Greenville Hazard Mitigation Plan Update 2021

Greenville, New Hampshire

Photo from Town Website

Prepared by the:

Town of Greenville Hazard Mitigation Work Group

&

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FEMA Final Approval: (add date)

FEMA

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TABLE OF CONTENTS

Executive Summary

The Greenville Hazard Mitigation Plan serves as a means to reduce future losses from natural or man-made hazard events before they occur. The Plan was developed by the Greenville Hazard Mitigation Work Group.

Natural hazards are addressed as follows:

- Flooding
- High Wind events (Tornado, Downburst)
- Wildfire
- Severe Winter Weather
- Tropical Storms & Hurricanes
- Drought
- Extreme Temperatures
- Landslides
- Lightning
- Infectious Disease, Pandemic
- Aging Infrastructure
- Transport Accident

The Greenville Hazard Mitigation Work Group, as shown per Chapters III and IV, identified "Critical Facilities" and "Areas at Risk" as follows:

Critical Facilities

- Emergency Operations Center
- Fire Station
- Police Station
- Ambulance Service
- Emergency Fuel Facilities
- Emergency Electrical Power Facility
- Emergency Shelters
- Dry Hydrants/Fire Ponds/Water Sources
- Evacuation Routes and Bridges (Primary)
- Town Garage/Transfer Station
- Communications
- Hospitals
- Helicopter Landing Sites

Areas at Risk

- Areas southeast of Old Wilton Road/Baker Street
- Areas west of Main Street where Souhegan River flows through Town Center
- White Street
- Mill Street/Hubbard Hill Road Intersection
- Livingston Road
- Adams Hill Road near NH 31 Intersection
- Southeast of Intersection of NH 31 and Mason Road
- Intersection of East Road/ Kimball Road/Richardson Road Area
- NH 31 and New Hill Crest Road Area
- Hemlock Hills
- Area between NH 31 and Adams Hill Road
- NH 31 East of NH 31 and North of Mason Road
- Intersection of Maldarelli Road and Barrett Road
- Merriam Hill Road and Mason Road
- Barrett Hill Road
- Area between Cross Street and Adams Hill Road
- High Street
- Adams Hill Road Area

The Greenville Hazard Mitigation Work Group identified existing hazard mitigation programs as follows:

- Town adopted Building Code
- Building Inspector
- Emergency Back-up Power
- Local Road Design Standards
- Local Bridge Maintenance Program
- Local Road Maintenance Program
- Winter Storm Operations Plan
- Town Master Plan
- Mutual Aid - Police, Fire, Ambulance and Highway
- Fire Pond and Dry Hydrant Management Plan
- Hazardous Materials Spill Prevention Control & Counter Measures Plan
- Town Radio System
- Slash Monitoring
- Town Sponsored Safety Awareness Program
- Ambulance Service
- Floodplain Ordinance
- Health Officer
- Tree Maintenance Program
- Emergency Management Plan
- Fire Codes (NFPA)
- Beaver Control /Monitoring

The Greenville Hazard Mitigation Work Group prioritized newly identified hazard mitigation strategies as follows:

- Update Town website to include Hazard Mitigation methods and emergency preparedness for homeowners. Consider adding links to NH HSEM and FEMA for additional outreach information.
- Inspect culverts after heavy rain events. Clean every 2-5 years unless needed sooner.
- Update the Emergency Operations Plan in 2021, to include integration of the Hazard Mitigation Plan. Begin process to secure funding in Fall of 2020.
- Continue operation-level training of Fire Fighters and Police Officers.
- Investigate and potentially install a fire danger sign at visible location.
- Develop an Implementation Plan for Green Bridge. Consider using the State Aid Bridge Program and CDBG.
- Develop a maintenance plan for fire ponds and encourage expanding hydrant access through economic development.
- Send written notification to NHDOT District 4, a list of needed repairs & upgrades to state highways and culverts. Arrange a site visit.
- Consider conducting a traffic volume and speed study on NH 31. Contact SWRPC.
- Expand Fire Prevention Week to include Safety Awareness Programs such as campfire education, proper use of generators, radon detection, etc.
- Prepare a response to SWRPC's solicitation request for potential state highways projects to be considered for inclusion into the Ten-Year Plan.
- Propose a revision to the Cluster Development ordinance or add a Conservation Subdivision ordinance.
- Install transfer switches at the water towers.
- Determine a method or protocol to improve communication among town departments for building permits.
- Obtain a written agreement with Souhegan Valley Ambulance Service.
- Coordinate with other town departments to develop an ordinance to address substandard housing.
- Host a workshop for homeowners to learn of ways to mitigate the effects of extreme temperatures such as insulation, windows, heating & cooling, etc.
- Upsize/upgrade the culvert on Darling Hill Road.
- Expand Fire permits to on-line or other options.
- Equip the EOC and emergency shelters with sufficient materials to handle a wide-spread infectious disease event.
- Develop a protocol for determining closures and measures needed to protect the public for hazards such as infectious disease, flooding, transport accident, etc.
- Conduct a workshop for providing information on ways to reduce the impact of hazards and to make emergency preparedness kits.
- Consider traffic calming options to reduce speed and increase driver awareness in areas with safety concerns.
- Consider conducting a safety audit on NH 31. Contact SWRPC and NHDOT.
- Make necessary improvements to the Green Bridge to remove it from NHDOT's red list status.
- Monitor improvements made to the waste water systems.
- Consider installing snow fence in the Barrett Road/Adams Hill Road/Darling Hill area.
- Enforce building codes to ensure tie-downs and other protection for newly installed mobile homes.
- Enforce the 2009 updated FEMA Digital Flood Insurance Rate Maps/FIS and floodplain ordinance to ensure the NFIP requirements are maintained & implemented.
- Adopt updated FEMA maps as they become available.
- Increase road maintenance budget to properly maintain safe travel on town roads, including emergency routes.
- Assess and add soil stabilization along areas of erosion or potential erosion.

Chapter 1
Introduction

Purpose

The Greenville Hazard Mitigation Plan Update 2021 is a planning tool to be used by the Town of Greenville, as well as other local, state and federal governments, in their efforts to reduce the effects from natural and man-made hazards. By maintaining an updated Hazard Mitigation Plan, the town is eligible to receive grant funding for mitigation projects.

Authority

This Multi-Hazard Mitigation Plan was prepared pursuant to Section 322, Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (the Act), herein enacted by Section 104 of the Disaster Mitigation Act of 2000 (DMA) (P.L. 106-390). This Act provides new and revitalized approaches to mitigation planning. Section 322 of DMA 2000 emphasizes the need for State, local and tribal entities to closely coordinate mitigation planning and implementation efforts. The development and periodic update of this plan satisfies the planning requirements of the Disaster Mitigation Act (DMA) of 2000 which amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act).

Funding Source

This Plan was funded by the NH Homeland Security and Emergency Management, with a grant from FEMA's Pre-disaster Mitigation Program.

Scope of the Plan

The scope of this Plan includes the identification of past and potential natural and manmade hazards affecting the Town of Greenville, the determination of vulnerability of existing and future structures to the identified potential hazards, and the identification and discussion of new strategies aimed at mitigating the likely effects of potential hazards before they occur.

Methodology

Using the Local Hazard Mitigation Planning Handbook, the Greenville Hazard Mitigation Work Group developed the content of the Greenville Hazard Mitigation Plan by following tasks set forth in the handbook. The Work Group held monthly meetings, open to the public, in order to develop the Plan.

Task 1: Determine the Planning Area & Resources: This task was conducted by town staff and the Regional Planning Commission. The results of this research were shared with the Work Group and can be found in Chapter 2, "Community Profile".

Task 2: Building the Planning Team: The Emergency Management Director contacted town officials, department heads, and residents who might wish to volunteer their time and serve on a Work Group.

Task 3: Create an Outreach Program: This task was used throughout the plan and is a vital part of the plan's success. Many of the proposed actions involve a community outreach component for individuals to use as a means to reduce the risk of loss of life and property from future natural and man-made hazards.

Task 4: Review Community Capabilities: The Work Group brainstormed on the type of hazards and locations that have sustained or could be susceptible to each hazard within the town. The Work Group then identified and catalogued all of the critical facilities within the town. The result is found in Chapter 6 with a location map at the end of the plan.

Task 5: Conduct a Risk Assessment: The Work Group conducted several assessments to help determine the gaps in coverage. These include Vulnerability Assessments and Assessing Probability, Severity and Risk. In addition to the assessments, the existing mitigation strategies were reviewed to determine where gaps in coverage exist and areas that need improvement.

Task 6: Develop a Mitigation Strategy: The Work Group identified plans and policies that are already in place to reduce the effects of man-made and natural hazards. Then the Work Group evaluated the effectiveness of the existing measures to identify where they can be improved. The Work Group then developed the Mitigation Action Plan, which is a clear strategy that outlines who is responsible for implementing each project, as well as when and how the actions will be implemented and the funding source.

Task 7: Keep the Plan Current: It is important to the Town of Greenville that this plan be monitored and updated annually or after a presidentially declared disaster. Chapter 10 addresses this issue.

Task 8: Review & Adopt the Plan: The Work Group members reviewed and approved each section of the plan as it was completed. After acceptance by the Work Group, the Plan was submitted to the New Hampshire Homeland Security and Emergency Management (HSEM) for review and Approval Pending Adoption. At a public meeting, the Board of Selectmen formally adopted the plan on (add adoption date). The plan was then granted formal approval by HSEM (add approval date by HSEM) and the Formal Approval letter from the Federal Emergency Management Agency (FEMA) was received on (add date of letter).

Task 9: Create a Safe & Resilient Community: The Work Group discussed the mitigation actions in the Action Plan and the ways in which the implementation of the actions will be beneficial to the community. Annual reviews of the Action Plan by the Work Group are needed to maintain the timeframes identified for completion of activities. Incorporation of the plan into other land use plans and the Capital Improvement Plan help to ensure that the goals of the plan are met. Implementation of the actions prior to a hazardous event can be funded through a variety of resources found at the end of this plan in Appendix D.

A final draft of this Plan was made available to the Work Group and the public for review and comment. The document was also provided to the NH Homeland Security and Emergency Management for their review and comment.

Public Work Group Meetings

Work Group meetings were held at the Greenville Town office on February 19, and by Zoom meetings on April 24, June 3 and 18, July 1 and 29, September 2, 2020.

An email was sent to each Work Group member, prior to each meeting that contained an agenda (Appendix E) and information to be covered. Agendas were posted at the Town Office to encourage public participation.

Public Participation:

An article was printed in the Southwest Region Planning Commission Newsletter to inform the members of the community as well as surrounding communities and other interested stakeholders about participating in this plan update. Copies of the newsletter were sent to the 34 towns within the region, the Cheshire County Office, businesses, and other interested parties. It was also available on the Southwest Region Planning Commission website. In addition to the SWRPC newsletter and website, an email of the *SWRPC Happenings* was sent to more than 450 addresses, including neighboring communities, counties, businesses, and academia. The email contained notices of public meetings and events.

A copy of the draft plan was made available for public review and input at the Town Office from March 17-April 2, 2021. In addition, the draft plan was also available for public viewing on the Town website to reach a broad range of interested parties. A copy of the public notice for the public viewing period is in Appendix E. There were no comments from the public received during the drafting stage of the plan as well as following the public viewing period.

Resource List for Hazard Mitigation Team

Greenville's EMD, or designee, reviewed and coordinated with the following agencies in order to determine if any conflicts existed or if there were any potential areas for cooperation. All agencies mentioned below were contacted by Greenville's EMD, or designee. All agencies were given the opportunity to attend Work Group meetings or provide valuable input and guidance through telephone conversation or printed data. Training support has been offered by some of those on this resource list.

New Hampshire Homeland Security and Emergency Management:
33 Hazen Drive 1-800-852-3792
Concord, NH 03305

Field Representative: Elizabeth Gilboy
State Hazard Mitigation Planner: Kayla Henderson

New Hampshire Department of Transportation:
John Kallfelz (District 4), Swanzey, NH 03446 (603) 352-2302

New Hampshire Department of Environmental Services - Dam Bureau:
Nancy Baillargeon (603)271-3406

New Hampshire Office of Strategic Initiatives:
Samara Ebinger (603) 271-1755

Plan Updates

During the planning process, the Work Group reviewed relevant portions of the previous hazard mitigation plan and updated those portions accordingly. Unchanged sections were incorporated into the plan while other sections were amended to reflect changes. Particular attention was given to the previous mitigation strategies that have been completed to give a status update on those that remain on the list. The previous plan was used as a basis to begin the update. Amendments were made in each chapter to reflect changes that have occurred during the five-year period. Included in the changes were:

Chapter 1 - Introduction - updated Methodology, Acknowledgements, etc., and added Plan Updates;

Chapter 2 - Community Profile - NFIP policies updated, added updated demographics;
Chapter 3 - Hazard Identification - updated hazards and their location;
Chapter 4 - Assessing Probability, Severity, and Risk - updated risk assessment;
Chapter 5 - Vulnerability Assessment - estimated potential losses;
Chapter 6 - Critical Facilities - updated locations;
Chapter 7 - Existing Mitigation Strategies and Proposed Improvements - updated chart and other data, updated chart for Status of Previous Mitigation Action Items;
Chapter 8 - Proposed Mitigation Strategies - updated STAPLEE chart;
Chapter 9 - Prioritized Implementation Schedule - updated Action Plan;
Chapter 10 - Adoption, Implementation, Monitoring, and Updates - Adoption certificate, updated information.

Appendices - agendas, resources, public documentation.

This update was prepared with assistance from professional planners at Southwest Region Planning Commission trained in Hazard Mitigation Planning. Data and maps used to prepare this plan are available at their office and should be used in preparing future updates.

Acknowledgements

The Greenville Board of Selectmen extends special thanks to the Greenville Hazard Mitigation Work Group as follows:

Ed White, *Greenville Emergency Management Director*
Helen Burke, *Greenville Deputy EMD*
Tara Sousa, *Greenville Town Administrator*
Thomas Plourde, *Greenville Road Agent*
Gregg Eastman, *Greenville Highway*
Brian Golec, *Greenville Water/Sewer Consultant*
Rob Lauricella, *Greenville Water/Sewer Consultant*
Bryan LeBlanc, *Greenville Water/Sewer Consultant*

The Greenville Board of Selectmen offers thanks to the New Hampshire Homeland Security and Emergency Management for developing the State of New Hampshire Multi-Hazard Mitigation Plan Update 2018 which served as a model for this plan. In addition, special thanks are extended to the staff of the Southwest Region Planning Commission for professional services, process facilitation and preparation of this document.

HSEM/FEMA Final Approval: (add date of HSEM/FEMA approval)

Hazard Mitigation Goals

The Greenville Hazard Mitigation Work Group reviewed the goals set forth in the State of New Hampshire Multi-Hazard Mitigation Plan Update 2018. The Work Group generally concurs with those goals and has amended them to better meet the goals of the town.

Town of Greenville, NH

The overall Goals of the Town of Greenville with respect to Hazard Mitigation are stipulated here:

1. To improve upon the protection of the general population, the citizens of the Town of Greenville and guests, from all natural, technological and human-caused hazards.

2. To reduce the potential impact of natural, technological and human-caused hazards on the Town of Greenville's Emergency Response Services, Critical Facilities, and infrastructure.

3. To reduce the potential impact of natural, technological and human-caused disasters on the Town of Greenville's economy, natural resources, historic/cultural treasures, and private property.

4. To improve the Town of Greenville's Emergency Preparedness and Disaster Response and Recovery Capability.

5. To reduce the Town of Greenville's risk with respect to natural, technological and human-caused hazards through outreach and education.

6. To identify, introduce and implement cost-effective Hazard Mitigation measures so as to accomplish the Town's Goals and Objectives and to raise the awareness of and acceptance of Hazard Mitigation opportunities generally.

7. To address the challenges posed by climate change as they pertain to increasing risks in Greenville’s infrastructure and natural environment.

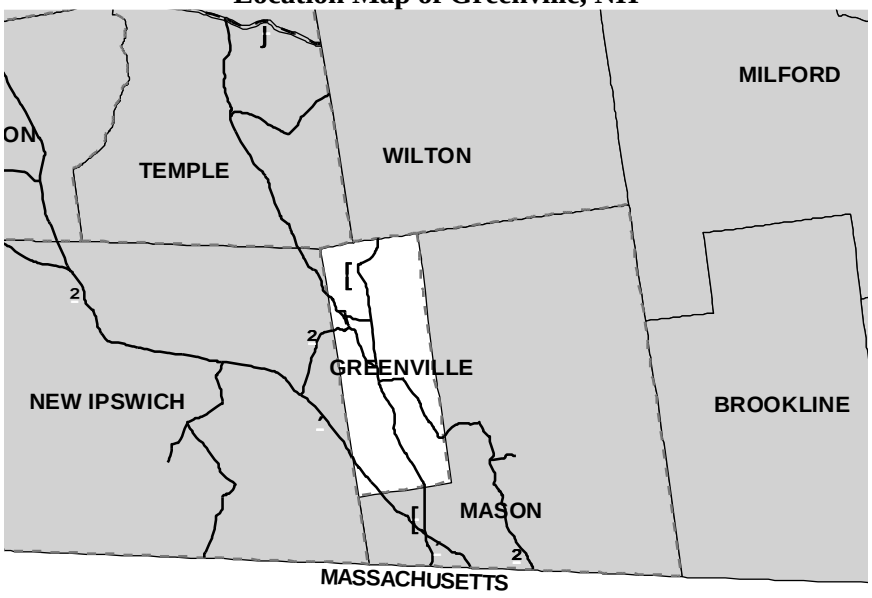
8. To work in conjunction and cooperation with the State of New Hampshire's Hazard Mitigation Goals and with FEMA.

Chapter 2
Community Profile

Town Overview

The Town of Greenville is located in the western portion of Hillsborough County, in Southwest New Hampshire. Greenville is bounded on the north side by Temple and Wilton, easterly and southerly by Mason, and westerly by New Ipswich. The Town population is 2,105.[1]

Location Map of Greenville, NH



The Town of Greenville consists of 6.9 square miles of land area. The Souhegan River flows through Greenville's Town Center. The topography of Greenville varies significantly, ranging from steep hills and slopes throughout town including Barrett Hill, to flatter areas dispersed throughout the community.

Greenville has a mid-latitude climate. Average summer temperature is 65 degrees Fahrenheit; average winter temperature is 20 degrees Fahrenheit. Average annual precipitation is 44 inches.

A three-member Board of Selectmen governs the Town of Greenville. The town has a full-time Town Administrator, volunteer Fire Chief with a volunteer fire department, a full-time Police Chief, 2 full-time and 2 part-time police officers, 3 full-time and 1 part-time Highway Department employees, and a part-time Building Inspector. The town contracts with Utility Partners for operation and maintenance of the towns' sewer and water systems. Ambulance service is provided by Souhegan Valley Ambulance Service located in New Ipswich. The towns' primary area hospital is Monadnock Community Hospital located in Peterborough, approximately 16 miles northwest of Greenville.

[1] Population data from US Census Bureau (2010)

Disaster Risk

Greenville is prone to a variety of man-made and natural hazards. These include: flooding, severe wind events, tropical storms and hurricanes, wildfires, severe winter weather, drought, extreme temperatures, lightning, landslides, infectious disease, aging infrastructure, and vehicle accidents.

Flooding, whether from snow run-off, heavy rains or ice jams, carries the greatest risk for Greenville. Seasonal flooding of small streams and wetlands has not been recorded. In March 2010, the town experienced a significant rain event which caused a major landslide on High Street into the Souhegan River impoundment. FEMA funds were utilized to stabilize the slope.

Severe wind events and hurricane residuals have caused damage to Greenville. Over the years hurricanes have resulted in severe flooding, and unrecorded wind events have caused losses of timber, particularly in the several high points throughout town.

There have been several documented wild fires throughout town due to a variety of causes including lightning, cigarette litter along roadways and accidents. Areas along heavily traveled roadways and wooded areas are at greatest risk.

Winter weather has proven to be a regular hazard throughout Greenville each year. The town is susceptible to receiving large volumes of snow from Nor'easters due to its geographical proximity to the east coast where these storms track. The town has also received a fair share of damage from ice storms in winter months. Winter storms and wind events often cause power outages.

Development Patterns and Trends

Greenville is a geographically small community with a majority of developable land already built on. Residential growth has been the predominant land use. This use of developable land is projected to continue. The town continues to feel pressure to become a bedroom community to regional economic centers.

This table shows the change in the number of housing units from 1970 to 2010. The largest percent change was during 1970 to 1980; a similar growth as many community's experienced in New Hampshire. While there is some increase in each decade following, the rate of increase has been greatly reduced.

	1970	1980	% Change 1970-1980	1990	% Change 1980-1990	2000	% Change 1990-2000	2010	% Change 2000-2010	% Change 1970-2010
# of Units	458	728	59.0%	918	26.1%	918	0%	933	1.6%	104%

Source: US Census Bureau

The Greenville Town Center has a greater density of development than exists in the outlying portions of town. This density of development is typical of New England villages, where house lots are historically smaller. The Village is also the location of most of the towns' public and semi-public uses: The Town Hall, Police Department, Library, and Post Office.

The town has some agricultural land, predominantly used for orchards. Commercial uses were previously concentrated in the Town Center, however, in recent years, more development has occurred along the NH 31 corridor. Industrial activity occurs in various locations throughout the town. Recreational opportunities

include several small parks, a public pool and ball field located next to the Mascenic SAU Office. In addition, fishing, canoeing and other activities occur in or near the Souhegan River.

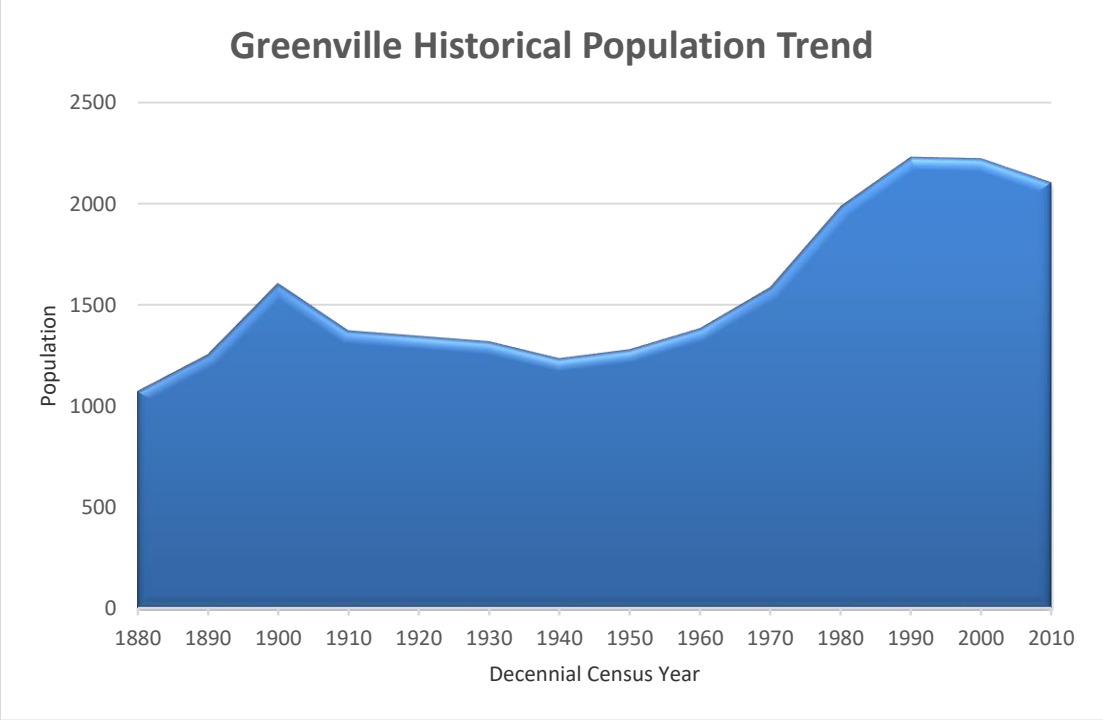
Consideration for Development

Several factors have played, and will continue to play, an important role in the development of Greenville. These include: the existing development pattern and availability of land for future development; the present road network; physical factors such as steep slopes, soil conditions, wetlands, and aquifers; and land set aside for conservation. These factors have an impact, both individually and cumulatively, on where and how development occurs.

