster Declaration DR-917:
DR-876	Flooding, Severe Storm	August 7-11, 1990	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, & Sullivan	Major Disaster Declaration DR-876:
DR-789	Severe Storms & Flooding	March 30-April 11, 1987	Carroll, Cheshire, Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan	Major Disaster Declaration DR-789
DR-771	Severe Storms & Flooding	July 29-August 10, 1986	Cheshire, Hillsborough & Sullivan	Major Disaster Declaration DR-771:
EM-3073	Flooding	March 15, 1979	Coos	Emergency Declaration EM-3073:
DR-549	High Winds, Tidal Surge, Coastal Flooding & Snow	February 16, 1978	All Ten NH Counties	Major Disaster Declaration DR-549: Blizzard of 1978
DR-411	Heavy Rains, Flooding	January 21, 1974	Belknap, Carroll, Cheshire & Grafton	Major Disaster Declaration DR-411:
DR-399	Severe Storms & Flooding	July 11, 1973	All Ten NH Counties	Major Disaster Declaration DR-399:
DR-327	Coastal Storms	March 18, 1972	Rockingham	Major Disaster Declaration DR-327:
DR-11	Forest Fire	July 2, 1953	Carroll	Major Disaster Declaration DR-11:

Source:

Disaster Declarations for New Hampshire

http://www.fema.gov/disasters/grid/state-tribal-government/33?field_disaster_type_term_tid_1=All

APPENDIX E: HAZARD MITIGATION PLANNING – LIST OF ACRONYMS

AAR	After Action Report	HSEM	Homeland Security Emergency Management
ACS	Acute Care Site	HSPD	Homeland Security Presidential Directive
ARC	American Red Cross	IAP	Incident Action Plan
ARES	Amateur Radio Emergency Service	IC	Incident Commander
BFE	Base Flood Elevation	ICC	Incident Command Center
BOCA	Building Officials and Code Administrators	ICS	Incident Command System
CBRNE	Chemical, Biological, Radiological,	JIC	Joint Information Center
CDC	Centers for Disease Control and Prevention	LEOP	Local Emergency Operations Plan
CDP	Center for Domestic Preparedness	MAPS	Mapping and Planning Solutions
CERT	Community Emergency Response Team	MCI	Mass Casualty Incident
CFR	Code of Federal Regulations	MEF	Mission Essential Function
CIKR	Critical Infrastructure & Key Resources	MOU	Memorandum of Understanding
CIP	Capital Improvements Program	NAWAS	National Warning System
COG	Continuity of Government	NEF	National Essential Function
COGCON	Continuity of Government Readiness Conditions	NERF	Non-Emergency Response Facility
COOP	Continuity of Operations	NFIP	National Flood Insurance Program
CPCC	Continuity Policy Coordination Committee	NGVD	National Geodetic Vertical Datum of 1929
CWPP	Community Wildfire Protection Plan	NIMS	National Incident Management System
DBHRT	Disaster Behavioral Health Response Team	NOAA	National Oceanic and Atmospheric Association
DEMD	Deputy Emergency Management Director	NRP	National Response Plan
DES	Department of Environment Services	NSPD	National Security Presidential Directive
DFO	Disaster Field Office	NTAS	National Terrorism Advisory System
DHHS	Department of Health and Human Services		Nuclear, and Explosive
DHS	Department of Homeland Security	NWS	National Weather Service
DMCR	Disaster Management Central Resource	OSI	Office of Strategic Initiatives
DNCR	Department of Natural & Cultural Resources	PA	Public Assistance
DOD	Department of Defense	PDA	Preliminary Damage Assessment
DOE	Department of Energy	PDD	Presidential Decision Directive
DOJ	Department of Justice	PIO	Public Information Officer
DOT	Department of Transportation	PMEF	Primary Mission Essential Function
DPW	Department of Public Works	POD	Point of Distribution
DRC	Disaster Recovery Center	PPE	Personal Protective Equipment
EAS	Emergency Alert System	PR	Potential Resources
EMD	Emergency Management Director	PSA	Public Service Announcement
EMS	Emergency Medical Services	RERP	Radiological Emergency Response Plan
EO	Executive Order	RNAT	Rapid Needs Assessment Team
EOC	Emergency Operations Center	SERT	State Emergency Response Team
EPA	U.S. Environmental Protection Agency	SITREP	Situation Report (Also SitRep)
EPZ	Emergency Planning Zone	SNS	Strategic National Stockpile
ERF	Emergency Response Facility	SOG	Standard Operating Guidelines
ERG	Emergency Relocation Group	SOP	Standard Operating Procedures
ESF	Emergency Support Functions	SPNHF	Society for the Protection of NH Forests
FEMA	Federal Emergency Management Agency	UC	Unified Command
FIRM	Flood Insurance Rate Map	USDA-FS	Department of Agriculture – Forest Service
FPP	Facilities & Populations to Protect	USGS	United States Geological Society
GIS	Geographic Information System	VOAD	Volunteer Organization Active in Disasters
HazMat	Hazardous Material(s)	WMD	Weapon(s) of Mass Destruction
HFRA	Healthy Forest Restoration Act	WMNF	White Mountain National Forest
HMGP	Hazard Mitigation Grant Program	WUI	Wildland Urban Interface
HSAS	Homeland Security Advisory System		

APPENDIX F: POTENTIAL MITIGATION IDEAS⁷⁵**Drought**

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

Earthquake

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

Erosion

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

Extreme Temperatures

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

Hailstorm

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

Landslide

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

Lightning

- L1..... Protect Critical Facilities
- L2..... Conduct Lightning Awareness Programs

Flood

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

Severe Wind

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

Severe Winter Weather

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

Tornado

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

⁷⁵ Mitigation Ideas, A Resource for Reducing Risk to Natural Hazards, FEMA, January 2013

Wildfire

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

Multi-Hazards

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

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Meeting House – Greenfield, NH

Photo Credit: <https://www.greenfield-nh.gov/about-greenfield/slideshows/images-around-town>

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