The greatest potential for development occurs along existing road frontage, particularly NH 45 and NH 31 which run through Greenville. Additional potential exists if existing Class VI roads are upgraded to Class V roads, or if new roads are constructed. As communities to the south and east of Greenville continue to grow, the likelihood for additional development in Greenville also increases.

Historical Population

The population in Greenville was relatively flat from 1910 until 1950, which then became the beginning of a steady increase in residents. From 1960 to 1990, the population change for Greenville went from 1,385 to 2,231. The town has been experiencing a decline in residents since 1990. The largest decennial percent change was an increase of 25 percent between 1970 and 1980. The 2017 Census estimate for Greenville was 2,099 residents, which ranked 136th among New Hampshire's incorporated cities and towns. Greenville contains 6.9 square miles of land and there are approximately 305 people per square mile of land area.



Source: US Census Bureau

Population Trends

The table below shows population in Greenville for each decennial from 1970 to 2010 according to the US Census. The largest increase in population occurred from 1990 to 2000 with an increase of 384 people (approximately 38 people per year). The most current census, taken in 2010, showed a 3.9 % increase in population (140 people) between 2000 and 2010.

Greenville Population 1970-2010

	1970	1980	1990	2000	2010
Population	1,587	1,988	2,231	2,224	2,105
% Change	----	25.3%	12.2%	-0.3%	-5.6%

Source: US Census Bureau

Population Projections

Population projections are an important component in planning for the future. Projections are beneficial to help communities begin to plan and budget for Capital Improvement projects. Since population projections are based on a set of assumptions, changes can be significant if the assumptions used in the calculations are not met. For example, a tropical storm that destroys a large employer or causes infrastructure damages to that facility can cause a significant economic hardship to the business that may ultimately result in its closure and loss of jobs. This can then result in an outward migration of residents from the community or region. Therefore, population projections should only be used as a basis to begin planning for the future. The town currently has a 50-unit residential complex proposed that includes both townhouses and detached single-family homes. If built, it would cause the projections to be underestimated.

Greenville Population Projection: 2010 to 2040

Year	2010	2015	2020	2025	2030	2035	2040	% Change
Greenville	2,105	2,070	2,009	1,954	1,992	2,016	2,024	-4%

Source: American Community Survey, 5-Year Estimates

Development in Hazard Areas

Some of the hazards identified in this plan, such as hurricanes, tornadoes and ice storms, are regional risks and, as such, all new development falls into the hazard area. The exception to this is flooding. Of the future developments known to the town, none fall into identified flood hazard areas.

National Flood Insurance Program (NFIP)

Greenville is a participating member of the National Flood Insurance Program. Greenville joined the NFIP on July 28, 1975 through emergency entry, and regular entry on May 19, 1981. Flood Insurance Rate Maps, all bearing the effective date of September 25, 2009, are used for flood insurance purposes and are on file with the Greenville Planning Board. According to the FEMA CIS, there were no structures located in FEMA designated Special Flood Hazard Areas (SFHAs) as of September 23, 2020. There are 3 residential flood insurance policies and 3 non-residential policies totaling 6 policies town-wide for $1,727,200. In addition, there have been 2 repetitive losses for $3,648. At the time of this plan update, FEMA is not

releasing the repetitive loss structure types to include in this plan. The flood insurance study was done on September 25, 2009.

Continued Compliance with NFIP Requirements

The Town of Greenville acknowledges the importance of maintaining requirements set forth in the National Flood Insurance Program. As such, the town took several steps related to continued compliance with the program that will help to reduce or eliminate the potential for loss of life and property due to flooding. The town will continue to promote awareness of the importance of NFIP as an ongoing mitigation item and encourage more NFIP policies.

While this update continues with structural projects, public outreach and education are also seen as a key to providing information to residents by raising an awareness of measures that they can take. Many of these items will be on-going actions to maintain awareness and continued monitoring.

Chapter 3
Hazard Identification

The following is a list of natural and manmade disasters, and the areas affected by them, that have had some impact to the Town of Greenville, the region, or the State. These hazards were identified from the State of New Hampshire Hazard Mitigation Plan (2018), the Federal Emergency Management Agency website, and from the previous Greenville Hazard Mitigation Plan. The hazards of avalanche, coastal flooding, earthquakes, and solar storms and space weather were determined to not be a threat or risk to the Town of Greenville, therefore, they were not included in this plan.

Past Hazards

Flooding - Disaster Declarations
Flooding - Localized areas
Drought
Extreme Temperatures
Wildfires
Lightning
High Wind/Tornadoes/Downbursts
Tropical Storms/Hurricanes
Severe Winter Weather
Infectious Disease/Pandemics
Aging Infrastructure
Transport Accidents

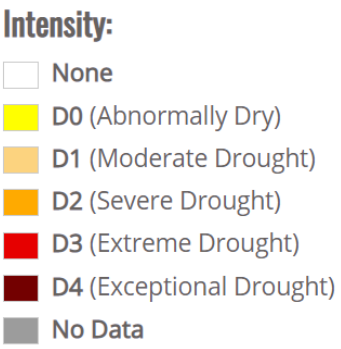
Hazard	Date	Location	Remarks/Description of Areas Impacted
Flooding - Disaster Declarations			
Below is a listing of Disaster Declarations for flooding events within the State of New Hampshire. Several severe events have caused significant damage to structures and roadways within the Southwest Region. Some of the historic flood events may be listed under Hurricane/Tropical storm instead of this category.			
Flood/Severe Storm	April 16, 1987	Cheshire, Carroll, Grafton, Hillsborough, Merrimack, Rockingham, & Sullivan Counties, NH	FEMA Disaster Declaration # 789. Flooding of low-lying areas along river caused by snowmelt and intense rain. $4,888,889 in damage.
Flood	August 7-11, 1990	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack & Sullivan Counties, NH	FEMA Disaster Declaration # 876. Flooding caused by a series of storm events with moderate to heavy rains. $2,297,777 in damage.
Flood	October 29, 1996	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan Counties, NH	FEMA Disaster Declaration # 1144. Flooding caused by heavy rains. $2,341,273 in damage.
Flood	July 2, 1998	Southern NH	FEMA Disaster Declaration # 1231. Severe storms and flooding.
Flood	October 26, 2005	Cheshire, Grafton, Merrimack, Sullivan, and Hillsborough Counties, NH	FEMA Disaster Declaration # 1610. Severe storms and flooding.
Flood	October 26, 2005	Cheshire, Grafton, Merrimack, Sullivan, and Hillsborough Counties, NH	FEMA Disaster Declaration # 1610. Severe storms and flooding.
Flood	October-November 2005	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan Counties, NH	FEMA Disaster Declaration #1144. Severe storms and flooding.

Hazard	Date	Location	Remarks/Description of Areas Impacted
Flooding - Disaster Declarations			
Flood	May 25, 2006	Belknap, Carroll, Hillsborough, Merrimack, Rockingham, and Strafford Counties, NH	FEMA Disaster Declaration # 1643. Severe storms and flooding.
Flood	April 16, 2007	All counties, NH	FEMA Disaster Declaration # 1695. Severe storms and flooding.
Flood	May 26-30, 2011	Coos and Grafton County	FEMA Disaster Declaration # DR-4006; May flood event.
Flood	May 29-31, 2012	Cheshire County	FEMA Disaster Declaration # 4065.
Flood	June 26-July 3, 2013	Cheshire, Sullivan, and Grafton Counties	FEMA Disaster Declaration #4139.
Flood	July 1-2, 2017	Grafton County	FEMA Disaster Declaration #4329. No local impact.
Flood	October 29, 2017 – November 1, 2017	Belknap, Carroll, Coos, Grafton, Merrimack, and Sullivan Counties	FEMA Disaster Declaration #4355. Some basements needed to be pumped out by the Fire Department in the Mill Street area. No injuries, death or structural damage reported.
Flood	March 2-8, 2018	Rockingham County	FEMA Disaster Declaration #4370. No local impact.
Flood	July 11-12, 2019	Grafton County	FEMA Disaster Declaration #4457. No local impact.
Flooding (localized) - High Risk			

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.

Floodplains are usually located in lowlands near rivers, and flood on a regular basis. The term 100-year flood does not mean that flood will occur once every 100 years. It is a statement of probability that scientists and engineers use to describe how one flood compares to others that are likely to occur. It is more accurate to use the phrase "1% annual chance flood". What this means is that there is a 1% chance of a flood of that size happening in any year. Below is a list of specific incidents of localized flooding events. Other events were remembered by Work Group members, but the impact was minor and no documented information was available.

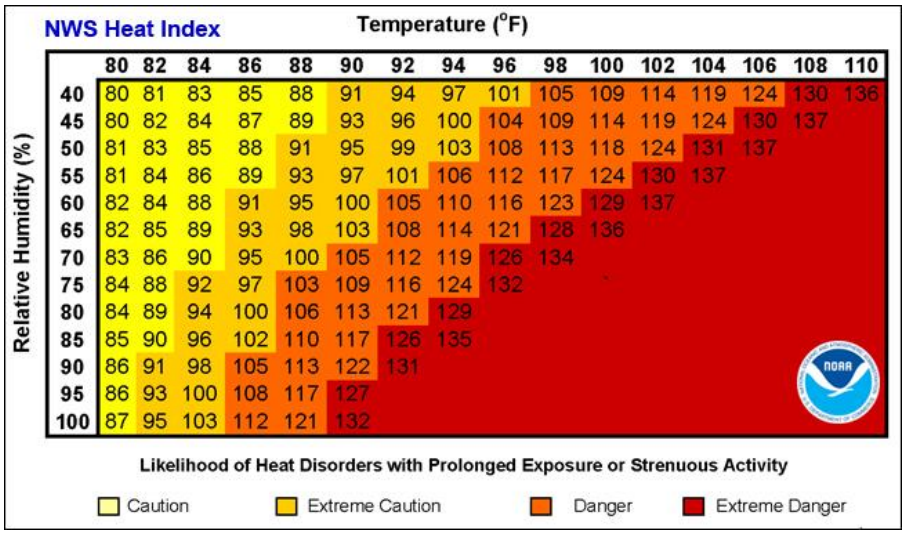
Flooding (Cont.)			
Hazard	Date	Location	Remarks/Description of Areas Impacted
Flooding	1936, 2005	Area west of Main Street where Souhegan River Flows through Town Center	Flooding of the Souhegan River onto NH 45 has occurred in this area due to accumulation of heavy rain and runoff. A 1936 flood incident caused water to rise twelve feet around a mill building. Dam has been raised since earlier storms. An October 2005 flood event resulted in flood waters flowing over the dam.
Flooding	1989	White Street	Spring rain and runoff causes a brook to overflow. Flood waters are restricted due to an undersized culvert on NH 31 which has caused a road washout. Water and sewer lines limit options for relocating or expanding the culvert or installing a deeper culvert. One structure was affected by past flooding in 1989, cost for repairs unknown.
Flooding	Annual Occurrence	Southeast of Intersection of NH 31 and Mason Road	Heavy rain and runoff cause flooding of a parking area during storm events. This is an annual occurrence. Flooding of Mason Road has occurred, though no damage to the road resulted. Water from the Hemlock Hills development has increased the amount of runoff collecting in this area during storm events. If development continues in this area flooding could become a larger problem.
Flooding	2005	Intersection of East Road, Kimball Hill Road, and Richardson Road	Heavy rain and runoff cause flooding of the road. The most recent flood incident occurred in October 2005. No structures have been or could be affected by a flood incident.
Flooding	Annual Occurrence	Mill Street/Hubbard Hill Road Intersection	Increased development in this area has caused narrowing of the brook and clogging of the brook due to the accumulation of sedimentation. Spring rain and runoff and heavy rain events affect the area with water flowing over the road and into basements. No record of damage.
Flooding	March 31, 2010	High Street	Flooding led to a significant landslide on a steep slope on the north side of the Otis Falls Hydro impoundment on the Souhegan River. For additional information, see Landslide on page 15.

Drought - Medium Risk
Droughts are a natural hazard that impacts the entire Town. Areas that are most impacted from droughts are farms and residents with wells. A greater emphasis is placed on responding to these hazards rather than mitigating for them. Outreach and education on methods of dealing with drought are important. Extreme heat and drought are town-wide events; therefore, no specific locations are identified. The severity of droughts can be found by referring to the Palmer Drought Severity Index used by the Climate Prediction Center and can be viewed at: http://www.cpc.ncep.noaa.gov/products/monitoring_and_data/drought.shtml The intensity scale on the right is used in conjunction with the Palmer Drought Severity Index to classify the severity of the drought. 

Hazard	Date	Location	Remarks/Description of Areas Impacted
Drought	1929-1936	Statewide	Regional. Recurrence Interval 10 to > 25 years.
Drought	1939-1944	Statewide	Severe in southeast and moderate elsewhere. Recurrence Interval 10 to > 25 years.
Drought	1947-1950	Statewide	Moderate. Recurrence Interval 10 to > 25 years.
Drought	1960-1969	Statewide	Regional longest recorded continuous spell of less than normal precipitation. Encompassed most of the Northeastern US. Recurrence Interval > 25 years.
Drought	2016-2017	Statewide	Significant drought but no reports of human or property impact.
Drought	2019	Statewide	The Souhegan River Instream Flow program indicated a critical flow. No reports of human or property impact.
Drought	2001-2002	Statewide	Third worst drought on record, exceeded only be the drought of 1956-1966 and 1941-1942.
Drought	Spring 2012	Statewide	Considered worse than the drought of 1941-42.
Drought	Summer 2018	Statewide	There were no deaths or injuries in Greenville caused by this drought, however some residents had difficulty with their wells.
Drought	Summer 2020	Statewide	There were no deaths or injuries in Greenville caused by this drought, however some residents had difficulty with their wells.

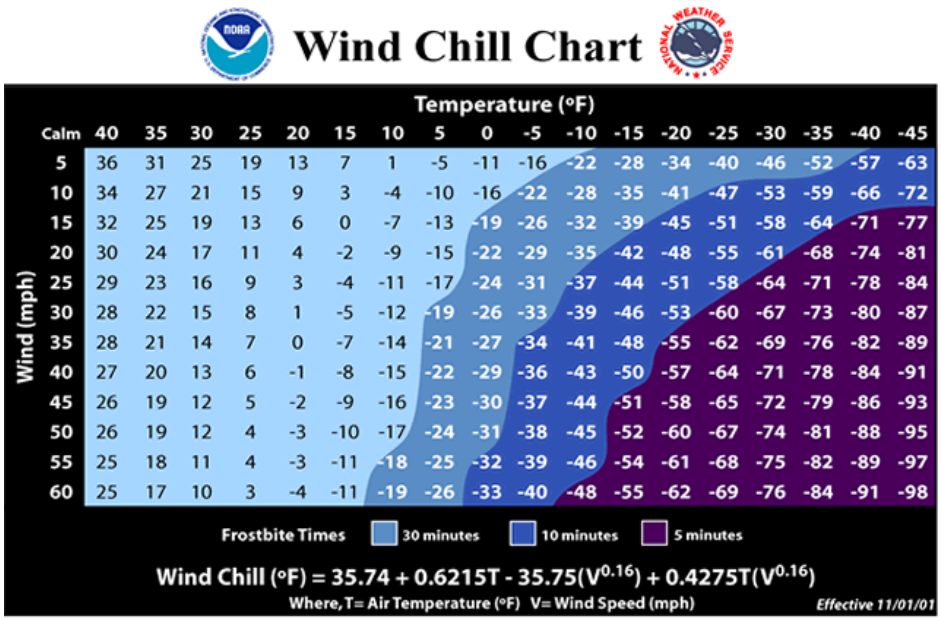
Extreme Temperatures - Medium Risk

Extreme heat is characterized by abnormally high temperatures and/or longer than average time periods of high temperatures. Although it is an infrequent event, it usually occurs on an annual basis between late July and August and happens town wide. The severity of extreme heat can be dangerous to those residents with medical conditions and the elderly. It is important to have cooling areas and a good supply of water available. Extreme heat can add to the potential for wildfires and depletion of the water supply for firefighting. The Greenville Hazard Mitigation Work Group did not recall any impact to the Town services due to this hazard. They also did not recall any death, injuries or structural damage as a result of extreme heat.



Source: National Weather Service

Extreme Cold events occur during meteorological cold waves, also known as cold snaps that are caused by the southern transport of arctic airmasses into the Northeast. These events are most common in winter months and increase the likelihood of cold disorders in humans and animals that have prolonged exposure to low ambient temperatures. Cold disorders can include frostbite and hypothermia which can eventually lead to death. Extreme cold can also damage or kill crops and animals (wild, farm, or domesticated), potentially presenting a risk to the economy. Cold disorders can include frostbite and hypothermia. NOAA's National Weather Service has prepared the following windchill chart for calculating the dangers from winter winds and freezing temperature.



Source: National Weather Service

Extreme Temperatures - (cont.)			
Hazard	Date	Location	Remarks/Description of Areas Impacted
Extreme Cold	November-December, 1988	New Hampshire	Temperature was below 0 degrees F for a month.
Extreme Heat	Late July, 1999	Northeast	13 days of 90+ degree heat.
Extreme Heat	Early August, 2001	New Hampshire	Mid 90s and high humidity.
Extreme Heat	2002	New Hampshire	Several weeks of extreme heat.
Extreme Heat	August 2-4, 2006	New Hampshire	Regional heat wave and severe storms.
Extreme Heat	Summer, 2019	Greenville	The Town opened the library and pool for cooling centers.
Extreme Cold	The Work Group did not recall any extreme cold temperatures in the past five years that resulted in the need for town services.		
Wildfires - High Risk			
Wildfire are classified according to size: Class A - 1/4 acre or less; Class B - more than 1/4 acre, but less than 10 acres; Class C - 10 acres or more, but less than 100 acres; Class D - 100 acres or more, but less than 300 acres; Class E - 300 acres or more, but less than 1,000 acres; Class F - 1,000 acres or more, but less than 5,000 acres; Class G - 5,000 acres or more. The wildfires in Greenville have mostly been small in nature and caused by lightning strikes (Class A or B).			
Wildfire	Past and Potential Occurrences	NH 31	Cigarettes or other causes such as traffic accidents have caused and have the potential to cause wildfires along this section of NH 31. Several small fires have been reported in the past. This is a largely wooded and heavily traveled area. No structures have been or could be affected.
Wildfire	Dates unknown	East of NH 31 and North of Mason Road	Cigarettes or other causes such as traffic accidents have caused wildfires in this area. Several small fires have been reported in the past. In the mid-1980s, 20 acres burned during a very dry season due to something that ignited along the roadway. This is a largely wooded and heavily traveled area. No structures have been or could be affected.
Wildfire	2003	Area between NH 31 and Adams Hill Road	A wildfire was caused by juveniles south of the power lines. No structures were affected.
Wildfire	There have only been small brush fires since the last plan update, but none have resulted in structural damage, death or injury. These were less than 1 acre in size. Locations were not identified by the Work Group.		

Landslide - Medium Risk			
A landslide is the downward or outward movement of earth materials on a slope that is reacting to a combination of the force of gravity and a predisposed weakness in the material that allows the sliding process to initiate.			
Landslide/ Erosion	March 31, 2010	High Street	A significant landslide on a steep slope on the north side of the Otis Falls Hydro impoundment on the Souhegan River. Total cost - $1,438,127. A FEMA grant provided 75% of the request or $1,078,595. The project was completed in June 2014.
There have been no incidences of landslides in Greenville since March 31, 2010.			

Lightning - Medium Risk

The table below categorizes lightning hazards according to the Lightning Activity Level (LAL) using cloud conditions and precipitation, and an estimate of lightning strikes per every 15 minutes.

LAL	Cloud & Storm Development	Lightning Strikes/15 min
1	No thunderstorms.	-
2	Cumulus clouds are common but few reach the towering cumulus stage. A single thunderstorm must be confirmed in the observation area. 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 3 must occur within the observation area. Moderate rain is common & 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.	9-15

Source: NOAA

Hazard	Date	Location	Remarks/Description of Areas Impacted
Lightning	1998	Intersection of Maldarelli Road and Barrett Road	A lightning strike caused a wildfire. One house and one barn were destroyed; cost of damages unknown.
Lightning	Past Occurrences	High Street	Many lightning strikes have occurred in this area. No structures have been affected by past incidents.
Lightning	2004	Hemlock Hills	A lightning strike triggered a wildfire in 2004 that was not discovered for two days. No structures were affected.

Lightning cont.			
Hazard	Date	Location	Remarks/Description of Areas Impacted
Lightning	2011	Area off of NH 124	A lightning strike caused a small wildfire.
Lightning	August 2012	2 Blanch Farm Road and 150 NH 45, Temple	The Intermediate Pump Station and the water treatment plant were damaged by a lightning strike. Repairs exceeded $25,000.
Lightning-recent	Greenville has not experienced any lightning strikes since August 2012 that have caused structural damage, need for town services, or death and injury.		

High Wind (Tornados, Downbursts, etc.) - Medium Risk
The **Enhanced Fujita Scale** is used to rate the intensity of a tornado by examining the damage caused by the tornado once it has passed. (see scale below). *Source:* http://www.tornadoproject.com/fscale/fscale.htm **EF - Scale Number, Wind Speed, Frequency, and Type of damage** **EF - 0** Wind Speed: 65 - 85 mph; Frequency: 53.5% Minor or no damage. Some damage to gutters, siding and roofs; breaks branches off trees; pushes over shallow-rooted trees. **EF - 1** Wind Speed: 86 - 110 mph; Frequency: 31.6% Moderate damage. Roofs severely stripped; mobile homes damaged or overturned; windows and glass broken, loss of exterior doors. **EF - 2** Wind Speed: 111 - 135 mph; Frequency: 10.7% Considerable damage. Roofs torn off well-constructed homes; foundations of framed homes shifted; mobile homes demolished; large trees snapped or uprooted; light object missiles generated; cars lifted off of ground. **EF - 3** Wind Speed: 136 - 165 mph; Frequency: 3.4% Severe Damage. Entire stories of well-constructed houses destroyed; severe damage to large building and malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown. **EF - 4** Wind Speed: 166 - 200 mph; Frequency: 0.7% Extreme Damage. Well-constructed houses completely leveled; cars thrown and large missiles generated. **EF - 5** Wind Speed: >200 mph; Frequency: <0.1% Total Destruction. Strong frame houses lifted off foundations and carried considerable distances to disintegrate; steel reinforced concrete structures are critically damaged; tall buildings collapse.

High Wind			
Hazard	Date	Location	Remarks/Description of Areas Impacted
Tornado	September 15, 1922	Hillsborough County	F2
Tornado	July 2, 1961	Hillsborough County	F2
Tornado	June 9, 1963	Hillsborough County	F2
Tornado	July 19, 1966	Hillsborough County	F2
Tornado	July 17, 1968	Hillsborough County	F2
Tornado	August 20, 1968	Hillsborough County	F3
Tornado	July 2, 1997	Hillsborough County	F2
Tornado	May 23, 1998	Hillsborough County	F2

High Wind cont.			
Hazard	Date	Location	Remarks/Description of Areas Impacted
Tornado	July 24, 2008	Deerfield/Northwood	EF2. No impact locally.
Severe Wind	2011	Southwestern New Hampshire	A microburst hit the area causing a temporary loss of power to some locations in the region. No injuries or structural damage reported. No local impact.
Severe Wind	2014	Southwestern New Hampshire	A microburst hit the region causing a temporary loss of power to some locations in the region. No injuries or structural damage reported. No local impact.
Severe Wind	2016	Southwestern New Hampshire	Severe wind hit the region causing a temporary loss of power to some locations in the region. No injuries or structural damage reported. No local impact.
Downburst	Oct. 29, 2017	Southwestern New Hampshire	A downburst hit several towns along the Connecticut River causing many downed trees and several homes damaged. No estimate of damage. Short-term power outages occurred. There were no injuries.

Hurricanes and Tropical Storms - High Risk

Saffir-Simpson Hurricane Wind Scale

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

Category, Sustained Winds and Types of Damage

Category 1, Wind Speed: 74-95 mph, 64-82 kts
Very dangerous winds will produce some damage: Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.

Category 2, Wind Speed: 96-110 mph, 83-95 kts
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.

Category 3, Wind Speed: 111-129 mph, 96-112 kts
Devastating damage will occur: Well-built framed 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.

Category 4, Wind Speed: 130-156 mph, 113-136 kts
Catastrophic damage will occur: Well-built framed 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.

Category 5, Wind Speed: 157 mph or higher, 137 kts 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.

Source: http://www.nhc.noaa.gov/aboutsshws.php

Hurricanes and Tropical Storms (cont.)			
Hazard	Date	Location	Remarks/Description of Areas Impacted
Hurricane	September 21, 1938	Southern New England	Flooding caused damage to road network and structures. There were 13 deaths and 494 injured throughout NH. Disruption of electric and telephone services for weeks. Two billion feet of marketable lumber blown down. Total storm losses of $12,337,643 (1938 dollars). 186 mph. maximum winds. Significant flooding in town.
Hurricane (Carol)	August 31, 1954	Southern New England	Category 3, winds 111-130 mph. Extensive tree and crop damage in NH, local flooding.
Hurricane (Edna)	September 11, 1954	Southern New England	Category 3 in Massachusetts. This Hurricane moved off shore but still cost 21 lives and $40.5 million in damages throughout New England. Following so close to Carol it made recovery difficult for some areas. Heavy rain in New Hampshire.
Hurricane	1958	Greenville	Caused trees to fall onto roads including Mill Street and Pleasant Street.
Hurricane (Donna)	September 12, 1960	Southern and Central NH	Category 3 (Category 1 in NH). Heavy flooding in some parts of the State.
Tropical Storm (Daisy)	October 7, 1962	Coastal NH	Heavy swell and flooding along the coast.
Tropical Storm (Doria)	August 28, 1971	New Hampshire	Center passed over NH resulting in heavy rain and damaging winds.
Hurricane (Belle)	August 10, 1976	Southern New England	Primarily rain with resulting flooding in New Hampshire. Category 1.
Hurricane (Gloria)	September, 1985	Southern New England	Category 2, winds 96-110 mph. Electric structures damaged; tree damages. This Hurricane fell apart upon striking Long Island with heavy rains, localized flooding, and minor wind damage in New Hampshire.

Hurricanes and Tropical Storms (cont.)			
Hazard	Date	Location	Remarks/Description of Areas Impacted
Hurricane (Bob)	August 19, 1991	Southern New England	Structural and electrical damage in region from fallen trees. Three people were killed and $2.5 million in damages were suffered along coastal New Hampshire. Federal Disaster FEMA-917-DR.
Hurricane (Eduard)	September 1, 1996	Southern New England	Winds in NH up to 38 mph and 1 inch of rain along the coast. Roads and electrical lines damaged.
Tropical Storm (Floyd)	September 16-18, 1999	Southern New England	FEMA DR-1305-NH. Heavy Rains.
Tropical Storm (Tammy)	October 5-13, 2005	East Coast of US	Remnants of Tammy contributed to the October 2005 floods which dropped 20 inches of rain in some places in NH.
Tropical Storm (Irene)	2011	New England states	FEMA Disaster Declaration #DR-4026 and EM- 3333.
Tropical Storm Sandy	October 26 - November 8, 2012	Eastern United States	FEMA Disaster Declaration # DR-4095; Considered the costliest hurricane/tropical storm in US history with costs exceeding $70 billion. 253 deaths, millions of power outages.
Tropical Storm/hurricanes	There have been no tropical storms or hurricanes that have had an impact on Town Services, caused death or injuries, or structural damage since 2012.		

Severe Winter Weather - High Risk

Three types of winter events are heavy snow, ice storms and extreme cold. Occasionally heavy snow will collapse buildings. Ice storms have disrupted power and communication services. Extreme cold affects the elderly. These random events make it difficult to set a cost to repair or replace any of the structures or utilities affected.

The chart below is an indicator of the severity of ice storms and can assist emergency management officials in predicting the length of power outages based on wind speed and amount of ice accumulation during the storm. This index is similar to those that are used to predict the severity of tornados and hurricanes. Planning ahead will mitigate the damage and prepare communities for severe ice events days in advance. The Sperry-Piltz Ice Accumulation Index, is an ice accumulation and ice damage prediction index that predicts the projected footprint, total ice accumulation, and resulting potential damage from approaching ice storms. It provides a prediction of total ice accumulation on a scale from 0 (minimal ice damage) to 5 (catastrophic ice damage).

The Sperry Piltz Ice Accumulation Index

Severe Winter Weather (cont.)			
Hazard	Date	Location	Remarks/Description of Areas Impacted
Blizzard	February 14-17, 1958	New Hampshire	20-30 inches of snow in parts of New Hampshire.
Snow Storm	March 18-21, 1958	New Hampshire	Up to 22 inches of snow in south central NH.
Snow Storm	December 10-13, 1960	New Hampshire	Up to 17 inches of snow in southern NH.
Snow Storm	January 18-20, 1961	New Hampshire	Up to 25 inches of snow in southern NH.
Snow Storm	February 2-5, 1961	New Hampshire	Up to 18 inches of snow in southern NH.
Snow Storm	January 11-16, 1964	New Hampshire	Up to 12 inches of snow in southern NH.
Blizzard	January 29-31, 1966	New Hampshire	Third and most severe storm of 3 that occurred over a 10-day period. Up to 10 inches of snow across central NH.
Snow Storm	December 26-28, 1969	New Hampshire	Up to 41 inches of snow in west central NH.
Snow Storm	February 18-20, 1972	New Hampshire	Up to 19 inches of snow in southern NH.

Snow Storm	January 19-21, 1978	New Hampshire	Up to 16 inches of snow in southern NH.
Blizzard	February 5-7, 1978	New Hampshire	Across New England-wide. Up to 25 inches of snow in central NH.
Snow Storm	February 1979	New Hampshire	President's Day storm.
Ice Storm	January 8-25, 1979	New Hampshire	Major disruptions to power and transportation.
Snow Storm	April 5-7, 1982	New Hampshire	Up to 18 inches of snow in southern NH.
Ice Storm	February 14, 1986	New Hampshire	Fiercest ice storm in 30 years in the higher elevations in the Monadnock region. It covered a swath about 10 miles wide from the MA border to New London NH.
Ice Storm	March 3-6, 1991	New Hampshire	Numerous outages from ice-laden power lines in southern NH.
Ice Storm	January 15, 1998	New Hampshire	Federal disaster declaration DR-1199-NH, 20 major road closures, 67,586 without electricity, 2,310 without phone service, $17+ million in damages to Public Service of NH alone. Greenville was not significantly affected.
Ice Storm	December 8, 2008	New Hampshire	Downed trees and power lines, power outages up to 2 weeks.
Severe Winter Weather (cont.)			
Hazard	Date	Location	Remarks/Description of Areas Impacted
Snow Storm	October 29-30, 2011	New Hampshire	FEMA Disaster Declaration # DR-4049 (Hillsborough and Rockingham Counties). Severe snowstorm event. Snowfall 34" in a 24-hour period.
Snow Storm	February 8-10, 2013	New Hampshire	February Blizzard "Nemo", exceeded previous snow fall amounts; category B, Declaration # DR4105.
Snow Strom	Nov. 2014	New Hampshire	"Thanksgiving Storm" - was declared the 4th largest power outage in NH history. Many communities received over 12" of snow. Locally - no local impact.
Snow Storm	Jan.26-29, 2015	New Hampshire	FEMA Disaster Declaration#DR-4209. (Hillsborough, Rockingham, and Strafford Counties). Several successive snow storms with more than 10" each. No local impact.
Snow Storm	March 14-15, 2017	New Hampshire	Heavy snow and wind. No local impact.
Snow Storm	March 13-14, 2018	New Hampshire	FEMA Disaster Declaration #DR-4371. (Carroll, Strafford, and Rockingham Counties) Local – no injuries or structures damaged.

Infectious Disease, Pandemics - High Risk			
Infectious Disease - Epidemics may be caused by infectious diseases, which can be transmitted through food, water, the environment or person-to-person or animal-to-person; and noninfectious diseases, such as a chemical exposure, that causes increased rates of illness. Infectious diseases that may cause an epidemic can be broadly categorized into the following groups: • Foodborne (Salmonellosis, E. Coli), • Water (Cholera, Giardiasis) • Vaccine Preventable (Measles, Mumps) • Sexually Transmitted (HIV, Syphilis) • Person-to-Person (TB, meningitis) • Arthropod borne (Lyme, West Nile Virus) • Zoonotic (Rabies, Psittacosis) • Opportunistic fungal and fungal infections (Candidiasis)			
Pandemic	March 2020 -?	Worldwide	Corona-19 Virus. Information is still being collected. Greenville has been impacted with cases in Town. This will be updated in the next plan with specific data to Greenville. The impact to town is through changing business operations and by providing a supply of safety materials and equipment (PPE's).
Aging Infrastructure - High Risk			
Aging infrastructure is defined as the continued regression of the States'/Towns' physical systems including, but not limited to roads and bridges, culverts, utilities, water, and sewage. There are no human or property impacts that have been identified, but concerns were raised about the increase in frequency and intensity of storms as infrastructure continues to age.			
Transport Accidents - Medium Risk			
A transport accident is any accident that occurs during transportation that has multiple injuries or deaths, or has significant impact to the roadways and surrounding area. Specifically, for this plan, it refers to an aviation, tractor trailer, or vehicle accident. There have been no transport accidents in recent years that have caused human or structural impact.			
Solar Storms and Space Weather - Low Risk			
The term space weather is relatively new and describes the dynamic conditions in the Earth's outer space environment, similar to how the terms "climate" and "weather" refer to the conditions in the Earth's lower atmosphere. Space weather includes any and all conditions and events on the sun, in the solar wind, in near-Earth space, and in our upper atmosphere that can affect space-borne and ground based technological systems. The entire State of New Hampshire is at risk for solar storms and space weather. There have been no incidents of damage or interruption of communication services recorded in Greenville. This is a new hazard added to this plan. It is anticipated that this will be discussed further in future plans.			

Dam Failure - Low Risk
Dam failure is considered a low risk to Greenville; however, it is included in this section to show the status of the dams and the classifications as provided by New Hampshire Department of Environmental Services Dam Bureau. The dam on Main Street breached on October 30-31, in 2017 and caused flooding to go through the Mill and into the river. Local impact included the highway department to provide concrete barriers, and HSEM to provide sandbags. No injuries or death and no estimate of cost to the structure.

The State of New Hampshire classifies dams into the following four categories:

NM - Non-menace S - Significant hazard Blank – Inactive or removed
L - Low hazard H - High Hazard

Non-Menace structure means 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, provided the dam is:

Less than six feet in height if it has a storage capacity greater than 50 acre-feet; less than 25 feet in height if it has a storage capacity of 15 to 50 acre-feet.

Low Hazard structure means 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 any of the following:

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 contaminated sediment if the storage capacity is less than two-acre-feet and is located more than 250 feet from a water body or water course; and reversible environmental losses to environmentally-sensitive sites.

Significant Hazard structure means 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 any of the following:

No probable loss of lives; 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:

- Damage to a public water system, as defined by 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.
- Damage to an environmentally-sensitive site that does not meet the definition of reversible environmental losses.

High Hazard means 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 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 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; any other circumstance that would more likely than not cause one or more deaths.

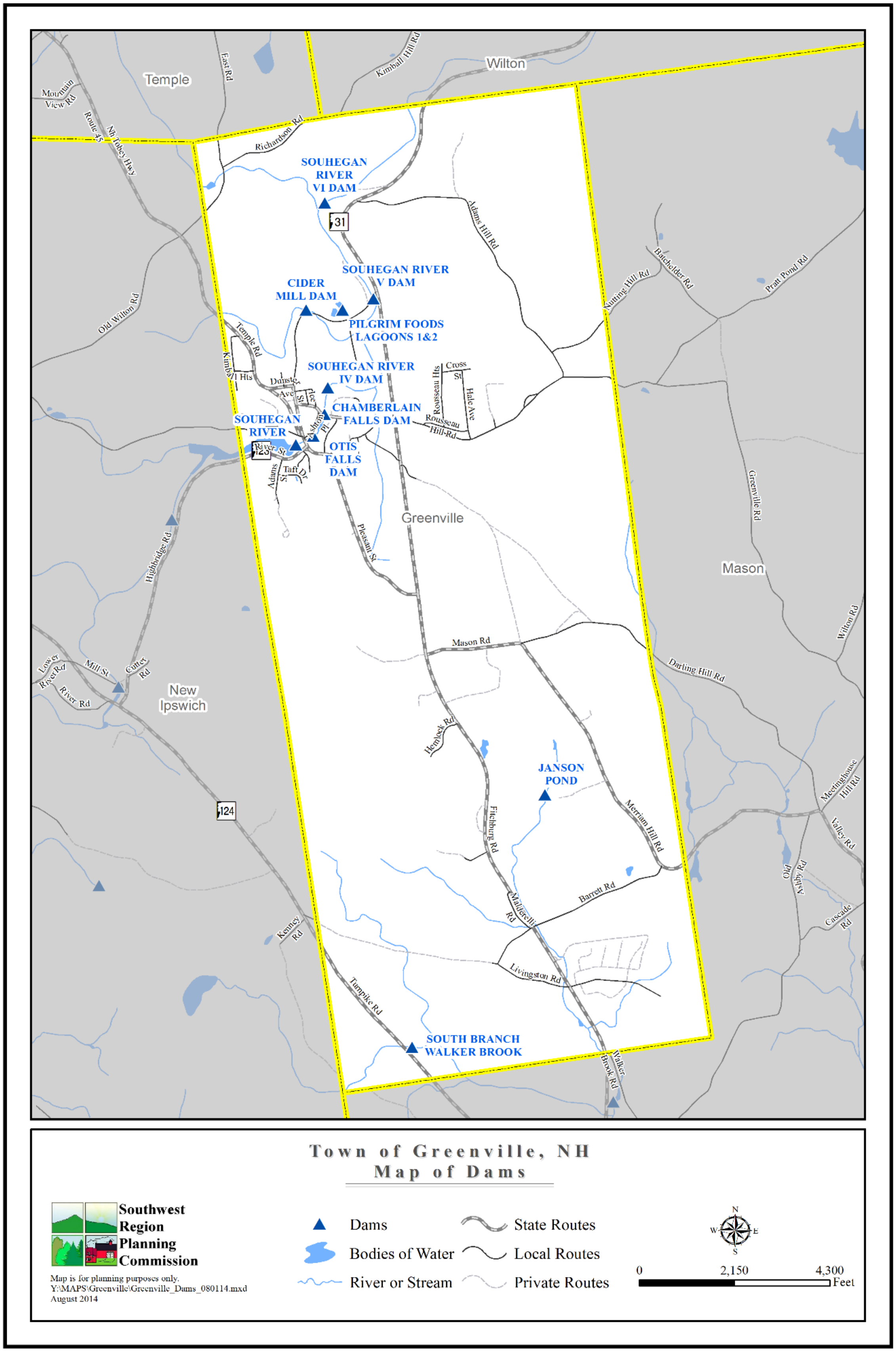
Generally, all Class H dams need to have Emergency Action Plans, and most Class S dams also require them. According to the Department of Environmental Services Dam Bureau, there are ten dams located in Greenville, five are designated NM, two are designated L and the remaining three are inactive. The table below shows all dams in the Town of Greenville.

GREENVILLE DAMS					
Dam #	Hazard Class	Dam Name	Owner	Height (Ft)	Impound (Acres)
101.01	L	Otis Falls Dam	Alpine Pacific Utility Hydro	27	8
101.02	NM	Souhegan River	Private	15	1.5
101.03	L	Chamberlain Falls Dam	Alpine Pacific Utility Hydro	20	0.5

Dam #	Hazard Class	Dam Name	Owner	Height (Ft)	Impound (Acres)
101.04	---	Souhegan River #4 Dam	Oil Recovery Systems	10	---
101.05	---	Souhegan River #5 Dam	Greenville Electric Lighting Company	---	---
101.06	---	Souhegan River #6 Dam	Eversource	27	---
101.07	NM	South Branch Walker Brook	Private	13	0.5
101.08	NM	Cider Mill Dam	Private	12	0.02
101.09	NM	Pilgrim Foods Lagoons 1&2	Private	14	1.43
101.10	NM	Janson Pond	Private	17	0.49

Source: Department of Environmental Services Dam Bureau 2020

The map on the next page shows the locations of the dams listed in this table. These dams are predominantly clustered in the northern portion of the town.


Town of Greenville, NH
Map of Dams
Temple
Wilton
Mason
New Ipswich
Greenville
SOUHEGAN RIVER VI DAM
SOUHEGAN RIVER V DAM
CIDER MILL DAM
PILGRIM FOODS LAGOONS 1&2
SOUHEGAN RIVER IV DAM
CHAMBERLAIN FALLS DAM
SOUHEGAN RIVER
OTIS FALLS DAM
JANSON POND
SOUTH BRANCH WALKER BROOK
Richardson Rd
Adams Hill Rd
Kimball Hill Rd
East Rd
Mountain View Rd
Route 45
Nh Turnpike Hwy
Old Wilton Rd
Temple Rd
Highbridge Rd
Mill St
Cutter Rd
Lower River Rd
River Rd
Kenney Rd
Turnpike Rd
Pleasant St
Mason Rd
Hemlock Rd
Fitchburg Rd
Merriam Hill Rd
Barrett Rd
Livingston Rd
Walker Brook Rd
Rousseau Hill Rd
Rousseau Hts
Hale Ave
Cross St
Nutting Hill Rd
Batchelder Rd
Pratt Pond Rd
Greenville Rd
Wilton Rd
Darling Hill Rd
Meetinghouse Hill Rd
Valley Rd
Old Ashby Rd
Cascade Rd
31
123
124
Southwest Region Planning Commission
Map is for planning purposes only.
Y:\MAPS\Greenville\Greenville_Dams_080114.mxd
August 2014
Dams
Bodies of Water
River or Stream
State Routes
Local Routes
Private Routes
0
2,150
4,300
Feet
N
E
S
W

Chapter 4
Assessing Probability, Severity and Risk
Estimating Potential Losses

The Hazard Mitigation Working Group met to discuss the towns' risk assessment and assign rating scores. Consideration was given to climate change, current capabilities, town assets and critical infrastructure, and previous occurrences when determining the scale of impacts and overall risk. The following terms were used to analyze the hazards:

Impacts: The *Impact* is an estimate generally based on a hazard's effects on humans, property and businesses.

Impact Scoring
1 - Inconvenience, reduced service/productivity, minor damages, non-life-threatening injuries.
3 - Moderate to major damages, temporary closure and reduced service/productivity, numerous injuries and deaths.
6 - Devastation and significant injuries and deaths, permanent closure and/or relocation of services, long-term effects.

Probability of Occurrence: The *Probability of Occurrence* is a numeric value that represents the likelihood that the given hazard will occur within the next 10 years.

Probability Scoring
1 - 33% probability of occurring within 10 years (Low)
3 - 34-66% probability of occurring within 10 years (Medium)
6 - 67-100% probability of occurring within 10 years (High)

Severity**:** Severity is calculated by taking the average of the vulnerability for human, business and property impacts of each hazard type.

Risk: Risk is an adjective description (High, Medium, or Low) of the overall threat posed by a hazard over the next 10 years. It is calculated by multiplying the probability of occurrence and severity.

Overall Risk: The *Overall Risk* is a representation of the combined *potential impact* and *probability of occurrence* ratings. This is calculated by multiplying the probability of occurrence rating score by the impact rating score (the average of human, property and business impacts). The goal of identifying the overall risk of each identified hazard is to assist the town in determining which hazards pose the largest potential threat. The overall risk ratings are broken down and color coded into the following categories:

White: values 1 - 6, Low Risk
Yellow: values 7 - 12, Medium Risk
Red: values 13 - 18, High Risk

	Threat/Hazard	Classification	Human Impact	Property Impact	Economic/ Business Impact	Average Impact Score	Probability of Occurrence	Overall Risk
Natural Hazards	Avalanches	No Risk	0	0	0	0	0	0
	Coastal Flooding	No Risk	0	0	0	0	0	0
	Inland Flooding	High	3	3	3	3	6	18
	Droughts	Medium	1	1	3	1.7	6	10
	Earthquakes	Low	1	1	1	1	1	1
	Extreme Temperatures	Medium	3	1	1	1.7	6	10
	High Wind Events (Tornado, Microburst, Downburst)	Medium	2	2	2	2	6	12
	Infectious Disease, Pandemics	High	6	1	6	4.3	6	26
	Landslides	Medium	3	3	1	2.3	3	7
	Lightning	Medium	1	3	1	1.7	6	10
	Severe Winter Weather	High	3	3	3	3	6	18
	Solar Storms & Space Weather	Low	1	1	1	1	3	3
	Tropical Storms & Hurricanes	High	3	3	3	3	6	18
	Wildfires	High	3	3	3	3	6	18
Technological Hazards	Aging Infrastructure	High	1	3	3	2.3	6	14
	Conflagration	Low	3	3	3	3	1	3
	Dam Failure	Low	3	3	3	3	1	3
	Known & Emerging Contaminants	Low	1	1	1	1	1	1
	Hazardous Materials	Low	1	1	1	1	6	6
	Long-term Utility Outage	Low	3	3	3	3	1	3
	Radiological	Low	1	1	1	1	1	1
Human-Caused Hazards	Cyber Event	Low	1	1	3	1.7	3	5
	Mass Casualty Incident	Low	6	1	1	2.7	1	3
	Terrorism/Violence	Low	6	1	2	3	1	3
	Transport Accidents	Medium	3	1	1	1.7	6	10

Chapter 5
Critical Facilities

Critical Facilities Within Hazard Areas

Hazards identified in this plan are regional risks and, as such, all critical facilities fall into the hazard area. The exception to this is flooding. There are no identified critical facilities that fall within the 100-year floodplain.

A Critical Facility is defined as a building, structure, or location which:

- Is vital to the hazard response effort
- Maintains an existing level of protection from hazards for the community
- Would create a secondary disaster if a hazard were to impact it

The Critical Facilities List for the Town of Greenville has been identified using a Critical Facilities List provided by the State Hazard Mitigation Officer. Greenville's Hazard Mitigation Work Group has divided this list of facilities into four categories. The first category contains facilities needed for Emergency Response in the event of a disaster. The second category contains Non-Emergency Response Facilities that have been identified by the Work Group as non-essential. These are not required in an emergency response event but are considered essential for the everyday operation of Greenville. The third category contains Facilities/Populations that the Work Group wishes to protect in the event of a disaster. The fourth category contains Potential Resources which can provide services or supplies in the event of a disaster. A table at the end of this section identifies critical facilities located in potential hazard areas.

Category 1 - Emergency Response Services:
The town has identified the Emergency Response Facilities and Services as the highest priority in regards to protection from natural and man-made hazards.

1. Emergency Operations Center
   Greenville Town Hall - 46 Main Street

2. Fire Station -7 River Street

3. Police Station -38 Main Street

4. Ambulance Service
   Souhegan Valley Ambulance Service (services Greenville & New Ipswich)

5. Emergency Fuel Facilities
   Town Highway Garage - Fuel depot for Highway, Police & Fire Departments - 109 Wilton Road
   Country Mile Gas Station/Convenience Store - 766 Fitchburg Road

6. Emergency Electrical Power Facility (Generators)
   Waste Water Treatment Plant - 109 Old Wilton Road
   Waste Water Pumping Station - 902 Fitchburg Road
   Greenville Estates next to Ashby Road
   Waste Water Pumping Station - 2 Blanch Farm Road, (next to the Country Mile Store)

Greenville Town Hall - 46 Main Street

7. Emergency Shelters
   Sacred Heart Church -19 High Street
   Former Greenville Elementary School - 16 Adams Street (no cooking facilities)
   Greenville - New Ipswich Ambulance Bay (Souhegan Valley Ambulance Service) - Turnpike Road

8. Dry Hydrants - Fire Ponds and Water Sources

   Dry Hydrants:
   Fire Station
   Adams Hill Road (not dependable)

   Fire Ponds:
   Livingston Road & NH 31
   Corner of Mason Road & NH 31
   NH 124 - in front of 645 Turnpike Road (seasonal)
   Adams Hill Road (private, seasonal access)
   Barrett Road (seasonal)
   Two near Water Treatment Plant
   One on Old Wilton Road (seasonal access)

9. Primary Evacuation Routes
   NH 31
   NH 45
   NH 123

10. Bridges Located on Primary Evacuation Routes
    There are no bridges located on primary evacuation routes.

11. Town Garage/Transfer Station
    209 Old Wilton Road (Same as Waste Water Treatment Plant)

12. Communications
    Cellular Tower on Barrett Hill Road
    Town Hall has Communication Towers for Police, Fire & Highway and the Fire Station has an antenna.
    Telephone Crossboxes - A major crossbox located at the intersection of Dunster Hill and Ash Street that serves portions of the Towns of Temple, New Ipswich, Mason, and Wilton
    Greenville Estates off Old Ashby Road
    Richardson Road

13. Hospitals
    Monadnock Community Hospital (located in Peterborough)
    Cheshire Medical Center (Keene)
    St. Joseph's Hospital (Nashua)
    Southern NH Medical Center (Nashua)
    Health Alliance (Leominster, MA)
    Nashoba Valley Deaconess Hospital (Ayer, MA)

14. Helicopter Landing Sites
    Adams Street near the former Greenville Elementary School
    American Legion Pavilion Field - 577 Fitchburg Road
    Other locations in town could be used for helicopter landings, though these are the designated landing sites.

Category 2 - Non-Emergency Response Facilities:
The town has identified these facilities as non-emergency facilities; however, they are considered essential for the everyday operation of Greenville.

1. Water Supply
    Public Water Supply Wells

2. Sewer & Sewer Infrastructure
    Town sewer in the Town Center and Greenville Estates
    Water in Town Center extends to Pleasant Street and Greenville Estates
    Waste water pump station (2 Blanch Farm Road) & Treatment Plant (150 NH 45)

3. Problem Culverts
    The Road Agent should be contacted to identify particular problem culverts at a given time in addition to those listed below:
    NH 31 (near Adams Hill Road and Mason Road)
    White Street
    Hubbard Hill & Mill Street
    Mill Street & Baker Street
    Richardson Road
    Mason Center Road
    Adams Hill Road (2)
    Both ends of Livingston Road
    Mason Road

4. Secondary Evacuation Routes
    High Street to New Ipswich
    Adams Hill Road to Mason
    Merriam Hill Road to Darling Hill Road into Mason
    Barrett Hill Road to Merriam Hill Road to Mason

5. Transfer Station
    209 Old Wilton Road

Category 3 - Facilities/Populations to Protect:
The third category contains people and facilities that need to be protected in event of a disaster.

1. Special Needs Populations
    A list of special need residents is available at the Emergency Operations Center. The list may include:
    Oxygen-dependent people
    People on a Lifeline
    People assisted by Home Health Care
    Shut-ins and disabled
    Mentally challenged
    Seniors

2. Recreation Areas
   Pool house next to Mascenic SAU - 15 Adams Street (ball field, pool, etc.)

3. Schools
   Head Start Program - 16 Adams Street

4. Day Care Facilities
   No registered childcare centers

5. Churches
   Greenville Community Christian Church - 5 Pleasant Street
   Sacred Heart Church - 19 High Street

6. Historic Buildings/Sites
   None listed on the historic registry.

7. Employment Centers
   Pilgrim Foods, Inc. - 68 Old Wilton Road
   LaMarre Concrete Products, Inc. - 87 Adams Hill Road
   Approved Color Corp. - 101 Adams Hill Road
   Concentration of 6 businesses along NH 31

8. Apartment Complexes
   Pleasant Street Apartments (18 units)
   Acton Place - Acton Court (2 buildings, 16 units each)
   Greenville Falls - 54 & 56 Main Street (2 buildings, 150 residents)

9. Post Office
   15 Main Street

10. Hazardous Material Storage
    Waste Water Treatment Plant - 109 Old Wilton Road
    Approved Color Corp. - 101 Adams Hill Road
    Pilgrim Foods, Inc. - 68 Old Wilton Road
    Country Mile (gas/convenience store) - NH 31, 766 Fitchburg Road
    Town pool (chlorine) - 15 Adams Street
    Haffner's (propane & #2 fuel) - 7 Sophia's Way

<u>Category 4 - Potential Resources:</u>
Contains facilities that provide potential resources for services or supplies.

1. Food & Water
   No designated food resources
   St. Vincent DePaul food pantry at Sacred Heart Church may be a resource

2. Hospitals/Medical Supplies
   Limited supplies at Souhegan Valley Ambulance Service and Greenville Fire Station
   Secondary hospitals include:
   Cheshire Medical Center (Keene)

2. Hospitals/Medical Supplies (cont.)
   St. Joseph's Hospital (Nashua)
   Southern NH Medical Center (Nashua)
   Health Alliance (Leominster, MA)
   Nashoba Valley Deaconess Hospital (Ayer, MA)

3. Gas
   Country Mile (gas/convenience store) - NH 31, 766 Fitchburg Road

4. Heating Fuel
   Haffner's Fuel - NH 31, 7 Sophia's Way

5. Building Material and Heavy Equipment Suppliers
   LaMarre Concrete Products, Inc. - 87 Adams Hill Road
   Frost Farm - Mason Road (Map 2 Lot 3)
   Washburn Windy Hill Orchard - 66 Mason Road
   Greenville Recycling, LLC. - (Map 1 Lot 44-2)
   Highway garage stockpiles material - 109 Old Wilton Road

6. Small Equipment/Contractors/Snow Removal
   LaMarre Concrete Products, Inc. - 87 Adams Hill Road
   Frost Farm - Mason Road (Map 2 Lot 3)
   Washburn Windy Hill Orchard - 66 Mason Road
   Dave's Tree Service - 1 Kimball Heights Ext
   City Line Auto 562 - Fitchburg Road
   Gauvin's Garage/Greenville Auto - 9 Dunster Ave
   West Side Auto - 12 Adams Street

9. Miscellaneous Resources

Emergency Broadcast & Television: WMUR

Transportation:
   Buses Student Transportation of America - 364 Hancock Road, Peterborough
   Community Transportation - 26 Fitzgerald Drive, Jaffrey
   Johnson Transportation - 118 Mason Road, New Ipswich
   Ultimate Party Bus of New England - 562 Fitchburg Road
   Trucks Local Contractors, National Guard, Keene

Beds, Cots, Blankets: National Guard and Red Cross

Critical Facilities and Evacuation Routes Potentially Affected by Hazard Areas

Hazard Type	Hazard Area	Critical Facilities Affected	Evacuation Routes Affected
Flooding	West of NH 31 and North of Baker Avenue	Sewer Department & Highway Garage; HazMat - Sewage Treatment.	None affected
	Main Street (North of High Street/Chamberlain Street/South of River Street)	EOC, multi-unit housing and medical supplies and water at the Greenville Fire Station.	Main Street (P)* High Street (S)**
	Mill St./Hubbard Street	Problem culvert (State of NH).	Mill Street (P)
	Adams Hill Road (2)	None affected.	Adams Hill Road. (S)
	Mason Hill Road/NH 31	Water source for fires, problem culvert, building material/heavy and small equip. Supplier, snow removal and small equipment.	Mason Hill Road. (P), NH 31(P)
	Livingston Road/NH 31/Barrett Road/Maldarelli Road	Problem culvert (2014 project)	NH 31 (P) Barrett Road (S)
	Livingston Road	Problem culvert, water source	None affected
Wildfire	Along Eastern side of NH 31 from border with Wilton to Adams Hill Road	None affected.	NH 31 (P)
Lightning Strikes	Along Merriam Hill Road	None affected.	Merriam Hill Road (P)
	Along High Street	None affected.	High Street (S)
	2 Blanch Farm Road	The intermediate pump station	None affected
	150 NH 45	Greenville Waste Water Treatment Plant	NH 45 (P)
Winter Weather Impact Area	Adams Hill Road	Water supply, 2 problem culverts, 2 employment centers, hazardous materials storage	Adams Hill Road (S)
Dam Failure	Mill Street	Greenville Town Hall	Mill Street (P)

* Primary (P)
** Secondary (S)

Chapter 6
Assessing Vulnerability and Estimating Potential Losses

Existing and future structures have the potential of being affected by some of the hazards identified in this Plan. Some hazards identified in this plan are regional or town-wide risks and, as such, all structures, infrastructure and critical facilities fall into the hazard area. As the population continues to grow, new development has been outside of the flood prone areas which has helped to protect the residents from any increase in vulnerability of hazards. However, as the intensity of storms continues to increase, it is important to review the existing programs and strategies, and improve upon areas that are needed.

Hazard Vulnerability Assessment

To determine estimated losses due to natural and man-made hazards in Greenville, each hazard area was analyzed and the results are shown below. Human losses were not calculated during this exercise, but could be expected to occur depending on the type and severity of the hazard. Most of these figures exclude both the land value and contents of the structure. Information was gathered from the 2020 Greenville Assessor's records and from the NH Office of Strategic Initiatives. The value of all structures, including tax exempt structures is $98,631,441 and the median value of a home in Greenville is $130,700.

As future development in Greenville is unpredictable at this time, it is difficult to predict how many future structures could be threatened by hazards. Therefore, only existing structures are considered in this assessment. Potential losses were calculated for each hazard area by multiplying the type and number of potentially at-risk structures by the appropriate calculated average valuation.

Flooding

High Risk - estimated cost $2,875,400: The Town of Greenville has approximately 5 structures within the special flood hazard area. The vast majority of these structures are single-family homes with basements. Below is a list of past and potential areas in Greenville that are at risk of flooding. Estimates of damage are also indicated in locations with structures. Cost for repairing or replacing the bridges, power lines, telephone lines, road and contents of structures are not included.

- Area west of Main Street where the Souhegan River flows through the Town Center: Flooding of the Souhegan River onto NH 45 has occurred and has the potential to occur in this area due to accumulation of heavy rain and runoff. Flooding has the potential to damage two mill buildings, a commercial structure and three houses on Chamberlain Street. At 100% damage to 100% of the structures, estimated cost of repairing or replacing is $653,500. Cost for repairing or replacing the power lines, telephone lines, and road are not included.

- Area southeast of Old Wilton Road/Baker Avenue: Flood control dams were installed in Temple and New Ipswich in the 1960s to regulate flood waters. Though no structures have been affected by flood incidents and the flood control dams are effective, up to seven structures in the White Street area could be affected by a major flood incident. The Souhegan River flows through this area. At 100% damage to 100% of the structures, estimated cost of repairing or replacing is $914,900. Cost for repairing or replacing the bridges, power lines, telephone lines, road and contents of structures are not included. Dam maintenance is required by owners in abutting communities.

- White Street: Spring rain and runoff causes a brook to overflow. Flood waters are restricted due to an undersized culvert on NH 31 which has caused and has the potential to cause a road washout. Water and sewer lines limit options for relocating or expanding the culvert or installing a deeper culvert. One structure was affected by past flooding in 1989, cost for repairs unknown. Four

structures could be affected by future flooding. At 100% damage to 100% of the structures, estimated cost of repairing or replacing is $522,800.

- Adams Hill Road near NH 31 intersection: Heavy rain and runoff causes flooding of a stream during most storm events. No structures have been affected by past flood incidents. Three structures could be affected by future flooding. At 100% damage to 100% of the structures, estimated cost of repairing or replacing is $392,100. Cost for repairing or replacing the bridges, power lines, telephone lines, road and contents of structures are not included.

- Southeast of intersection of NH 31 and Mason Road: Heavy rain and runoff causes flooding of a parking area during storm events. This is an annual occurrence. Flooding of Mason Road has occurred, though no damage to the road resulted. Water from the Hemlock Hills development has increased the amount of runoff collecting in this area during storm events. If development continues in this area flooding could become a larger problem. No structures have been or could be affected by flood incidents at the present time.

- Livingston Road: Increased development (Hemlock Hills) in this area has increased impervious surfaces and reduced potential for infiltration of heavy rain. Such rain events cause sheet flow of water along Livingston Road and flooding at both ends of Livingston Road where the road intersects with NH 31. One structure could be affected by flooding around the southerly intersection of Livingston Road and NH 31. At 100% damage to 100% of the structures, estimated cost of repairing or replacing is $130,700. Cost for repairing or replacing the bridges, power lines, telephone lines, road and contents of structures are not included. The culvert at the lower crossing was replaced with a much larger structure in 2014 using a FEMA grant.

- Intersection of East Road/Kimball Hill Road/Richardson Road: Heavy rain and runoff causes flooding of the road. The most recent flood incident occurred in October 2005. No structures have been or could be affected by a flood incident.

- Mill Street/Hubbard Hill Road intersection: Increased development in this area has caused narrowing of the brook and clogging of the brook due to the accumulation of sedimentation. Spring rain and runoff and heavy rain events affect the area with water flowing over the road and into basements. Access to some homes could be problematic during flood incidents. Three homes could be affected with wet basements during a flood incident. At 100% damage to 100% of the structures, estimated cost of repairing or replacing is $392,100. Cost for repairing or replacing the bridges, power lines, telephone lines, road and contents of structures are not included.

Drought

Medium Risk - no estimate of cost: Greenville has had limited experience with severe drought conditions. Drought will increase the risk of wildfire, especially in wooded, undeveloped areas. Residents were evacuated in the 1950s due to a high risk of wildfires from drought/low rainfall. Forested areas with high fuel content have more potential to burn. Drought will increase the risk of wildfire, especially in areas of high recreational use and as more timberland is set aside as non-harvested timberland, the potential for the risk of wildfire will increase.

Extreme Temperatures (heat and cold)

Medium Risk - no estimate of cost: Extreme temperatures is a town wide concern and can be dangerous to those residents with medical conditions and the elderly. It is important to have cooling areas and a good supply of water available for extreme heat events. Extreme heat can add to the potential for wildfires and depletes the water supply for firefighting. Extreme cold events can also be dangerous to residents with

medical conditions and the older residents. Heating centers are important during these events. Outreach and education on methods of dealing with extreme temperatures are important.

Wildfire

High Risk - no estimate of cost: There is plenty of fuel and much contiguous forested land. The whole town is at risk for wildfires. A lack of direct access to many remote areas within town adds to the danger. There is a substantial amount of debris on the ground from the ice storms of 1998 and 2008, wind shears, heavy winds, and logging practices. As timber harvesting is reduced, wood roads close, debris builds up on the ground, and the potential for wildfire increases town-wide.

Landslides

Medium Risk - no estimate of cost: Areas in Greenville with steep slopes are at risk to landslides. Those within the watersheds pose a particular threat to water quality.

High Wind Events (Tornado, Microbursts, Downbursts)

Medium Risk - estimate of cost $1,972,629: Risk from tornados is considered to be high in Hillsborough County. The Enhanced Fujita Scale is used to determine the intensity of tornadoes. Most tornadoes are in the EF0 to EF2 Class. Building to modern wind standards provides significant property protection from these hazard events. New Hampshire is located within Zone 2 for Design Wind Speed for Community Shelters, which is 160 mph, and is also noted as being within a hurricane susceptible region. While it is difficult to assess the monetary impact a tornado may have on the community, the range of monetary damage shown below indicates an approximate amount that could be expected.

The southwestern portion of the state is considered a special wind hazard area as demonstrated by the high proportion of tornadoes and severe wind events that are experienced in this region annually. On July 3, 1997 several tornadoes struck this section of the state. An F1 tornado caused severe tree loss in Swanzey, destroying a building and damaging the stables at the Cheshire Fairgrounds. Although outside the southwest region, the 2008 Barnstead tornado caused significant damage and also involved the loss of life. Therefore, this is a real hazard and the damage it could inflict should not to be taken lightly. High wind events are a town wide concern and could cause significant damage especially in the Town center.

Greenville has no history of tornados occurring in Town. Buildings have not been built to Zone 2, Design Wind Speed Codes. An estimated damage to 10% of structures in town with 20% damages is $1,972,629. Estimated cost does not include building contents, land values or damages to utilities. River corridors and hill tops are susceptible.

Hurricane/Tropical Storms

High Risk - estimate of cost $2,465,786: A major hurricane can cause significant damage to a community. Most of the damage is caused by high water and high winds. Greenville's inland location in southwestern New Hampshire reduces the risk of extremely high winds that are associated with hurricanes. The town has experienced small blocks of downed timber and uprooting of trees onto structures. The whole town is at risk for this type of hazard. Hurricanes often create flooding. Estimated wind damage to 5% of the structures with 10% damage per structure is $493,157. Estimated flood damage to 10% of the structures with 20% damage per structure is $1,972,629. Cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included. Possible flooding of evacuation routes is also a risk.

Lightning Strikes

Medium Risk - previous cost $25,000: Telephone and power outages occur when transformers are hit by lightning or when a tree gets struck and falls onto the lines. Antennas and satellites, church steeples, cupolas, and other upward protruding architectural features are at greater risk for lightning strikes. Hikers, fisherman and boaters are at risk during lightning events and should seek safe shelter. Forested areas in

Greenville with a high fuel load, such as excessive accumulation of downed timber due to timber removal or after severe weather events, are a high risk for forest fire during lightning storms.

Particular areas of concern include Barret Hill Road area and Merriam Hill Road near Mason Road. Details of concerns in these areas are described on the next page.

- Barrett Hill Road - A steel water tank and cellular tower located on Barrett Hill Road have increased potential for lightning strikes. No past incidents have been reported. Brush around the cellular tower has been cleared and both structures are grounded. A lightning strike could cause a wildfire.

- Area between Barrett Hill Road and Adams Street - A steel water tank located in this area has increased potential for lightning strikes. No past incidents have been reported. The tower is grounded. A lightning strike could cause a wildfire.

- Merriam Hill Road and Mason Road - This area has a high potential for lightning strikes due to the high elevation and the possibility of high traces of a metal resource in the ground such as iron ore. A number of homes could be affected by wildfires or lightning along this section of roadway.

Severe Winter Weather

High Risk - no estimate of cost: Occasionally, heavy snow events can collapse buildings. Ice storms have disrupted power and communication services. Timberland has been severely damaged. Greenville's recent history has not recorded any loss of life due to the severe winter weather. These random events are difficult to set a cost to repair or replace any of the structures or utilities affected.

Areas of concern include Kimball Hill Road, Richardson Road, East Road and Adams Hill Road. Winter storms cause treacherous travel along these roads. Falling trees and branches could be a problem due to heavy snow and ice. Access to homes and for emergency services could be limited during storm events.

Infectious Disease

High Risk - no estimate of cost: Infectious disease is a town wide concern and can have lasting a significant impact on the health and wellness of Greenville residents and animals. Epidemics may be caused by infectious diseases, which can be transmitted through food, water, the environment or person-to-person or animal-to-person, and noninfectious diseases, such as a chemical exposure, that causes increased rates of illness. Infectious diseases that may cause an epidemic as was demonstrated with the Corona virus pandemic.

Aging Infrastructure

High Risk - no estimate of cost.

Transport Accidents

Medium - no estimate of cost: Crashes are a concern town wide, however, the state highways of NH 31, NH 45, and NH 123 are the greatest concern due to an increase of truck traffic and higher speeds. An increase in monitoring speed can help reduce the extent of impact and frequency of serious crashes.

The Greenville Hazard Mitigation Work Group considered other hazards that could occur within the town, but which received a ranking as a low risk including avalanche, coastal flooding, solar storms and space weather, and earthquakes. These low-risk hazards were not included in this vulnerability assessment.

Chapter 7
Existing Mitigation Strategies and Proposed Improvements

This step involves identifying existing mitigation strategies and town programs. This section evaluates their effectiveness and outlines those programs and recommends improvements to ensure the highest quality emergency services possible.

Effectiveness of the Existing Protection is rated Good, Average, or Below Average: *Good* - meets and sometimes exceeds expectations; *Average*- meets general expectations; *Below Average* - needs improvements.

Existing Protection	Area Covered	Responsible Local Agent	Effective-ness	Proposed Improvements/ Comments
Town-Adopted Building Code - The town employs a code enforcement officer and has adopted provisions of the NH Life Safety Code and the NH State Building Code which includes the International Building Code, International Plumbing Code, International Mechanical Code, International Energy Conservation Code and National Electric Code.	All new construction , Town-wide	Building Inspector	Good	Building approval requires department heads to sign-off. There is a need for increased communication between all departments involved with inspections. There is also a need for more timely enforcement of new construction.
Building Inspector - Enforces building and zoning ordinances and reviews permit applications.	Town-wide	Building Inspector	Good	No changes needed at this time.
Emergency Back-up Power Program - The Town has propane powered back-up generators at both waste water pumping stations and the water and waste water treatment plant. The Town Hall has a back-up generator that serves the Town Hall and the Emergency Management Office. The Fire Station has 3 portable generators. There is also a generator at the Sacred Heart Church.	Pumping Stations, Water Treatment Facilities, Town Hall, Fire Department, Highway Department	Contractor of Water Utilities, Fire Chief, EMD	Good	The Town is currently seeking to install transfer switches at water towers.
Local Road Design Standards - Standards set by the town and the Highway Department to ensure a constant construction benchmark.	Town-wide for new roads	Planning Board and Road Agent	Good	Construction is closely monitored.
Local Bridge Maintenance Program - There are two locally owned bridges.	Town-owned bridge	Highway Department	Average	The Town is actively maintaining one bridge and annually contributing to capital reserve for the red listed bridge.

Existing Protection	Description/ Area Covered	Responsible Local Agent	Effective-ness	Proposed Improvements/ Comments
Local Road Maintenance Program - Greenville allocates approximately $35,000 each year to various roadway projects and receives money from the State appropriations. Funds are used for activities such as resurfacing, culvert replacement and repair.	Town-wide	Road Agent	Good	No funds are set aside for emergency. There is a fair amount of private and State maintained roads. The budget should continue to increase as cost of labor and material costs increase.
Winter Storms Operations Plan - A set of guidelines for the Highway Department and Town personnel to follow during times of extreme winter weather.	Town-wide	Road Agent	Good	Current plow policy and treatment plan for winter storm clean-up works well, however, it involves long hours on behalf of the limited number of Highway Department employees. Capital reserve funds have been established for new equipment.
Town Master Plan - A guidance document to ensure that overall development in town is sustainable, meeting the needs of the citizens by setting forth steps and guidelines for a sound living environment through well planned growth.	Town-wide	Planning Board	Good	The Master Plan was updated in 2017.
Mutual Aid - Provides assistance to all aspects of Greenville's Emergency Management Services including the Police and Fire Department, Ambulance Services and the Highway Department. Southwest NH Fire Mutual Aid (SWNHFMA), the Hillsborough County Sheriff's Department, the State Police, and neighboring communities provide mutual aid to Greenville. SWNHFMA serves 83 cities and towns, and the Hillsborough County Sheriff's Department serves all communities within Hillsborough County.	Town-wide	Police Department	Good	Temple, Greenville, Mason, New Ipswich, Wilton, State Police Dept., and Hillsborough County Sheriff's Department.
	Town-wide	Fire Department	Good	SWNHFMA. Daytime coverage limited due to lack of availability of volunteers.
	Town-wide	Ambulance Service	Good	Verbal agreement w/ Jaffrey, Wilton and other areas to respond. Coverage could be limited in large incident.
Floodplain Ordinance -The Town has adopted a floodplain ordinance in accordance with the National Floodplain Insurance Program (NFIP) standards.	Town-wide	Planning Board	Good	Limited development proposals in floodplains.

Existing Protection	Description/ Area Covered	Responsible Local Agent	Effective-ness	Proposed Improvements/ Comments
Fire Pond and Dry Hydrant Management Plan - This designates a maintenance schedule for the local fire ponds and dry hydrants used by the Fire Department for water supply for fire suppression.	Town-wide	Fire Department	Below Average	When possible, money has been set aside for dredging of ponds and maintenance of hydrants. However, there is no plan for the use of these funds. Need to create a plan that prescribes a regular maintenance plan for fire ponds and hydrants.
Hazardous Materials Spill Prevention Control and Counter Measures Plan - This plan is on hand with the Fire Department in the event that there is an incident. The Keene or Nashua HazMat team is called upon in the event of a major spill.	Town-wide	Fire Department	Good	The level of response is limited by available equipment. Obtain updated HazMat equipment.
Fire Codes - The town uses the National Fire Protection Association (NFPA) Code.	Town-wide for new construction	Fire Inspector	Good	Update as necessary.
Ambulance Service -The Town is served by the Souhegan Valley Ambulance Services that provides service for both Greenville and New Ipswich. The Town also relies on ambulance service from Jaffrey and Wilton, although no formal mutual aid agreements are in place.	Town-wide	Souhegan Valley Ambulance Service	Good	Work on obtaining a written agreement with Souhegan Valley Ambulance Service.
Town-Sponsored Safety Awareness Program - The Fire Department conducts an annual Fire Prevention Awareness Week town-wide and in the Head Start Program. Fire Prevention Week, 1st week of October.	Town-wide	Fire Department	Good	Suggestions have been made to create a safety awareness program specifically for the older residents.
Town Radio System -The Fire Department has both low-band and high-band frequency radio systems. The Highway Department has low-band radios with which they can communicate with the Police and Fire Departments. Hillsborough County Dispatch provides town-wide alert to emergency responders in the event of an incident. The EMD has portable radios but no mobile radios.	Town-wide	Fire Department, Police Department, Ambulance, Dept. of Public Works, Emergency Mgmt.	Good	The Town will continue to work towards high-band frequency.

Existing Protection	Description/ Area Covered	Responsible Local Agent	Effective-ness	Proposed Improvements/ Comments
Health Officer - The Health Officer routinely inspects suspected health hazards in the community.	Town-wide	Nominated by Selectmen/ appointed by DHHS	Good	There is an existing Health Officer in Town that has engaged in very successful public outreach programs. The Assistant Health Officer is the Building Inspector.
Tree Maintenance Program - The Department of Public Works engages in an annual Tree Maintenance Program to remove possible hazards to structures and roads.	Town-wide	Road Agent	Good	The plan covers all roads.
Emergency Operations Plan - The town has adopted an Emergency Operations Plan that details actions to be taken in the event of an emergency.	Town-wide	Emergency Management Director	Good	The plan should be updated in 2021. Begin the application for funding in the fall/winter of 2020. There is also a need for further funding to equip the Emergency Management Department with necessities for emergencies.
Beaver Control and Monitoring Plan - Beavers are trapped and moved to another location to reduce the building of dams and potential flooding.	Town-wide	Road Agent	Good	Beaver dams are monitored on a regular basis by the town.
Slash Monitoring - This is done to prevent forest fires.	Town-wide	Fire Chief	Good	Severe winds and ice storms can cause a significant amount of downed timber.

Previous Mitigation Action Update

The Hazard Mitigation Work Group reviewed each Mitigation Action Item from the previous plan to determine the status of the proposed actions. A status of **completed, deferred, or deleted** is recorded in the table below.

Mitigation Action	Status	Comment
Update Town website to include Hazard Mitigation methods and emergency preparedness for homeowners.	Completed	Completed and review for updates.
Informational outreach for the following hazards: tornados, hurricanes, wildfires, radon, lightning, hazardous spills, extreme heat, drought, earthquake, severe winter weather.	Deferred	Some hazards had outreach. Continue to add FEMA and NH HSEM links to the Town website.
Enforce the 2009 updated FEMA Digital Flood Insurance Rate Maps/FIS and floodplain ordinance to ensure the NFIP requirements are maintained & implemented.	Completed	Completed. The Town will continue to enforce the ordinance.
Adopt updated FEMA maps.	Completed	Maps are up-to-date.
Continue to update the culvert Maintenance Plan on a yearly basis.	Completed	Continue to clean the culverts on a yearly basis or sooner.
Install emergency generator at the Highway Department.	Completed	Installed in 2019.
Update the Emergency Operations Plan.	Completed	Completed in 2017. Update should begin in 2021.
Provide information to the public about Fluvial Erosion Hazard Zones.	Completed	Information displayed at Town Office.
Install fire danger sign at visible location.	Deferred	Determine location and seek funding.
Survey the well area to determine where fences should be installed.	Delete	A fence has been installed around one well, and concrete or granite slab is on the other well.
Stabilize steep slope near the impoundment - four houses at risk.	Completed	Done around 2016.
Send written notification to NH DOT District 4, a list of needed repairs & upgrades to state highways and culverts.	Deferred	Continue as a new mitigation action.
Prepare a response to SWRPC's project solicitation request for potential state highways projects to be considered for inclusion into the Ten-Year Plan.	Deferred	The Town is working with SWRPC.
Expand Fire Prevention Week to include Safety Awareness Programs such as campfire education, proper use of generators, radon detection, etc.	Completed	Completed and ongoing.
Update the Master Plan and incorporate the Hazard Mitigation as an appendix	Completed	Complete rewrite done in 2017.
Continue operation-level training of fire fighters and police officers.	Completed	Continue training as needed.

Mitigation Action	Status	Comment
Develop a maintenance plan for fire ponds and hydrants.	Completed	Continue annually
Develop an Implementation Plan for Green Bridge.	Deferred	Continue as a new strategy.
Propose a revision to the Cluster Development Ord. or add a Conservation Subdivision ordinance (or similar).	Deferred	In process.
Open roads to sunlight to prevent icing.	Deleted	Unable to work with property owners. Eversource is trimming some trees.

Chapter 8
Existing and Potential Mitigation Strategies: Identifying Gaps in Coverage

In addition to the programs and activities that Greenville is currently undertaking to protect its residents and property from natural and manmade disasters, a number of additional strategies were identified by the Hazard Mitigation Work Group for consideration. The process of compiling a comprehensive list of all mitigation strategies currently in place throughout the town helped the Work Group to identify gaps in the existing coverage and improvements which could be made to the strategies. Existing and potential strategies were identified for each general hazard type using the following categories: Prevention (programs and policies), Property Protection, Emergency Services, and Public Information. Each strategy was discussed to determine realistic strategies to be included in the STAPLEE chart.

Existing and Potential Strategies

Hazard Type	Prevention (programs and policies)	Property Protection	Emergency Services	Public Information
Flooding	Town Capital Improvement Plan for bridge/culvert replacement.	Inventory culverts and bridges to determine needed upgrades.	Continue to participate in NFIP trainings/workshops offered by the State and/or FEMA (or in other training) that addresses flood hazard planning and management.	Provide information to the public about NFIP.
		Enforcement of the Floodplain Development Ordinance.	Maintain & update Emergency Operations Plan.	Upgrade website to include NFIP and hazard mitigation information.
Drought	Contact the older residents and special needs populations.	Add a water conservation regulation & water ban if necessary.	Consider locations water distribution center.	Provide information to residents on water conservation/drought resistant landscaping and/or rain gardens.
Extreme Temperatures	Contact the older residents and special needs populations.	Update heating and cooling, insulation, windows, etc.	Establish alternative emergency shelters.	Provide information to residents on ways to mitigate the impact of extreme temperatures and maintain health.
Wild Fires	Expand Fire permits to on-line or other options.	Continue to implement the fire pond management plan.	Continue training for firefighters.	Town-wide safety training: Fire prevention training at school; fire and health safety training; fire prevention outreach at Fire Dept.

Hazard Type	Prevention	Property Protection	Emergency Services	Public Information
Lightning	Continue to enforce Building Codes.	Install grounding equipment on public & historic buildings.		Include a link of FEMA's website on the town website.
Tornados/ Severe Wind/ Downbursts	Coordinate with Eversource to trim tree branches near power lines.	Trim tree branches near critical facilities, town structures and roadways.		Provide information for residents to understand ways to mitigate potential damage during a tornado/severe wind/downburst.
Hurricanes/ Tropical Storms	Coordinate with Eversource to trim tree branches near power lines.	Consider requirement for new construction to withstand severe wind speeds.		Continue to provide information to the public about NFIP.
Severe Winter Weather	Coordinate with Eversource to trim tree branches near power lines.	Trim tree branches near critical facilities, town structures, and roadways.	Review current and future needs for emergency backup power. Town Hall, Library (shelter). Winter Storm Operations Plan.	Disseminate information to residents about proper use of generators and the importance of maintaining the heating system to prevent carbon monoxide poisoning and fires.
Erosion/Landslide	Utilize Best Management Practices. Erosion & Sedimentation Plans required for new development.	Existing areas of erosion should be monitored, including pictures or other documentation after heavy weather events.		Provide public information on best management practices and stormwater management methods (NHDES).
Infectious Disease	Develop a protocol for determining closures and measures needed to protect the public.		Equip the EOC and Shelters with sufficient materials to handle a wide-spread infectious disease event.	Conduct a public information workshop on emergency preparedness for short- and long-term quarantine.
Transport Accident	Enforcement of the existing traffic laws and seek the option of additional restrictions. Consider traffic calming options.	Consider conducting a safety audit on NH 31.		Provide alerts on digital display signs.

Hazard Type	Prevention	Property Protection	Emergency Services	Public Information
Aging Infrastructure	Make necessary improvements to the Green Bridge to remove it from NHDOT's red list status.	Upsize culverts in areas of concern. Monitor improvements made to the water systems.		Create an outreach campaign to get voter support for large projects.
All Hazards	Town-sponsored Safety Awareness Program.	Maintain annual reviews of the Action Plan (chapter 9) and implement the strategies.	Annual training for fire, police and public works staff and volunteers.	Educate the public about the Shoreland Water Quality Protection Act.

Prioritization of Proposed Mitigation Strategies

The goal of each strategy identified in the previous table is reduction or prevention of damage from a hazard event. In order to determine their effectiveness in accomplishing this goal, a set of criteria was applied to each strategy. The STAPLEE method analyzes the Social, Technical, Administrative, Political, Legal, Economic and Environmental aspects of a project and is commonly used by public administration officials and planners for making planning decisions. Using this method, changes in priorities of the previous mitigation plan can be made to reflect current trends and conditions. The following questions were asked about the proposed mitigation strategies and discussed in the table below:

- **Social**: Is the proposed strategy socially acceptable to the community? Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- **Technical**: Will the proposed strategy work? Will it create more problems than it solves?
- **Administrative**: Can the community implement the strategy? Is there someone to coordinate and lead the effort?
- **Political**: Is the strategy politically acceptable? Is there public support both to implement and to maintain the project?
- **Legal**: Is the community authorized to implement the proposed strategy? Is there a clear legal basis or precedent for this activity?
- **Economic**: What are the costs and benefits of this strategy? Does the cost seem reasonable for the size of the problem and the likely benefits?
- **Environmental**: How will the strategy impact the environment? Will the strategy need environmental regulatory approvals?

Each mitigation strategy was evaluated and assigned a score (Good = 3, Average = 2, Poor = 1) based on the above criteria. An evaluation chart with total scores for each strategy can be found in the table on the next page. Each strategy was evaluated and prioritized according to the final score. The highest scoring strategies were determined to be of most importance, economically, socially, environmentally, and politically.

Proposed Mitigation Strategy	Is it **Socially** acceptable?	Is it **Technically** feasible?	Is it **Administratively** workable?	Is it **Politically** acceptable?	Is there **Legal** authority to implement?	Is it **Economically** beneficial?	Is it **Environmentally** beneficial?	Total Score
Update Town website to include Hazard Mitigation methods and emergency preparedness for homeowners. Consider adding links to NH HSEM and FEMA for additional outreach information.	3	3	3	3	3	3	3	21
Inspect culverts after heavy rain events. Clean every 2-5 years unless needed sooner.	3	3	3	3	3	3	3	21
Update the Emergency Operations Plan in 2021, to include integration of the Hazard Mitigation Plan. Begin process to secure funding in Fall of 2020.	3	3	3	3	3	3	3	21
Continue operation-level training of Fire Fighters and Police Officers.	3	3	3	3	3	3	3	21
Investigate and potentially install a fire danger sign at visible location.	3	3	3	3	3	3	3	21
Develop an Implementation Plan for Green Bridge (Old Wilton Road). Consider using the State Aid Bridge Program and CDBG.	3	3	3	3	3	3	3	21
Develop a maintenance plan for fire ponds and encourage expanding hydrant access through economic development.	3	3	3	3	3	3	3	21
Send written notification to NH DOT District 4, a list of needed repairs & upgrades to state highways and culverts. Arrange a site visit.	3	3	3	3	3	3	3	21
Consider conducting a traffic volume and speed study on NH 31. Contact SWRPC.	3	3	3	3	3	3	3	21
Expand Fire Prevention Week to include Safety Awareness Programs such as campfire education, proper use of generators, radon detection, etc.	3	3	3	3	3	3	3	21

Proposed Mitigation Strategy	Is it **Socially** acceptable?	Is it **Technically** feasible?	Is it **Administratively** workable?	Is it **Politically** acceptable?	Is there **Legal** authority to implement?	Is it **Economically** beneficial?	Is it **Environ-mentally** beneficial?	Total Score
Prepare a response to SWRPC's solicitation request for potential state highways projects to be considered for inclusion into the Ten-Year Plan.	3	3	3	3	3	3	3	21
Determine a method or protocol to improve communication among Town departments for building permits.	3	3	3	3	3	3	3	21
Obtain a written agreement with Souhegan Valley Ambulance Service.	3	3	3	3	3	3	3	21
Coordinate with other Town departments to develop an ordinance to address substandard housing.	3	3	3	3	3	3	3	21
Host a workshop for homeowners to learn of ways to mitigate the effects of extreme temperatures such as insulation, windows, heating & cooling, etc.	3	3	3	3	3	3	3	21
Upsize/upgrade the culvert on Darling Hill Road.	3	3	3	3	3	3	3	21
Expand Fire permits to on-line or other options.	3	3	3	3	3	3	3	21
Equip the EOC and emergency shelters with sufficient materials to handle a wide-spread infectious disease event.	3	3	3	3	3	3	3	21
Develop a protocol for determining closures and measures needed to protect the public for hazards such as infectious disease, flooding, transport accident, etc.	3	3	3	3	3	3	3	21

Proposed Mitigation Strategy	Is it **Socially** acceptable?	Is it **Technically** feasible?	Is it **Administratively** workable?	Is it **Politically** acceptable?	Is there **Legal** authority to implement?	Is it **Economically** beneficial?	Is it **Environmentally** beneficial?	Total Score
Conduct a workshop for providing information on ways to reduce the impact of hazards and to make emergency preparedness kits.	3	3	3	3	3	3	3	21
Consider traffic calming options to reduce speed and increase driver awareness in areas with safety concerns.	3	3	3	3	3	3	3	21
Consider conducting a safety audit on NH 31. Contact SWRPC and NHDOT.	3	3	3	3	3	3	3	21
Make necessary improvements to the Green Bridge to remove it from NHDOT's red list status.	3	3	3	3	3	3	3	21
Monitor improvements made to the waste water systems.	3	3	3	3	3	3	3	21
Consider installing snow fence in the Barrett Road/Adams Hill Road/Darling Hill area.	3	3	3	3	3	3	3	21
Enforce building codes to ensure tie-downs and other protection for newly installed mobile homes.	3	3	3	3	3	3	3	21
Assess and add surge protectors & backup systems to critical facilities.	3	3	3	3	3	3	3	21
Enforce the 2009 updated FEMA Digital Flood Insurance Rate Maps/FIS and floodplain ordinance to ensure the NFIP requirements are maintained & implemented.	3	3	3	2	3	3	3	20
Adopt updated FEMA maps as they become available.	3	3	3	2	3	3	3	20
Increase road maintenance budget to properly maintain safe travel on town roads, including emergency routes.	3	3	3	2	3	3	3	20
Propose a revision to the Cluster Development Ord. or add a Conservation Subdivision ordinance (or similar).	2	3	3	2	3	3	3	19
Assess and add soil stabilization along areas of erosion or potential erosion.	3	3	3	2	3	2	3	19

Chapter 9
Prioritized Implementation Schedule and Action Plan

The Greenville Hazard Mitigation Work Group developed an action plan that outlines who is responsible for implementing each of the prioritized strategies determined in the previous chapters, as well as when and how the actions will be implemented. The following questions were asked to develop an implementation schedule for the identified priority mitigation strategies:

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?

A fourth consideration was the cost/benefit of each proposed action. Comments regarding the cost/benefit of each project are included, along with the "who," "when," and "how" in the table below.

As additional information becomes available regarding project leadership, timeline, funding sources, and/or cost estimates, the Plan will be reviewed and amended accordingly.

Mitigation Actions that were identified in Chapter VIII but did not score as a priority, will remain in the plan. As additional funding and staff becomes available, these strategies should be considered in future plan updates.

Once the plan is formally approved by FEMA, the Town will begin working on the actions listed below with an estimated completion date as noted in the Timeframe (When) column.

Implementation/Action Plan

Mitigation Action	Who (Leadership)	When (Deadline)	How (Estimated Cost/ Funding Source)
Update Town website to include Hazard Mitigation methods and emergency preparedness for homeowners. Consider adding links to NH HSEM and FEMA for additional outreach information.	Emergency Management Director /Town Administrator	Short-term	Under $500 Town budget
Inspect culverts after heavy rain events. Clean every 2-5 years unless needed sooner.	Road Agent	Mid-term	$1,000 Town budget
Update the Emergency Operations Plan in 2021, to include integration of the Hazard Mitigation Plan. Begin to secure funding in Fall of 2020.	Emergency Management Director	Short-term	$8,000 FEMA grant
Continue operation-level training of Fire Fighters and Police Officers.	Fire Chief and Police Chief	Short-term	$5,000 - $7,000 yearly Town budget
Investigate and potentially install a fire danger sign at visible location.	Fire Chief	Short-term	Town budget, grants

Mitigation Action	Who (Leadership)	When (Deadline)	How (Estimated Cost/ Funding Source)
Develop an Implementation Plan for Green Bridge. Consider using the State Aid Bridge Program and CDBG.	Board of Selectmen	Short to Mid term	Town budget, CDBG
Develop a maintenance plan for fire ponds and encourage expanding hydrant access through economic development.	Fire Chief and Planning Board	Mid-term	Town budget
Send written notification to NHDOT District 4, a list of needed repairs & upgrades to state highways and culverts. Arrange a site visit.	Town Administrator	Short-term	Under $100 Town budget
Consider conducting a traffic volume and speed study on NH 31. Contact SWRPC.	BOS/Road Agent/Police Chief	Long-term	$500 Town budget, grants
Expand Fire Prevention Week to include Safety Awareness Programs such as campfire education, proper use of generators, radon detection, etc.	Fire Chief	Mid-term	Town budget
Prepare a response to SWRPC's solicitation request for potential state highways projects to be considered for inclusion into the Ten-Year Plan.	Road Agent and BOS	Mid-term	Under $100 Town budget
Determine a method or protocol to improve communication among town departments for building permits.	Town Administrator	Short-term	$500 Town budget
Obtain a written agreement with Souhegan Valley Ambulance Service.	Board of Selectmen	Short-term	Under $500 Town budget
Coordinate with other town departments to develop an ordinance to address substandard housing.	Town Administrator	Mid-term	$500 Town budget
Host a workshop for homeowners to learn of ways to mitigate the effects of extreme temperatures such as insulation, windows, heating & cooling, etc.	Town Administrator	Mid-term	Town budget, grants
Upsize/upgrade the culvert on Darling Hill Road.	Road agent	Short-term	Approximately $6,000
Expand Fire permits to on-line or other options.	Fire Chief	Short-term	$500 Town budget
Equip the EOC and emergency shelters with sufficient materials to handle a wide-spread infectious disease event.	Emergency Management Director	Short to Mid-term	Town budget, grants
Develop a protocol for determining closures and measures needed to protect the public for hazards such as infectious disease, flooding, transport accident, etc.	Board of Selectmen/ Emergency Management Director	Short to Mid-term	Town budget

Mitigation Action	Who (Leadership)	When (Deadline)	How (Estimated Cost/ Funding Source)
Conduct a workshop for providing information on ways to reduce the impact of hazards and to make emergency preparedness kits.	Emergency Management Director	Mid-term	$500 Town budget, grants
Consider traffic calming options to reduce speed and increase driver awareness in areas with safety concerns.	Board of Selectmen/ Road Agent/Police Chief	Long-term	$500 (to look at options)Town budget, grants
Consider conducting a safety audit on NH 31. Contact SWRPC and NHDOT.	Board of Selectmen	Short-term	$500 Town budget, grants
Make necessary improvements to the Green Bridge to remove it from NHDOT's red list status.	Board of Selectmen	Long-term	Capital Reserve, bonds, grants
Monitor improvements made to the waste water systems.	Utility Partners	Mid-term	Waste water budget
Consider installing snow fence in the Barrett Road/Adams Hill Road/Darling Hill area.	Road Agent	Mid-term	Town budget
Enforce building codes to ensure tie-downs and other protection for new mobile homes.	Building Inspector	Short-term	Town budget
Enforce the 2009 updated FEMA Digital Flood Insurance Rate Maps/FIS and floodplain ordinance to ensure the NFIP requirements are maintained and implemented.	Building Inspector/Code Enforcement and Planning Board	Short-term	$2,000 Town budget
Adopt updated FEMA maps as they become available.	Board of Selectmen	Long-term	$500 Town budget
Increase road maintenance budget to properly maintain safe travel on town roads, including emergency routes.	Road Agent	Short-term	Under $300 Town budget
Propose a revision to the Cluster Development ordinance or add a Conservation Subdivision ordinance.	Planning Board	Short-term	Under $500 Town budget, grant
Assess and add soil stabilization along areas of erosion or potential erosion.	Board of Selectmen	Long-term	Town budget, bonds, grants

* The following culverts need to be upsized; however, they are on state roads and therefore are not within the jurisdiction of the Town of Greenville to replace:

1) Mill Street and Hubbard Hill Road intersection - larger culvert needs to be installed; 3 structures and access are at risk.
2) Adams Hill Road (south) near NH 31 intersection - repair or replace culvert with larger one; flooding impacts the White Street area; 3 structures are at risk.
3) SE of intersection of NH 31 and Mason Road (NH123) - Upsize culvert and raise the road
4) NH 123 crossing under 66 Main Street- culvert repair or replace.

Chapter 10
Adoption, Implementation, Monitoring, and Updating

The Greenville Board of Selectmen adopted the Greenville Hazard Mitigation Plan Update 2021 on *(add BOS adoption date).* A copy of the resolution can be found at the end of this chapter. Adopted policy addresses the actions for implementation set forth in the chart "Implementation Strategy for Priority Mitigation Actions" in Chapter 9 and in the "Monitoring & Updates" sub-section contained in this chapter. All other sections of this Plan are supporting documentation for information purposes only and are not included as the statement of policy.

A copy of the public hearing notice for the Board of Selectmen meeting at which the plan was adopted is included in **Appendix E.** The plan was available to the public via a hard copy at the Town offices prior to the Board of Selectmen meeting. Any comments were considered and addressed prior to adoption of the plan.

Monitoring & Updates

Recognizing that many mitigation projects are ongoing, and that while in the implementation stage communities may suffer budget cuts, experience staff turnover, or projects may fail altogether, a good plan needs to provide for periodic monitoring and evaluation of its successes and failures and allow for updates of the Plan where necessary.

In order to track progress and update the Mitigation Strategies identified in the Prioritized Implementation Schedule (Chapter 9), the Hazard Mitigation Work Group will revisit the Greenville Hazard Mitigation Plan Update 2021 annually, or after a hazard event. The Emergency Management Director is responsible for initiating this review and should to consult with the Board of Selectmen and other key local officials. Changes should be made to the Plan to accommodate for projects that have failed or are not considered feasible after a review for their consistency with the timeframe, the community's priorities and funding resources. Priorities that did not make the implementation list, but are identified as potential mitigation strategies, should also be reviewed during the monitoring and update of this Plan to determine feasibility of future implementation. In keeping with the process of adopting the Greenville Hazard Mitigation Plan Update 2021, a public hearing to receive public comment on plan maintenance and updating will be held during the annual review period and the final product adopted by the Board of Selectmen.

Monitoring of the plan shall include periodic reports, meetings, site visits, and phone calls. The projects identified in this plan will be evaluated to make sure they are still applicable and practical. When the plan is evaluated, any changes should be incorporated into the plan in the annual update.

Appendix F is meant to assist in the monitoring and evaluation of the plan on an ongoing basis.

The Town of Greenville, NH Hazard Mitigation Plan Update 2021 must be reviewed, revised as appropriate, and resubmitted to FEMA for approval every five years in order to maintain eligibility for Hazard Mitigation & Assistance Grants (HMA Grants).

This plan received NH HSEM/FEMA final approval on (add approval date)

Implementation of the Plan Through Existing Programs

In addition to work by the Hazard Mitigation Work Group and Town departments, several other mechanisms exist which will ensure that the Greenville Hazard Mitigation Plan receives the attention it requires for satisfactory use.

Master Plan - Recommendations from the Greenville Hazard Mitigation Plan will be considered for insertion into future updates of the Master Plan. The Local Hazard Mitigation Work Group will oversee the process to begin working with the Planning Board to ensure that the Greenville Hazard Mitigation Plan is adopted into the Master Plan.

Zoning Ordinance and Regulations - Some of the implementation strategies proposed involve revisions to the Subdivision Regulations and/or the Site Plan Review Regulations as well as the Zoning Ordinance. The Local Hazard Mitigation Work Group will oversee the process to begin working with the Planning Board to develop appropriate language for the recommended modifications. Hazard Mitigation has been included in other plans through ordinances such as the Floodplain Development Ordinance, Building Code Ordinance, and the Manufactured Housing Ordinance.

Continued Public Involvement

On behalf of the Hazard Mitigation Work Group, the Emergency Management Director (EMD), under direction of the Board of Selectmen, will be responsible for ensuring that town departments and the public have adequate opportunity to participate in the planning process. Administrative staff may be utilized to assist with the public involvement process. For the yearly update process, techniques that will be utilized for public involvement may include:

- Provide personal invitations to Budget Committee members;
- Provide personal invitations to town department heads;
- Post notices of meetings at the Town Office, Library, and local businesses;
- Put notice on public access television;
- Submit newspaper articles for publication in appropriate newspapers and Town Newsletter; and
- Information added to the Town Website.

A number of Implementation Action items which will be undertaken relate to public education and involvement. Additionally, members of the public including area business owners, schools, communities, and organizations will be invited to participate in the yearly process of updating the Greenville Hazard Mitigation Plan Update 2021. These outreach activities will be undertaken during the Plan's annual review and during any Hazard Mitigation Work Group meetings the Board of Selectmen calls to order. For all meetings regarding the Greenville Hazard Mitigation Plan Update 2021, the public will be noticed and the meetings will be open to the public.

(Add signed/scanned Adoption Certificate from Greenville BOS)

Appendices

Appendix A:
Hazard Descriptions

Natural Hazards

Avalanche: An avalanche is a slope failure consisting of a mass of rapidly moving, fluidized snow that slides down a mountainside. The flow can be composed of snow, ice, water, soil, rocks, and trees. An avalanche can be comparable to a landslide; only with snow instead of earth. Natural and human-caused snow avalanches most often result from structural weaknesses of mountainside and unstable snow and ice formations. Heavy snowfall followed by high winds often create areas of unstable snow accumulations that can be set in motion by human activities, such as hiking, ice climbing, skiing, and snowboarding.

Inland Flooding: Inland flooding is generally defined as a high flow, overflow, or inundation by water, which causes or threatens damage. Flooding results from the overflow of rivers, their tributaries and streams primarily from high precipitation events. Flash flooding is defined as a flow with a rapid rise in water level and extreme velocities in a river or stream, beginning within six hours of the causative event (e.g., intense rainfall, dam failure, ice jam). Ongoing flooding can intensify to flash flooding in cases where intense rainfall results in a rapid surge of rising flood waters. Because of New Hampshire's steep terrain in the headwaters of watersheds, particularly outside of the coastal plain, flash floods also lead to river bank and bed erosion. Extreme precipitation events in recent years, such as Tropical Storm Irene, have led to buildings on the edges of streambanks becoming at risk to river erosion, or culvert failures. The National Flood Insurance Program (NFIP) has a more specific definition of flooding, which can also be considered and used when looking at floodplain and floodplain mapping.

A flood is defined by the NFIP as:

- A general and temporary condition of partial or complete inundation of 2 or more acres of normally dry land area or of 2 or more properties (at least 1 of which is the policyholder's property) from:
    - o Overflow of inland or tidal waters
    - o Unusual and rapid accumulation or runoff of surface waters from any source
    - o Mudflow
- Collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood as defined above.

Floodplains are usually located in lowlands near rivers, and flood on a regular basis. The term 100-year flood does not mean that flood will occur once every 100 years. It is a statement of probability that scientists and engineers use to describe how one flood compares to others that are likely to occur. It is more accurate to use the phrase "1% annual chance flood". What this means is that there is a 1% chance of a flood of that size happening in any year.

Areas that have been identified as part of the 1% annual chance floodplain in support of the NFIP simply represent those areas for which mapping has been performed. With sufficient rainfall, snowmelt, or through the result of ice jam formation or in the event of dam failure, all areas that are floodplain adjacent to rivers and streams are prone to flood inundation. Developed areas are susceptible to poor drainage flooding during episodes of heavy rain that falls within a short duration. Such flooding is the result of the concentration of impervious surfaces where the amount of concrete, asphalt, rooftops, and other minimally or non-porous materials concentrates flow to stormwater systems that, during heavy rain, cannot always handle the input, causing flooding conditions on streets and parking lots.

Drought: A drought is basically the absence of water in an area that occurs slowly due to below-average precipitation over an extended period, resulting in low stream flows, low surface water, and low groundwater levels. Mitigation for drought is difficult, however, preparedness can help to reduce the impacts that a drought can have. During a drought, water stored in aquifers and surface reservoirs becomes increasingly important to offset the lack of rain, especially in areas of high agricultural production.

Conservation of water usage prior to, and during a drought can help reduce the potential water shortages that often occur during a drought.

Earthquakes > 4.0: The United States Geological Survey (USGS) defines an earthquake as a sudden slip on a fault. Tectonic plates are always slowly moving, but can get stuck on edges due to friction. When the stress on the plates overcomes the friction, there is an earthquake that releases an energy wave that travels through the earth's crust. The earthquake hazard is anything associated with an earthquake that may affect the normal activities of people; such as, surface faulting, ground shaking, landslides, tsunamis, structural damage, etc. There are two primary ways in which earthquakes are measured, magnitude (the size of the earthquake) and intensity (measure of the shaking and damage, which can vary from location to location). Magnitude is measured in the Moment Magnitude scale (based off the obsolete Richter scale). The Modified Mercalli Intensity (MMI) classifies the perceived feeling of the earthquake.

Extreme Temperatures: Extreme temperatures are a period of prolonged and/or excessive hot or cold that presents a danger to human health and life.

Extreme heat is characterized by abnormally high temperatures and/or longer than average time periods of high temperatures. These event conditions are typically infrequent. When they do occur, however, they are usually in late July and August. The severity of extreme heat can be dangerous to those residents with medical conditions and the older population. It is important to have cooling areas and a good supply of water available. Extreme heat can add to the potential for wildfires and depletion of the water supply for firefighting. Extreme heat can also damage or kill crops and animals (wild, farm, or domesticated), potentially presenting a risk to the economy.

The National Weather Service (NWS) provides the following definitions (northeast ranges):

- Heat Advisory: Two or more consecutive hours of Heat Index values of 95-99 degrees Fahrenheit for two or more days OR any duration of Heat Index values of 100-104 degrees Fahrenheit. A Heat Advisory is issued within 12 hours of the onset of extremely dangerous heat conditions.
- Excessive Heat Warning: Two or more hours with Heat Index values of 105 degrees Fahrenheit or greater. An Excessive Heat Warning is issued within 12 hours of the onset of extremely dangerous heat conditions.
- Excessive Heat Watches: Heat watches are issued when conditions are favorable for an excessive heat event in the next 24 to 72 hours. A Watch is used when the risk of a heat wave has increased but its occurrence and timing is still uncertain.
- Excessive Heat Outlooks: Issued when the potential exists for an excessive heat event in the next 3-7 days. An Outlook provides information to those who need considerable lead-time to prepare for the event.

Extreme Cold events occur during meteorological cold waves, also known as cold snaps that are caused by the southern transport of arctic airmasses into the Northeast. These events are most common in winter months and increase the likelihood of cold disorders in humans and animals that have prolonged exposure to low ambient temperatures. Cold disorders can include frostbite and hypothermia which can eventually lead to death. Extreme cold can also damage or kill crops and animals (wild, farm, or domesticated), potentially presenting a risk to the economy.

The National Weather Service provides the following definitions (northeast ranges):

- Wind Chill Watch: NWS issues a wind chill watch when dangerously cold wind chill values are possible. As with a warning, adjust your plans to avoid being outside during the coldest parts of the day. Make sure your car has at least a half a tank of gas, and update your winter survival kit.
- Wind Chill Advisory: NWS issues a wind chill advisory when seasonably cold wind chill values but not extremely cold values are expected or occurring. Be sure you and your loved ones' dress appropriately and cover exposed skin when venturing outdoors. A Wind Chill Advisory is issued

for New Hampshire if wind chill values are expected to be -20°F to -29°F and winds are greater than 5 mph.

- Wind Chill Warning: NWS issues a wind chill warning when dangerously cold wind chill values are expected or occurring. A Wind Chill Advisory is issued for New Hampshire if wind chill values are expected to be -30°F and winds are greater than 5 mph.
- Freeze Watch: NWS issues a freeze watch when there is a potential for significant, widespread freezing temperatures within the next 24-36 hours. A freeze watch is issued in the autumn until the end of the growing season and in the spring at the start of the growing season.
- Frost Advisory: A frost advisory means areas of frost are expected or occurring, posing a threat to sensitive vegetation.
- Freeze Warning: When temperatures are forecasted to go below 32°F for a long period of time, NWS issues a freeze warning. This temperature threshold kills some types of commercial crops and residential plants.
- Hard Freeze Warning: NWS issues a hard freeze warning when temperatures are expected to drop below 28°F for an extended period of time, killing most types of commercial crops and residential plants.

High Wind Events: The State of New Hampshire experiences two types of high wind events that may result from other severe storms and may occur at any time of the year:

Tornadoes: A tornado is a narrow, violently rotating column of air that extends from the base of a thunderstorm to the ground. Because wind is invisible, it is hard to see a tornado unless it forms a condensation funnel made up of water droplets, dust and debris. Tornadoes are the most violent of all atmospheric storms.

Straight-line winds: This term describes any thunderstorm wind that is not associated with rotation, and is usually used to differentiate from tornadic winds. There are several sub-types of straight-line winds:

- Downdraft - small-scale column of air that rapidly sinks towards the ground.
- Downburst - result of a downdraft, referred to as a macroburst when the area affected is greater than 2.5 miles and microburst when less than 2.5 miles.
- Gust Front - leading edge of rain-cooled air that clashes with warmer thunderstorm inflow. Characterized by wind shift, temperature drop and gusty winds in front of a thunderstorm.
- Derecho - widespread, long-lived wind storm that is associated with a band of rapidly moving showers or thunderstorms. A typical derecho consists of numerous microbursts, downbursts and downburst clusters. By definition, if the wind damage swath extends more than 240 miles and includes wind gusts of at least 58 mph or greater along most of its length, then the event may be classified as a derecho.

Infectious Disease/Pandemic: Infectious diseases are illnesses 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. Signs and symptoms vary depending on the organism causing the infection, but often include fever and fatigue. Mild infections get better on their own without treatment, while some are life-threatening infections and may require hospitalization. Wide-spread infectious diseases may cause mass causality regionally and world-wide.

Landslide: A landslide is the downward or outward movement of earth materials on a slope that is reacting to a combination of the force of gravity and a predisposed weakness in the material that allows the sliding process to initiate. The broad classification of landslides includes mudflows, mudslides, debris flows,

rockslides, debris avalanches, debris slides, and earth flows. Landslides may be formed when a layer of soil atop a slope becomes saturated by significant precipitation and slides along a more cohesive layer of soil or rock. Although gravity becomes the primary reason for a landslide once a slope has become weak through a process such as the one just described, other causes can include:

- Erosion by rivers or the ocean that creates over-steepened slopes through erosion of the slope's base. In the case of rivers, this can occur as a result of flash flooding.
- Rock and soil slopes are weakened through saturation by snowmelt or heavy rains.
- Wildfires (loss of vegetation).
- Excess weight from accumulation of rain or snow, stockpiling of rock or ore and other material.

Lightning: Lightning is a visible electric discharge produced by a thunderstorm. Thunder always accompanies lightning, but may or may not be heard depending on the position of the observer. As lightning passes through the air, it heats the air to a temperature of 18,000-60,000 degrees Fahrenheit. This causes the air to rapidly expand and contract creating a sound wave known as thunder. Thunder can be heard up to 10 miles away from the strike. At longer distances thunder sounds like a low rumble as the higher frequency sounds are absorbed by the environment.

Severe Winter Weather: The State of New Hampshire experiences four types of severe weather during the winter months, which usually bring snow, high winds and/or rain depending on temperatures.

Heavy snow - Heavy snow is generally defined as:

- Snowfall accumulating to 4" or more in depth in 12 hours or less; or
- Snowfall accumulating to 6" or more in depth in 24 hours or less.

Blizzard - A blizzard is a snowstorm with the following conditions that is expected to prevail for a period of 3 hours or longer:

- Sustained wind or frequent gusts to 35mph or greater and considerable falling and/or blowing snow that frequently reduces visibility to less than ¼ mile.

Nor'easter - A Nor'easter is a large cyclonic storm that tracks north/northeastward along the East Coast of North America. It is so named due to the northeasterly prevailing wind direction that occurs during the storm. While these storms may occur at any time of the year, they are most frequent and severe during the months of September through April. Nor'easters usually develop off the east coast between Georgia and New Jersey, travel northeastward, and intensify in the New England region. Nor'easters nearly always bring precipitation in the form of heavy rain and/or snow, as well as gale force winds, rough seas, and coastal flooding.

Ice Storm - Ice storms typically occur with warm frontal boundaries, where warm air rises up and over a shallow mass of cold air near the earth's surface. When snow falls from clouds near just north of the warm frontal boundary, it will fall through the deep warm layer aloft first and melt completely into a liquid water droplet. As it passes through the shallow cold layer near the surface, the water droplet cools to the point of being supercooled (a liquid raindrop that remains a liquid at the freezing point). When these supercooled water droplets make contact with freezing surfaces on the ground, such as streets and walkways, they freeze on contact forming layers of ice. This process of freezing rain, when persistent over a long period of time, will form layers that may exceed over an inch thick in extreme cases. Any accumulation of ice can present hazards; however, significant accumulations of ice (1/4" or greater) can pull down trees and utility lines resulting in loss of power and communications. Walking and driving also becomes very dangerous to almost impossible during an ice storm.

Solar Storms and Space Weather: The term space weather is relatively new and describes the dynamic conditions in the Earth's outer space environment, similar to how the terms "climate" and "weather" refer to the conditions in the Earth's lower atmosphere. Space weather includes any and all conditions and events on the sun, in the solar wind, in near-Earth space, and in our upper atmosphere that can affect space-borne and ground based technological systems.

The entire State of New Hampshire is at risk for solar storms and space weather. Space weather affects Earth due to the sun sending energy across the Earth in the form of light and electrically charged particles

and magnetic fields. Although space weather has occurred since the beginning of time, little was understood about the causes and impacts of these instances on the planet. As society becomes increasingly reliant on electronics and technology, the hazards presented by space weather are not to be underestimated. The magnetic disturbances that solar storms can bring can disrupt communications, damage or destroy electronic components, corrode gas and oil pipelines, and cause significant damage to spacecraft and satellites. Radio operators have long been aware of the effects of space weather and how it impacts radio communications, especially those in the High Frequency (HF) band (3-30MHz). Depending on atmospheric conditions from space weather, radio signals can be partially or completely blocked.

Hurricane and Tropical Storm: 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 may extend over 400 miles. High winds and flooding are primary causes of hurricane-inflicted loss of life and property damage. *Tropical Storms* are typically storms that have been downgraded from a hurricane as it reaches further inland. These storms often have large amounts of rain and severe wind, but wind speeds do not reach the level to be classified as a hurricane.

Wildfire: A wildfire is any non-structural fire, other than prescribed fire, that occurs in the Wildland. Wildland here is defined as consisting of vegetation or natural fuels. Wildfires can be referred to as brushfires, wildland fires, or grass fires depending on the location and what is burning.

Technological Hazards

Aging Infrastructure: The continued regression of the States'/towns' physical systems including, but not limited to roads and bridges, culverts, utilities, water, and sewage.

Conflagration: A large and destructive fire that threatens human life, animal life, health, and/or property. It may also be described as a blaze or simply a (large) fire. A conflagration can begin accidentally, be naturally caused (wildfire), or intentionally created (arson). Conflagrations have the potential to cause loss of life, property devastation/destruction and potential negative economic impacts.

Dam Failure: Dam failure is defined as the sudden, rapid, and uncontrolled release of impounded water.

Known & Emerging Contaminants: Contaminants in drinking water include naturally occurring contaminants associated with the geology in a given region and known man-made contaminants associated with nearby land use activities. Some contaminants are considered emerging contaminants.

Man-made Contaminants - Man-made chemicals that have been historically recognized to impact some groundwater and surface water sources of drinking water include volatile organic compounds, pesticides, semi-volatile compounds, radionuclides, nitrates/nitrites, metals, and radionuclides.

Emerging Contaminants - *Emerging contaminants* are chemicals that historically have not been monitored in drinking water due to the lack of laboratory capabilities to detect the compounds or a lack of knowledge about the use of certain compounds and their potential to cause human health impacts. Emerging contaminates have been detected in surface and groundwater that are sources of drinking water in the State of New Hampshire. The latest incidents in New Hampshire to garner widespread media and public attention were related to the discovery of poly and perfluoroalkyl substances, more commonly referred to as PFAS. Historically, other emerging contaminates have spiked public concern, including Methyl Tertiary Butyl Ether (MtBE), which is a manufactured chemical used to increase the octane rating of gasoline. MtBE degrades slowly and is highly soluble in water, allowing it to spread further and last longer in groundwater than many other contaminates.

Hazardous Materials: A hazardous material is any item or agent (biological, chemical, radiological, and/or physical), which has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors. Hazardous materials spills or releases can cause damage or loss to

life and property. Short or long-term evacuation of local residents and businesses may be required, depending on the nature and extent of the incident.

Long-term Utility Outage: A long-term utility outage is defined as a prolonged absence of any type of public utility that is caused by infrastructure failure, cyber-attack, supply depletion, distribution disruption, water source contamination, or a natural, human-caused or technological disaster. This plan considers a long-term utility outage as one lasting two weeks more, or a prolonged outage that causes extreme cascading impacts.

Radiological: Radiological hazards can range from relatively localized incidents involving small amounts of radioactive materials to large-scale catastrophic events. Smaller sources of radiation hazards may be found in medical facilities, industrial and laboratory facilities where radioactive materials and/or radiation producing devices are used. Some radiation is produced naturally from decomposition of radioactive isotopes in soils and underlying strata.

Human-Caused Hazards

Cyber Event: The Department of Homeland Security (DHS) defines a cyber incident as an event occurring on or conducted through a computer network that actually or imminently jeopardizes the confidentiality, integrity, or availability of computers, information or communications systems or networks, physical or virtual infrastructure controlled by computers or information systems.

Mass Casualty Incident: Any large number of casualties (sick, injured, or dead) produced in a relatively short period of time, usually as the result of a single incident such as a military aircraft accident, hurricane, flood, earthquake, or armed attack that exceeds local logistic support capabilities.

Terrorism/Violence: Premeditated, politically motivated violence perpetrated against noncombatant targets by subnational groups or clandestine agents.

Transport Accident: A transport accident is any accident that occurs during transportation that has multiple injuries or deaths, or has significant impact to the roadways and surrounding area. Specifically, for this plan, it refers to an aviation, tractor trailer, or vehicle accident.

Appendix B:
Risk Assessment

Risk Assessment

The Hazard Mitigation Working Group met to discuss the towns' risk assessment and assign rating scores. Consideration was given to climate change, current capabilities, town assets and critical infrastructure, and previous occurrences when determining the scale of impacts and overall risk. The following terms were used to analyze the hazards:

Impacts: The ***Impact*** is an estimate generally based on a hazard's effects on humans, property and businesses. The Working Group determined the impact rating for each of the previously identified hazards. The average impact score was calculated by computing the average of the human, property and business impact scores. The impact ratings were broken down into the following categories:

Impact Scoring
1 - Inconvenience, reduced service/productivity, minor damages, non-life-threatening injuries.
3 - Moderate to major damages, temporary closure and reduced service/productivity, numerous injuries and deaths.
6 - Devastation and significant injuries and deaths, permanent closure and/or relocation of services, long-term effects.

Probability of Occurrence: The *Probability of Occurrence* is a numeric value that represents the likelihood that the given hazard will occur within the next 10 years. This value was chosen based on historical information. The Working Group determined the probability of occurrence rating for each of the previously identified hazards. The probability of occurrence ratings was broken into the following categories:

Low**:** There is little likelihood that this event will occur within the next 10 years (1 event in 10 years).
Medium**:** There is moderate likelihood that this event will occur within the next 10 years (1-2 events each 5-10 years).
High**:** There is great likelihood that this event will occur within the next 10 years (1-2 events each year).

Probability Scoring
1 - 33% probability of occurring within 10 years (Low)
3 - 34-66% probability of occurring within 10 years (Medium)
6 - 67-100% probability of occurring within 10 years (High)

Severity - Severity is calculated by taking the average of the vulnerability for human, business and property impacts of each hazard type.

Risk - Risk is an adjective description (High, Medium, or Low) of the overall threat posed by a hazard over the next 10 years. It is calculated by multiplying the probability of occurrence and severity.

Low**:** There is little potential for a disaster during the next 10 years. The threat is such as to warrant no special effort to prepare for, respond to, recover from, or mitigate against this hazard. This hazard does not need to be specifically addressed in the town's emergency management training and exercise program except as generally dealt with during hazard awareness training.

Medium: There is moderate potential for a disaster of less than major proportions during the next 10 years. The threat is great enough to warrant modest effort to prepare for, respond to, recover from, and mitigate

against this hazard. This hazard should be included in the town's emergency management training and exercise program.

High**:** Risks that are considered to be high were likely ranked so due to (1) a strong potential for a disaster of major proportions during the next 10 years; or (2) history suggests the occurrence of multiple disasters of moderate proportions during the next 10 years. The threat is significant enough to warrant major program effort to prepare for, respond to, recover from, and mitigate against this hazard. This hazard should be a major focus of the towns' emergency management training and exercise program.

Overall Risk: The ***Overall Risk*** is a representation of the combined *potential impact* and *probability of occurrence* ratings. This is calculated by multiplying the probability of occurrence rating score by the impact rating score (the average of human, property and business impacts). The goal of identifying the overall risk of each identified hazard is to assist the town in determining which hazards pose the largest potential threat. The overall risk ratings are broken down and color coded into the following categories:

White: values 1 - 6, Low Risk
Yellow: values 7 - 12, Medium Risk
Red: values 13 - 18, High Risk

Appendix C: Resources

Resources Used in the Preparation of this Plan

NH HSEM's State of New Hampshire Natural Hazards Mitigation Plan (2018)
FEMA's Understanding Your Risks: Identifying Hazards and Estimating Losses
Local Mitigation Planning Handbook
Town of Greenville, NH's Master Plan (2017)

Agencies

New Hampshire Homeland Security and Emergency Management (HSEM)…...……...…….271-2231
Field Representative Hillsborough County**:** Liz Gilboy…...……..…….....603-223-3613
Mitigation Officer**:** Kayla Henderson.……..……271-2231
Mitigation Planner**:** Meaghan Wells ……..……...……...223-3655
Federal Emergency Management Agency (FEMA) 877-336-2734
NH Regional Planning Commissions:
Central NH Regional Planning Commission 226-6020
Lakes Region Planning Commission 279-8171
Nashua Regional Planning Commission 883-0366
North Country Council 444-6303
Rockingham Planning Commission 778-0885
Southern New Hampshire Planning Commission 669-4664
Southwest Region Planning Commission 357-0557
Strafford Regional Planning Commission 742-2523
Upper Valley Lake Sunapee Regional Planning Commission 448-1680
NH Executive Department:
Governor's Office of Energy and Community Services 271-2611
NH Department of Cultural Resources: 271-2540
Division of Historical Resources 271-3483
NH Department of Environmental Services: 271-3503
Air Resources 271-1370
Air Toxins Control Program.....271-0901
Asbestos Program.....271-1373
Childhood Lead Poisoning Prevention Program.....271-5733
Environmental Health Tracking Program.....271-4072
Environmental Toxicology Program 271-3994
Health Risk Assessment Program.....271-6909
Indoor Air Quality Program.....271-3911
Occupational Health and Safety Program.....271-2024
Radon Program.....271-4764
Geology Unit 271-3503
Pollution Preventive Program.....271-6460
Waste Management 271-2900
Water Supply and Pollution Control 271-3414
Rivers Management and Protection Program 271-8801
NH Office of Strategic Initiatives (OSI) 271-2155
NH Municipal Association 224-7447
NH Fish and Game Department 271-3421
Region 1, Lancaster.....788-3164
Region 2, New Hampton.....744-5470
Region 3, Durham 868-1095
Region 4, Keene.....352-9669
NH Department of Resources and Economic Development: 271-2411
Economic Development.....271-2629
Travel and Tourism.....271-6870
Division of Forests and Lands 271-2214

Division of Parks and Recreation 271-3556
Design, Development, and Maintenance 271-2411
NH Department of Transportation 271-3734
Northeast States Emergency Consortium, Inc. (NESEC) .....(781) 224-9876
US Department of Commerce: .....(202) 482-2000
NOAA: National Weather Service; Taunton, Massachusetts .....(508) 824-5116
US Department of the Interior: 202-208-3100
US Fish and Wildlife Service 225-1411
US Geological Survey 225-4681
US Army Corps of Engineers .....(978) 318-8087
US Department of Agriculture:
Natural Resource Conservation Service 868-7581
Cheshire County, Walpole 756-2988
Sullivan County, Newport 863-4297
Hillsborough County, Milford ..... 673-2409 Ext. #4

Mitigation Funding Resources

404 Hazard Mitigation Grant Program (HMGP).....NH Homeland Security and Emergency Management
406 Public Assistance and Hazard Mitigation.....NH Homeland Security and Emergency Management
Community Development Block Grant (CDBG) .....NH HSEM, NH OSI, also refer to RPC
Dam Safety Program .....NH Department of Environmental Services
Emergency Generators Program by NESEC‡ .....NH Homeland Security and Emergency Management
Emergency Watershed Protection (EWP) Program.....USDA, Natural Resources Conservation Service
Flood Mitigation Assistance Program (FMAP) .....NH HSEM, NH OEP
Flood Plain Management Services (FPMS) .....US Army Corps of Engineers
Mitigation Assistance Planning (MAP) .....NH Homeland Security and Emergency Management
Mutual Aid for Public Works.....NH Municipal Association
National Flood Insurance Program (NFIP) † .....NH OSI, NH HSEM
Power of Prevention Grant by NESEC‡ .....NH Homeland Security and Emergency Management
Project Impact .....NH Homeland Security and Emergency Management
Roadway Repair & Maintenance Program(s).....NH Department of Transportation
Section 14 Emergency Stream Bank Erosion & Shoreline Protection ……..……US Army Corps of Engineers
Section 103 Beach Erosion……..…US Army Corps of Engineers
Section 205 Flood Damage Reduction……....US Army Corps of Engineers
Section 208 Snagging and Clearing .....US Army Corps of Engineers
Shoreline Protection Program……..…….NH Department of Environmental Services
Various Forest and Lands Program(s).....NH Department of Resources and Economic Development
Wetlands Programs .....NH Department of Environmental Services

‡NESEC - Northeast States Emergency Consortium, Inc. is a 501(c)(3), not-for-profit natural disaster, multi-hazard mitigation and emergency management organization located in Wakefield, Massachusetts. Please, contact NH HSEM for more information or visit the Consortium's website at http://www.nesec.org/index.cfm.

† Note regarding **National Flood Insurance Program** (NFIP) and **Community Rating System** (CRS):
The National Flood Insurance Program has developed suggested floodplain management activities for those communities who wish to more thoroughly manage or reduce the impact of flooding in their jurisdiction. Through use of a rating system (CRS rating), a community's floodplain management efforts can be evaluated for effectiveness. The rating, which indicates an above average floodplain management effort, is then factored into the premium cost for flood insurance policies sold in the community. The higher the rating achieved in that community, the greater the reduction in flood insurance premium costs for local property owners. The NH Office of Strategic Initiatives can provide additional information regarding participation in the NFIP-CRS Program.

FEMA Region 1 Mitigation Planning Webliography

Hazard Mitigation is sustained action taken to reduce or eliminate risk to people and their property from natural hazards over the longest possible term.

REGULATORY INFORMATION

Final Rule
44 CFR 201.6
http://www.fema.gov/pdf/help/fr02-4321.pdf

Disaster Mitigation Act of 2000 (DMA 2K)
http://www.fema.gov/library/viewRecord.do?id=1935

DISASTERS AND NATURAL HAZARDS INFORMATION

FEMA-How to deal with specific hazards
http://www.ready.gov/natural-disasters

Natural Hazards Center at the University of Colorado
http://www.colorado.edu/hazards

National Oceanic and Atmospheric Administration (NOAA): Information on various projects and research on climate and weather.
http://www.websites.noaa.gov

National Climatic Data Center active archive of weather data.
http://lwf.ncdc.noaa.gov/oa/ncdc.html

Northeast Snowfall Impact Scale
http://www.erh.noaa.gov/rnk/Newsletter/Fall%202007/NESIS.htm

Weekend Snowstorm Strikes The Northeast Corridor Classified As A Category 3 "Major" Storm
http://www.publicaffairs.noaa.gov/releases2006/feb06/noaa06-023.html

FLOOD RELATED HAZARDS

FEMA Coastal Flood Hazard Analysis & Mapping
http://www.fema.gov/national-flood-insurance-program-0/fema-coastal-flood-hazard-analyses-and-mapping-1

Floodsmart
http://www.floodsmart.gov/floodsmart/

National Flood Insurance Program (NFIP)
http://www.fema.gov/nfip

Digital quality Level 3 Flood Maps
http://msc.fema.gov/MSC/statemap.htm

Flood Map Modernization

http://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/map-modernization
Hilliard 2/20/2014 Pg. 2

Reducing Damage from Localized Flooding: A Guide for Communities, 2005 FEMA 511
http://www.fema.gov/library/viewRecord.do?id=1448

FIRE RELATED HAZARDS

Firewise
http://www.firewise.org

NOAA Fire Event Satellite Photos
http://www.osei.noaa.gov/Events/Fires

U.S. Forest Service, USDA
http://www.fs.fed.us/land/wfas/welcome.htm

Wildfire Hazards – A National Threat
http://pubs.usgs.gov/fs/2006/3015/2006-3015.pdf

GEOLOGIC RELATED HAZARDS

USGS Topographic Maps
http://topomaps.usgs.gov/

Building Seismic Safety Council
http://www.nibs.org/?page=bssc

Earthquake hazard history by state
http://earthquake.usgs.gov/earthquakes/states/

USGS data on earthquakes
http://earthquake.usgs.gov/monitoring/deformation/data/download/

USGS Earthquake homepage
http://quake.wr.usgs.gov

National Cooperative Geologic Mapping Program (NCGMP)
http://ncgmp.usgs.gov/

Landslide Overview Map of the Conterminous United States
http://landslides.usgs.gov/learning/nationalmap/

Kafka, Alan L. 2008. Why Does the Earth Quake in New England? Boston College, Weston Observatory, Department of Geology and Geophysics
http://www2.bc.edu/~kafka/Why_Quakes/why_quakes.html

Map and Geographic Information Center, 2010, "Connecticut GIS Data", University of Connecticut
http://magic.lib.uconn.edu/connecticut_data.html

2012 Maine earthquake
http://www.huffingtonpost.com/2012/10/17/maine-earthquake-2012-new-england_n_1972555.html

WIND-RELATED HAZARDS

ATC Wind Speed Web Site
http://www.atcouncil.org/windspeed/index.php
Hilliard 2/20/2014 Pg. 3

U.S. Wind Zone Maps
http://www.fema.gov/safe-rooms/wind-zones-united-states

Tornado Project Online
http://www.tornadoproject.com/

National Hurricane Center
http://www.nhc.noaa.gov

Community Hurricane Preparedness Tutorial
http://meted.ucar.edu/hurrican/chp/hp.htm

National Severe Storms Laboratory, 2009, "Tornado Basics",
http://www.nssl.noaa.gov/primer/tornado/tor_basics.html

DETERMINING RISK AND VULNERABILITY

HAZUS
http://www.hazus.org

FEMA Hazus Average Annualized Loss Viewer
http://fema.maps.arcgis.com/home/webmap/viewer.html?webmap=cb8228309e9d405ca6b4db6027df36d9&extent=-139.0898,7.6266,-48.2109,62.6754

Vulnerability Assessment Tutorial: On-line tutorial for local risk and vulnerability assessment
http://www.csc.noaa.gov/products/nchaz/htm/mitigate.htm

Case Study: an example of a completed risk and vulnerability assessment
http://www.csc.noaa.gov/products/nchaz/htm/case.htm

GEOGRAPHIC INFORMATION SYSTEMS (GIS) AND MAPPING

The National Spatial Data Infrastructure & Clearinghouse (NSDI) and Federal Geographic Data Committee (FGDC) Source for information on producing and sharing geographic data
http://www.fgdc.gov

The OpenGIS Consortium Industry source for developing standards and specifications for GIS data
http://www.opengis.org

Northeast States Emergency Consortium (NESEC): Provides information on various hazards, funding resources, and other information
http://www.nesec.org

US Dept of the Interior Geospatial Emergency Management System (IGEMS) provides the public with both an overview and more specific information on current natural hazard events. It is supported by the Department of the Interior Office of Emergency Management.
http://igems.doi.gov/

FEMA GeoPlatform: Geospatial data and analytics in support of emergency management
http://fema.maps.arcgis.com/home/index.html
Hilliard 2/20/2014 Pg. 4

DATA GATHERING

National Information Sharing Consortium (NISC): brings together data owners, custodians, and users in the fields of homeland security, public safety, and emergency management and response. Members leverage efforts related to the governance, development, and sharing of situational awareness and incident management resources, tools, and best practices http://nisconsortium.org/

The Hydrologic Engineering Center (HEC), an organization within the Institute for Water Resources, is the designated Center of Expertise for the US Army Corps of Engineers
http://www.hec.usace.army.mil/

National Water & Climate Center
http://www.wcc.nrcs.usda.gov/

WinTR-55 Watershed Hydrology
http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/water/?&cid=stelprdb1042901

USACE Hydrologic Engineering Center (HEC)
http://www.hec.usace.army.mil/software/

Stormwater Manager's Resource Center SMRC
http://www.stormwatercenter.net

USGS Current Water Data for the Nation
http://waterdata.usgs.gov/nwis/rt

USGS Water Data for the Nation
http://waterdata.usgs.gov/nwis /

Topography Maps and Aerial photos
http://www.terraserver.com/view.asp?tid=142

National Register of Historic Places
http://www.nps.gov/nr/about.htm

National Wetlands Inventory
http://www.fws.gov/wetlands/

ICLUS Data for Northeast Region
http://www.epa.gov/ncea/global/iclus/inclus_nca_northeast.htm

PLANNING

American Planning Association
http://www.planning.org

Planners Web - Provides city and regional planning resources
http://www.plannersweb.com

FEMA RESOURCES

Federal Emergency Management Agency (FEMA)
www.fema.gov
Hilliard 2/20/2014 Pg. 5

National Mitigation Framework
http://www.fema.gov/national-mitigation-framework

Federal Insurance and Mitigation Administration (FIMA)
http://www.fema.gov/fima

Community Rating System (CRS) http://www.fema.gov/national-flood-insurance-program/national-flood-insurance-program-community-rating-system

FEMA Building Science
http://www.fema.gov/building-science

National Flood Insurance Program (NFIP)
http://www.fema.gov/national-flood-insurance-program

Floodplain Management & Community Assistance Program
http://www.fema.gov/floodplain-management

Increased Cost of Compliance (ICC): ICC coverage allows homeowners whose structures have been repeatedly or substantially damaged to cover the cost of elevation and design requirements for rebuilding with their flood insurance claim up to a maximum of $30,000.
http://www.fema.gov/national-flood-insurance-program-2/increased-cost-compliance-coverage

National Disaster Recovery Framework
http://www.fema.gov/national-disaster-recovery-framework

Computer Sciences Corporation: contracted by FIMA as the NFIP Statistical Agent, CSC provides information and assistance on flood insurance to lenders, insurance agents and communities
www.csc.com

Integrating the Local Natural Hazard Mitigation Plan into a Community's Comprehensive Plan: A Guidebook for Local Governments
https://www.fema.gov/ar/media-library/assets/documents/89725

Mitigation Best Practices Portfolio
http://www.fema.gov/mitigation-best-practices-portfolio

FEMA Multi-Hazard Mitigation Planning Website
http://www.fema.gov/multi-hazard-mitigation-planning

FEMA Resources Page http://www.fema.gov/plan/mitplanning/resources.shtm

Hilliard 2/20/2014 Pg. 6
Local Mitigation Plan Review Guide http://www.fema.gov/library/viewRecord.do?id=4859

Local Mitigation Planning Handbook complements and liberally references the Local Mitigation Plan Review Guide above
http://www.fema.gov/library/viewRecord.do?id=7209

HAZUS
http://www.fema.gov/protecting-our-communities/hazus

Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards
http://www.fema.gov/library/viewRecord.do?id=6938

Integrating Hazard Mitigation Into Local Planning: Case Studies and Tools for Community Officials
http://www.fema.gov/library/viewRecord.do?id=7130

Mitigation Planning for Local and Tribal Communities
Independent Study Course
http://training.fema.gov/EMIWeb/IS/is318.asp

Region 1 Mitigation Contacts
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Connecticut; Maine; New Hampshire
Hilliard 2/20/2014 Pg. 7

OTHER FEDERAL RESOURCES

U.S. Army Corps of Engineers: Provides funding for floodplain management planning and technical assistance and other water resources issues. www.nae.usace.army.mil

Natural Resources Conservation Service: Technical assistance to individual land owners, groups of landowners, communities, and soil and water conservation districts. www.nrcs.usda.gov

NOAA Coastal Services Center http://www.csc.noaa.gov/

Rural Economic and Community Development: Technical assistance to rural areas and smaller communities in rural areas on financing public works projects. www.rurdev.usda.gov

Farm Service Agency: Manages the Wetlands Reserve Program (useful in open space or acquisition projects by purchasing easements on wetlands properties) and farmland set aside programs
www.fsa.usda.gov

National Weather Service: Prepares and issues flood, severe weather and coastal storm warnings. Staff hydrologists can work with communities on flood warning issues; can give technical assistance in preparing flood-warning plans. www.weather.gov

Economic Development Administration (EDA): Assists communities with technical assistance for economic development planning www.osec.doc.gov/eda/default.htm

National Park Service: Technical assistance with open space preservation planning; can help facilitate meetings and identify non-structural options for floodplain redevelopment. www.nps.gov

Fish and Wildlife Services: Can provide technical and financial assistance to restore wetlands and riparian habitats. www.fws.gov

Department of Housing & Urban Development www.hud.gov

Small Business Administration: SBA can provide additional low-interest funds (up to 20% above what an eligible applicant would qualify for) to install mitigation measures. They can also loan the cost of bringing a damaged property up to state or local code requirements. www.sba.gov/disaster

Environmental Protection Agency www.epa.gov

Sustainability/Adaptation/Climate Change
Why the Emergency Management Community Should be Concerned about Climate Change: A discussion of the impact of climate change on selected natural hazards
Hilliard 2/20/2014 Pg. 8
http://www.cna.org/sites/default/files/research/WEB%2007%2029%2010.1%20Climate%20Change%20and%20the%20Emergency%20Management%20Community.pdf

Resilient Sustainable Communities: Integrating Hazard Mitigation& Sustainability into Land Use
http://www.earth.columbia.edu/sitefiles/file/education/documents/2013/Resilient-Sustainable-Communities-Report.pdf

U.S. EPA
http://www.epa.gov/climatechange/

NOAA National Ocean Service (NOS)
http://oceanservice.noaa.gov/

The Northeast Climate Research Center (NRCC) folks were heavily involved in climate data in the NCA, below. They have a wealth of historic climate data and weather information, trends, etc. http://www.nrcc.cornell.edu/

NOAA RISA for the Northeast (Regional Integrated Sciences and Assessments) http://ccrun.org/home

Community and Regional Resilience: Perspectives from hazards, disasters, and emergency management http://www.resilientus.org/library/FINAL_CUTTER_9-25-08_1223482309.pdf

National Fish, Wildlife and Plants Climate Adaptation Strategy www.wildlifeadaptationstrategy.gov
ICLEI Local Governments for Sustainability http://www.icleiusa.org/

Kresge Foundation Survey
http://www.kresge.org/news/survey-finds-communities-northeast-are-trying-plan-for-changes-climate-need-help-0

New England's Sustainable Knowledge Corridor http://www.sustainableknowledgecorridor.org/site/

The Strategic Foresight Initiative (SFI)
http://www.fema.gov/pdf/about/programs/oppa/findings_051111.pdf

Northeast Climate Choices http://www.climatechoices.org/ne/resources_ne/nereport.html

Northeast Climate Impacts Assessment http://www.northeastclimateimpacts.org/

Draft National Climate Assessment Northeast Chapter released early 2013 http://ncadac.globalchange.gov/

Northeast Chapter of the National Climate Assessment of 2009:
http://www.globalchange.gov/images/cir/pdf/northeast.pdf

ClimateNE
www.climatenortheast.com

Scenarios for Climate Assessment and Adaptation http://scenarios.globalchange.gov/

Northeast Climate Science Center http://necsc.umass.edu/

FEMA Climate Change Adaptation and Emergency Management
https://www.llis.dhs.gov/content/climate-change-adaptation-and-emergency-management-0

Climate Central http://www.climatecentral.org

OTHER RESOURCES

New England States Emergency Consortium (NESEC): NESEC conducts public awareness and education programs on natural disaster and emergency management activities throughout New England. Resources are available on earthquake preparedness, mitigation, and hurricane safety.
www.nesec.org

Association of State Floodplain Managers (ASFPM): ASFPM has developed a series of technical and topical research papers, and a series of proceedings from their annual conferences.
www.floods.org

National Voluntary Organizations Active in Disaster (VOAD) is a non-profit, nonpartisan membership organization that serves as the forum where organizations share knowledge and resources throughout the disaster cycle - preparation, response, recovery and mitigation. http://www.nvoad.org/

ADDITIONAL WEBSITES

Sponsor	Internet Address	Summary of Contents
Natural Hazards Research Center, U. of Colorado	http://www.colorado.edu/hazards/	Searchable database of references and links to many disaster-related websites.
National Emergency Management Association	http://nemaweb.org	Association of state emergency management directors; list of mitigation projects.
NASA – Goddard Space Flight Center "Disaster Finder:	http://disasterfinder.gsfc.nasa.gov/Disaster_ Management/ /	Searchable database of sites that encompass a wide range of natural disasters.
NASA Natural Disaster Reference Database	http://ltpwww.gsfc.nasa.gov/ndrd/main/html	Searchable database of worldwide natural disasters.
U.S. State & Local Gateway	http://www.statelocal.gov/	General information through the federal-state partnership.
National Weather Service	http://nws.noaa.gov/	Central page for National Weather Warnings, updated every 60 seconds.
USGS Real Time Hydrologic Data	http://waterdata.usgs.gov/nwis/rt	Provisional hydrological data
Dartmouth Flood Observatory	http://www.dartmouth.edu/~floods	Observations of flooding situations.
FEMA, National Flood Insurance Program, Community Status Book	http://www.fema.gov/about/programs/nfip/index.shtm	Searchable site for access of Community Status Books
Florida State University Atlantic Hurricane Site	http://www.met.fsu.edu/explores/tropical.html	Tracking and NWS warnings for Atlantic Hurricanes and other links
National Lightning Safety Institute	http://lightningsafety.com/	Information and listing of appropriate publications regarding lightning safety.
NASA Optical Transient Detector	http://thunder.msfc.nasa.gov/research.html	Space-based sensor of lightning strikes
LLNL Geologic & Atmospheric Hazards	http://www.llnl.gov/hmc/	General hazard information developed for the Dept. of Energy.
The Tornado Project Online	http://www.tornadoproject.com/	Information on tornadoes, including details of recent impacts.
National Severe Storms Laboratory	http://www.nssl.noaa.gov/	Information about and tracking of severe storms.
Earth Satellite Corporation	http://www.earthsat.com/	Flood risk maps searchable by state.
USDA Forest Service Web	http://www.fs.fed.us/land	Information on forest fires and land management.

Appendix D: Hazard Mitigation Resource Profiles

The following are resources that can be used in Hazard Mitigation projects:

U.S. Army Corps of Engineers

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Mike Keegan, Chief, Project Planning Section (for Section 14, 103, and 205 authorities),
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Address: US Army Corps of Engineers
New England District
696 Virginia Road
Concord, Massachusetts 01742-2751

Description and Mission:

The Corps of Engineers is a multi-disciplinary engineering and environmental organization that has been identifying and meeting the water resources needs of the nation. These needs have been in the areas of flood damage reduction, flood plain information and management, navigation, shore protection, environmental restoration, water supply, streambank protection, recreation, and fish and wildlife resources conservation, as well as technical assistance in other water resources areas.

The New England District (NAE) of the Corps of Engineers is responsible for managing the Corps' civil responsibilities in a 66,000 square-mile region encompassing the six New England states east of the Lake Champlain drainage basin. The District and its leadership are headquartered in Concord, Massachusetts. The missions of the New England District are many and varied. They include:

- flood damage reduction
- navigation improvements and maintenance
- natural resource management
- streambank and shoreline protection
- disaster assistance
- environmental remediation and engineering
- engineering and construction management support to other agencies

Flood Mitigation Involvement:

As a result of the catastrophic floods in 1936, 1938 and 1955, the Corps was called upon to undertake a comprehensive flood damage reduction program. Since then the Corps has built many flood control structures throughout New England. These include 35 dams and reservoirs, five hurricane protection barriers (two are operated by the Corps) and approximately 60 local flood protection projects. The New England District has also completed two nonstructural projects involving the relocation of flood prone property and the acquisition of natural flood storage areas. The Corps also provides technical assistance to states and municipalities in locally constructed flood damage mitigation projects and to promote wise and informed use of floodplain and natural retention areas in order to minimize potential future flood damages.

Mitigation Goals and Objectives:

The New England District has two primary mitigation objectives with respect to flood damage reduction. The first objective is the operation and maintenance of the 35 flood control reservoirs and two hurricane barriers that provide protection to the Connecticut, Merrimack, Thames, Naugatuck, and Blackstone River Basins. The second objective is to continue to work with the states and communities in New England to address flooding problems affecting the region.

Projects Desired:

The Corps of Engineers has several programs available under its Civil Works authorities to address flooding problems. These programs provide assistance either through the construction of structural and nonstructural projects to mitigate the flooding problem or by providing technical information to assist mitigation performed at the state or local level. Flood damage reduction projects constructed by the Corps of Engineers must demonstrate, based on current Federal guidelines, that the flood damages prevented by the project's construction exceed its total cost. The Corps must also demonstrate that the 10-year frequency flood discharge at the point of concern is equal to or greater than 800 cubic-feet per second (cfs). Technical assistance provided by the Corps does not need to meet the above criteria.

COE Resources with Respect to Hazard Mitigation:

The New England Division assists in meeting national, regional and local needs through a variety of means. Congressionally authorized water resources investigations have resulted in the planning, design and implementation of many flood control and flood damage reduction projects. Work conducted under a Congressional authorization can be extensive and there is currently no monetary limit of funding. Typically, there is a 1-2 year minimum delay in the identification of a proposed investigation and the funding of that work. The first phase of study, the Reconnaissance investigation, is 100 percent Federally funded and must be completed within twelve months. The second phase, the Feasibility investigations, must be cost-shared with a local sponsor where the sponsor provides 50 percent of the cost of the feasibility study. Congress in a Water Resources Development Act must specifically authorize construction of any project resulting from a General Investigation study. The cost of implementation for flood damage reduction projects is generally 65 percent Federal and 35 percent non-Federal.

Through the Continuing Authorities Programs of the Corps many structural and non-structural local protection project reducing or eliminating damages from flooding have been constructed. Investigations initiated under the Corps Continuing Authorities do not require specific congressional authorization are initiated simply with a request from the State or community to the New England District. The following is a list of Continuing Authorities applicable to flood mitigation:

Section 14 - Emergency Stream Bank & Shoreline Protection: This work consists of evaluating alternatives to provide emergency protection to public facilities, such as highways and bridges that are threatened due to erosion. The current Federal limit on Section 14 projects is $500,000. The local sponsor is required to provide 25 percent of the cost of developing plans and specifications and of construction.

Section 103 - Beach Erosion: Investigations conducted under this authority are to determine methods of protecting public facilities that have been threatened by beach erosion. Currently there is a Federal limit of $2,000,000 and the local sponsor is required to contribute 35 percent of plans, specifications and construction. The local sponsor is also required to cost-share equally the cost of the feasibility investigation that exceeds $100,000. The first $100,000 is at full Federal expense.

Section 205 - Flood Damage Reduction: Investigations are conducted under this program to assist local communities to identify flooding problems and to formulate and construct alternatives for flood damage reduction. The local sponsor is required to cost-share equally in the cost of the feasibility investigation that exceeds $100,000 and the Federal limit is $5,000,000. The local sponsor is required to contribute 25 percent of the cost of plans, specifications and construction.

Section 208 - Snagging and Clearing: This emergency program is designed to reduce flood damage potential by identifying and removing obstructions that contribute to flooding by causing higher flood stages in the floodways. The

Federal limit under this program is $500,000 and the local sponsor is required to contribute 25 percent of the cost of plans, specifications and construction.

The New England Division also has two Planning Assistance Programs, which provide opportunities for the States to obtain assistance in addressing water resource issues. These programs are the Section 22, Planning Assistance to the States (PAS) program and the Section 206, Flood Plain Management Services (FPMS) program.

Planning Assistance to States Program (PAS): The Planning Assistance to States Program is designed to assist the States in developing comprehensive plans to meet State planning goals. The program is extremely flexible in the type and the methodology of investigations. Studies conducted under the PAS program require a 50/50 cost share with a local sponsor. The existing funding limits are $300,000 per state and a national budget not to exceed $5,000,000.

Flood Plain Management Services (FPMS): The FPMS Program is designed for the Corps to assist States and local communities in improving management of flood plains by performing technical assistance and conducting special investigations. Cost recovery has been implemented in this program effective in FY 1991. Under cost recovery, assistance provided to Federal agencies and private interests must be fully reimbursed by those customers. States and local communities are still provided technical assistance at 100 percent Federal cost. One of the major efforts being conducted under the FPMS program at this time is the preparation of Hurricane Evacuation Studies. These studies are jointly funded with the Federal Emergency Management Agency.

Ice Engineering Research Division
U.S. Army Cold Regions Research and Engineering Laboratory

Contact:
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E-mail: Jean-Claude.Tatinclaux@crl02.usace.army.mil
Website: http://www.crrel.usace.army.mil/ierd/

Address: US Army Cold Regions Research and Engineering Laboratory
Ice Engineering Research Division
72 Lyme Road
Hanover, NH 03755-1290

Description and Mission:
The US Army Cold Regions Research and Engineering Laboratory (CRREL) is a Corps of Engineers' research laboratory that is dedicated to multi-disciplinary engineering and research that addresses the problems and opportunities unique to the world's cold regions. CRREL exists largely to solve the technical problems that develop in cold regions, especially those related to construction, transport, and military operations. Most of these problems are caused by falling and blowing snow, snow on the ground, ice in the air and in the ground, river ice, ice on seas and lakes, and ice effects on manmade materials. CRREL serves the Corps of Engineers and its clients in three main areas:

- Traditional military engineering, which deals with problems that arise during conflict;
- Military construction and operations technology, i.e., the building and maintenance of military bases, airfields, roads, ports, and other facilities; and
- Civil works, which involves the Corps in such things as flood protection, navigation on inland waterways and coastal engineering.

CRREL also deals with cold regions problems for the other defense services, for civilian agencies of the federal government, and to some extent for state agencies, municipalities and private industry.

CRREL's Ice Engineering Research Division (IERD) was created to research, analyze and solve ice problems in and around water bodies, including ice jam flooding and ice accumulation in lock chambers, to ice buildup at water intakes and the destructive forces that moving ice exerts on riverine or coastal structures. In cooperation with the New England District (NAE) of the Corps of Engineers (located in Concord, MA), IERD personnel provide technical assistance before, during and after ice jam flood emergencies. IERD research has resulted in the design and construction of a number of low-cost ice control structures as well as nonstructural mitigation measures. IERD also provides instruction on dealing with river ice problems to local emergency management agencies.

Flood Mitigation Involvement:
IERD is frequently called upon by the various Corps Districts to provide technical assistance to states and municipalities in the form of emergency mitigation. IERD is also involved with Corps and local agencies in developing locally constructed flood damage mitigation projects and promoting wise and informed use of floodplain areas in order to minimize potential future flood damages.

Mitigation Goals and Objectives:
The IERD has two primary mitigation objectives with respect to flood damage reduction. The first objective is to work with the Corps and other federal, state and local agencies to design and implement ice control methods to reduce ice-related flood potential. The second is to work with the states and communities nationwide as well as in New England to address ice-related emergency flooding problems affecting the region.

Projects Desired:

CRREL and IERD are a national resource ready to apply our unique facilities and capabilities to solve problems and conduct innovative, state-of-the-art research and technical support. There are a number of mechanisms that enable IERD and the rest of CRREL to partner with various Federal, non-DoD and private sector entities. The Federal Technology Transfer Act of 1986 (15 USC 3710a) allows CRREL to collaborate with any non-Federal partner on research and technical support consistent with the mission of the laboratory. The Intergovernmental Cooperation Act (31 USC 6505) lets CRREL work with state and local governments on a broad range of reimbursable projects. Under the "Authority to Sell" (10 USC 2539b), CRREL can provide test and evaluation services to the states and the private sector. This includes the testing and evaluation of materials, equipment, models, computer software, and other items. The laboratory can also provide support to other Federal agencies via the Economy in Government Act (31 USC 1535) through MOUs/MOAs that establish a framework for the partnership and provide a concise description of the planned work. CRREL's 35 active Cooperative Research and Development Agreements (CRADAs) with industry and academia and 17 Intergovernmental Cooperation Agreements with states and local governments in 1998 demonstrate a robust program in this area and the relevance of CRREL's research to many segments of American society beyond DoD.

The Corps of Engineers has several programs available under its Civil Works authorities to address flooding problems. These programs provide assistance either through the construction of structural and nonstructural projects to mitigate the flooding problem or by providing technical information to assist mitigation performed at the state or local level. Flood damage reduction projects constructed by the Corps of Engineers must demonstrate, based on current Federal guidelines, that the flood damages prevented by the project's construction exceed its total cost. The Corps must also demonstrate that the 10-year frequency flood discharge at the point of concern is equal to or greater than 800 cubic-feet per second (cfs). Technical assistance provided by the Corps does not need to meet the above criteria. Through the Corps, IERD has been involved in Section 205 Flood Damage Reduction program, Section 22 Planning Assistance to States Program (PAS)) projects, the Section 206 Flood Plain Management Services (FPMS) program funded jointly with FEMA, and numerous instances of technical assistance.

CRREL IERD Resources with Respect to Hazard Mitigation:

Corps: CRREL works jointly with the Corps' New England Division to address regional and local ice-related hazard mitigation needs through a variety of means. Congressionally authorized water resources investigations have resulted in the planning, design and implementation of many flood control and flood damage reduction projects. Work conducted under a Congressional authorization can be extensive and there is currently no monetary limit of funding. Typically there is a 1-2 year minimum delay in the identification of a proposed investigation and the funding of that work. The first phase of study, the Reconnaissance investigation, is 100 percent Federally funded and must be completed within twelve months. The second phase, the Feasibility investigations, must be cost-shared with a local sponsor where the sponsor provides 50 percent of the cost of the feasibility study. Congress in a Water Resources Development Act must specifically authorize construction of any project resulting from a General Investigation study. The cost of implementation for flood damage reduction projects is generally 65 percent Federal and 35 percent non-Federal.

Through the Continuing Authorities Programs of the Corps many structural and non-structural local protection project reducing or eliminating damages from flooding have been constructed. Investigations initiated under the Corps Continuing Authorities do not require specific congressional authorization are initiated simply with a request from the State or community to the New England District. The following is a list of Continuing Authorities applicable to flood mitigation:

Section 205 - Flood Damage Reduction: Investigations are conducted under this program to assist local communities to identify flooding problems and to formulate and construct alternatives for flood damage reduction. The local sponsor is required to cost-share equally in the cost of the feasibility investigation that exceeds $100,000 and the Federal limit is $5,000,000. The local sponsor is required to contribute 25 percent of the cost of plans, specifications and construction.

Section 22 - Planning Assistance to States Program (PAS): The Planning Assistance to States Program is designed to assist the States in developing comprehensive plans to meet State planning goals. The program is extremely flexible in the type and the methodology of investigations. Studies conducted under the PAS program require a 50/50 cost share with a local sponsor. The existing funding limits are $300,000 per state and a national budget not to exceed $5,000,000.

Section 206 - Flood Plain Management Services (FPMS): The FPMS Program is designed for the Corps to assist States and local communities improve management of flood plains by performing technical assistance and conducting special investigations. Cost recovery has been implemented in this program effective in FY 1991. Under cost recovery, assistance provided to Federal agencies and private interests must be fully reimbursed by those customers. States and local communities are still provided technical assistance at 100 percent Federal cost. One of the major efforts being conducted under the FPMS program at this time is the preparation of Hurricane Evacuation Studies. These studies are jointly funded with the Federal Emergency Management Agency.

Personnel:

IERD was created to research, analyze and solve ice problems in and around water bodies. The technical experience of the staff and their in-depth research and field capabilities combine with CRREL's unique Ice Engineering Facility to form one of the premier ice engineering organizations in the world. IERD has a staff of 15 engineers and technicians experienced in technical analyses, methods and engineering solutions to ice problems -- that is, any situation where the effects of ice cause flooding, increase operational and maintenance requirements of water control projects, impede navigation, or adversely impact the environment in cold regions.

Equipment and Facilities:

The Ice Engineering Facility was built to increase the research capabilities of the U.S. Army Cold Regions Research and Engineering Laboratory. It is a two-story building approximately 160 by 210 feet containing

three primary cold spaces: the test Basin, Flume, and Research Area. They have recently designed and built a new Wind Tunnel Facility. In addition, there is a machine room in the basement, an instrumentation corridor separating the flume and test basin spaces, a shop/storage area, and one sample-storage cold room.

The Test Basin was designed primarily for large-scale work on ice forces on structures, such as drill platforms and bridge piers, and for tests using model icebreakers. The Basin is 30 feet wide, 8 feet deep and 120 feet long. The room is designed to operate at any temperatures between +65° and -10°F with very even temperature distribution, which results in uniform ice thickness. Other studies conducted in the Test Basin concern the formation of ice pressure ridges, ice problems in and around navigation locks and vertical uplift forces.

The Flume is situated in a room where the temperature can be regulated between +65° and -20° F. The Flume is 2 by 4 feet in cross section and 120 feet long. It can tilt from +2° to -1° slope, have a flow capacity of nearly 14 cubic feet per second and have a refrigerated bottom. Some other studies conducted in the Flume are the formation of ice covers and frazil ice, the hydraulics of ice-covered rivers, the formation of ice jams, and the effect of ice covers on sediment transport and scour.

Possibly the most versatile portion of the Ice Engineering Facility is the Research Area. This room is 80 by 160 feet clear span and has a temperature range of +65° to -10°F. Piping capable of providing a flow of 1, 2, 4 or 8 cubic feet per second is located on one side of the room, and a large drain trough is on the other. The floor is designed for loads up to 400 pounds per square foot. Models of reaches can be constructed in this area to test ways to alleviate ice jams through channel modification. Tests of the bearing capacity of large ice sheets and cold-testing of vehicles and structures are a few of the other potential uses of this space. Tests conducted in this room will help to alleviate much of the flooding caused by ice jams.

USDA, Natural Resources Conservation Service

Contacts:

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Address: Federal Building
2 Madbury Road
Durham, NH 03824

Description and Mission:
The Natural Resources Conservation Service (NRCS) is a Federal agency within the US Department of Agriculture. The mission of the NRCS is to help people conserve, improve and sustain our natural resources and environment. NRCS, formerly the Soil Conservation Service, is the lead federal agency for conservation on private land. NRCS provides conservation technical assistance through local conservation districts and Resource Conservation and Development (RC&D) Councils to individuals, communities, watershed groups, tribal governments, federal, state, and local agencies, and others. NRCS has an interdisciplinary staff of professional engineers, planners, biologists, foresters, agronomists, and soil scientists working together to provide the necessary technical assistance to solve resource or environmental problems. NRCS products typically include conservation plans, study reports, engineering designs, and resource maps.

Authorities and Funding:
NRCS state and field offices derive funding from two possible sources, direct Federal appropriations and reimbursable agreements with agencies and units of government. NRCS manages several programs; Environmental Quality Incentive Program (EQIP), Wildlife Habitat Incentives Program (WHIP), Wetland Reserve Program (WRP), Forestry Incentives Program (FIP), and Farmland Protection Program (FPP) which provide cost-share assistance to landowners and users (primarily agricultural or forestry land) to install conservation practices to restore and protect natural resources. NRCS can also provide technical assistance ranging from preliminary reviews to complete detail designs to landowners/users solving resource problems even if financial assistance is not being provided for the installation of conservation practices. This assistance is dependent on staff availability and priorities.

NRCS also manages the Emergency Watershed Protection (EWP) program, which can provide financial and technical assistance to units of government and groups to repair damages sustained from a natural disaster (flood, fire, hurricane, tornado) creating an imminent hazard to life and property. The restoration efforts must be environmentally and economically cost effective and typically includes clearing debris from clogged stream channels, stabilizing eroded stream banks and restoring vegetation for stabilization purposes. NRCS can also provide technical assistance to watershed associations or groups to develop comprehensive plans for improving or protecting the watershed environment (water quality, flood reduction, wildlife habitat).

Mitigation Involvement:
The NRCS can provide technical assistance to conduct inventories, to complete watershed or site-specific plans, or to develop detail engineering and construction designs for conservation applications that will help reduce future damages from natural disasters. Some examples of past mitigation efforts include: floodplain management studies for towns, site assessments of stream flow impairments, stabilization designs to protect structures which could sustain severe damages from another storm event, and small watershed plans addressing flooding problems. Some of these products can be provided through other conservation assistance efforts. However, the major jobs would require a reimbursable agreement with the state or towns to complete the work.

Mitigation Goals and Objectives:
With respect to hazard mitigation, the goal of the NRCS in New Hampshire is to meet the needs of the State and local governments by providing timely technical assistance to support recovery and restoration efforts. NRCS can contribute this technical assistance by interacting directly with NH HSEM at the state level and having field staff working directly with Town Emergency Management officials at the local level. Short-term goals are to establish contacts with local officials and the conservation districts at the field office level to facilitate quicker response times. Intermediate and long-term objectives are to improve the cooperative efforts of working with NH HSEM and establish additional contacts for providing timely technical assistance at the local level.

Projects/Planning Desired:
NRCS would like to work with local watershed associations to develop comprehensive plans addressing resource and environmental needs and opportunities in the priority watersheds as identified in the Unified Watershed Assessment. These plans can provide the basis for targeting and requesting special funding to meet the needs of the local watershed association. Technical assistance for planning and designing along with public information dissemination are the typical activities the agency can provide in this effort.

NRCS Resources with respect to Hazard Mitigation

Personnel:
NRCS in New Hampshire has a workforce of 45 staff members along with 5 multi-state staff members. Approximately 22 staff members consisting of engineers, biologists, foresters, conservation planners, and technicians are available to provide some assistance in mitigation efforts. Support staff of a GIS specialist,

computer specialist and public information specialist could assist in providing information for public outreach. This staff is available to provide limited assistance under present program funding authorities. However, larger projects would require reimbursement for planning and design assistance.

Equipment, Physical Facilities and Other Capabilities:
All of the field offices and State office have computers and access to the internet. All of the field offices have survey equipment and all engineers have the use of CADD software. All field offices have access to small meeting rooms and access to the Federal Telecommunications System. Government vehicles are located at all field offices for use by government employees and could be made available in emergencies.

Northeast States Emergency Consortium (NESEC)

Contacts:

Edward S. Fratto, Executive Director: Phone: (781) 224-9876, Fax: (781) 224-4350
E-Mail: www.nesec.org

Kristin M. O'Brien, Assistant Executive Director: Phone: (781) 224-9876 ; e-mail: www.nesec.org

Address: Northeast States Emergency Consortium
419 Main Street, Suite 5
Wakefield, MA 01880

Organization Description:
The Northeast States Emergency Consortium, Inc. (NESEC) is a 501(c)(3) not-for-profit natural disaster mitigation and emergency management organization, located in Wakefield, Massachusetts. NESEC is the only multi-hazard consortium of its kind in the country and is supported and funded by the Federal Emergency Management Agency (FEMA). The eight Northeast States of Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island and Vermont form the consortium. NESEC has a full-time Executive Director, and Assistant. It is governed by a Board of Directors. The Board is comprised of the Directors of the State Emergency Management Agencies from each of the six New England States and the States of New York and New Jersey.

Organization Mission:
NESEC works in partnership with government and private organizations to reduce losses of life and property from natural disasters in the Northeast United States. The Northeast States are vulnerable to most of the natural hazards, including hurricanes, earthquakes, coastal and inland flooding, tornadoes and micro-bursts, forest fires, drought, lighting, blizzards, and other forms of severe weather. Our developed urban areas and the desire to build and live on waterfront property have increased our degree of risk from natural hazards.

Mitigation Programs:
Grants**:** NESEC raises funds from government and private sources to support local mitigation projects. These funds are awarded on a competitive basis in the form of grants in the range of $500-5,000. The name of this program is called the **Power of Prevention**. All grant programs are administered in cooperation with the New Hampshire Homeland Security and Emergency Management (NH HSEM). Communities interested in participating should contact NH HSEM.

HAZUS: NESEC assists FEMA PROJECT IMPACT Communities in the use of HAZUS as a planning platform for incorporating multi-hazard disaster prevention initiatives. NESEC can produce a HAZUS report using default data for each of the initial PROJECT IMPACT Communities. Priority is given to PROJECT IMPACT communities; however, assistance may be provided to other communities as resources allow. This report provides an excellent starting point for communities wishing to utilize HAZUS to identify potential

hazards. The NESEC HAZUS Report is multi-hazard and usually contains information on earthquakes, tornadoes, flood and wind.

There is no fee or charge for producing the default HAZUS Report and meeting with the community to discuss the results. All HAZUS support is arranged in cooperation with the New Hampshire Homeland Security and Emergency Management (NH HSEM). Communities interested in participating should contact NH HSEM.

Emergency Generators: NESEC assists communities to establish a partnership with their electric utilities and service companies. The partnership would conduct an energy efficiency audit of the community, recommend cost saving measures, and implement a cost saving plan. Monthly savings could be used to fund emergency generator(s) for local critical facilities. The utility or energy service company could then lease, install, and maintain generator(s) in a community.

The community would pay a monthly charge for the lease agreement. This charge would not exceed the savings derived through energy efficiency measures, so there would be no capital outlay or additional cost to the community. In fact, some communities may be able to reduce their monthly electric bills in an amount that exceeds the cost of the generator(s) lease agreement.

Monthly savings and utility participation will vary from state to state and community-to-community depending on present electric power usage and efficiency measures and deregulation. There is no fee or charge for assisting communities in establishing partnerships with electric utilities. NESEC assistance will be provided as resources allow. All emergency generator support is arranged in cooperation with the New Hampshire Homeland Security and Emergency Management (NH HSEM). Communities interested in participating should contact NH HSEM.

Federal Mitigation Grant Programs

Pre-Disaster Mitigation Grant Program
The Pre-Disaster Mitigation (PDM) program provides funds to states, territories, 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. http://www.fema.gov/government/grant/pdm/index.shtm

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. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. The HMGP is authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act.
http://www.fema.gov/government/grant/hmgp/index.shtm

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

FEMA provides FMA funds to assist states and communities in implementing 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.
http://www.fema.gov/government/grant/fma/index.shtm

Appendix E: Documentation of the Planning Process

Greenville Hazard Mitigation Plan Update
Meeting #1
AGENDA

February 19, 2020
9:30 a.m.
Greenville Town Hall
Meeting Room
Greenville, NH 03048

1. Introduction

   a. Discuss the addition of recently added hazards to the State Hazard Mitigation Plan

2. Status of Previous Hazard Mitigation Actions

   a. Review the Action Plan from the existing Hazard Mitigation Plan to determine what has been completed, deleted, or deferred to the updated plan

3. Identify Past and Potential Hazards

   a. Review each hazard type and other information on the chart provided in the existing plan (Chapter 3)
   b. Add any new hazards that have occurred since the previous plan was adopted
   c. Add any "potential hazard" concerns

4. Risk Assessment

   a. Determine the *Impact*, *Probability* and *Overall Risk* of each potential hazard

5. Critical Facilities

   a. Review and update the Critical Facilities listed in the existing plan (Chapter 5)

6. Next Meeting - to be determined

Greenville Hazard Mitigation
Meeting 1
February 19, 2020

Sign-In Sheet

Name	Title/Affiliation	Email
Ed White	EMD/ Planning Board Chair	Gfd03@yahoo.com
Helen Burke	Deputy EMD	Gfd03@yahoo.com
Tara Sousa	Town Administrator	administrator@greenvillenh.org
Thomas Plourde	Road Agent	highway@greenvillenh.org
Rob Lauricella	Water Department	rlauricella@utilitypartnersllc.com
Bryan LeBlanc	Water Department	Bryan.leblanc@utilitypartnersllc.com
Kayla Henderson	NH HSEM	Kayla.henderson@dos.nh.gov
Liz Gilboy	NH HSEM	Elizabeth.gilboy@dos.nh.gov
Lisa Murphy	SWRPC	lmurphy@swrpc.org

Greenville Hazard Mitigation Plan Update
Meeting #2
AGENDA
April 24, 2020
10:00 a.m.

To join this Zoom Meeting click:

https://zoom.us/j/93567469385

Meeting ID: 935 6746 9385 Password: 562273

Or by phone: (646) 558-8656 or (312) 626-6799

1. Risk Assessment

    a. Determine the *Impact*, *Probability* and *Overall Risk* of each potential hazard

2. Critical Facilities

    a. Review and update the Critical Facilities listed in the existing plan

3. Existing Mitigation Strategies and Proposed Improvements

    a. Review the list of existing strategies and programs. Determine any needed improvements.

4. Next Meeting- to be determined

Greenville Hazard Mitigation
Meeting 2
April 24, 2020

Sign-In Sheet

Name	Title/Affiliation	Email
Ed White	EMD/ Planning Board Chair	Gfd03@yahoo.com
Helen Burke	Deputy EMD	Gfd03@yahoo.com
Tara Sousa	Town Administrator	administrator@greenvillenh.org
Thomas Plourde	Road Agent	highway@greenvillenh.org
Rob Lauricella	Water/Sewer Consultant	rlauricella@utilitypartnersllc.com
Kayla Henderson	NH HSEM	Kayla.henderson@dos.nh.gov
Liz Gilboy	NH HSEM	Elizabeth.gilboy@dos.nh.gov
Lisa Murphy	SWRPC	lmurphy@swrpc.org

Greenville Hazard Mitigation Plan Update
Meeting #3
AGENDA
June 3, 2020
9:00 a.m.

To join this Zoom Meeting click:
https://bit.ly/june320GHMPU

Meeting ID: 879 2610 3469
Password: 756607
Telephone: (646) 558-8656 or (312) 626-6799

1. Existing Mitigation Strategies and Proposed Improvements

   a. Review the list of existing strategies and programs. Determine any needed improvements.

2. Hazard Mitigation Goals

   a. Determine the goals for the updated hazard mitigation plan.

3. Identify Gaps in Coverage

   a. Review the existing coverage for mitigation strategies and determine if there are any gaps.

4. Potential Date for Next Meeting - Wednesday, June 17th at 9:00 a.m.

Greenville Hazard Mitigation
Meeting # 3
June 3, 2020

Sign-In Sheet

Name	Title/Affiliation	Email
Ed White	EMD/ Planning Board Chair	Gfd03@yahoo.com
Helen Burke	Deputy EMD	Gfd03@yahoo.com
Tara Sousa	Town Administrator	administrator@greenvillenh.org
Thomas Plourde	Road Agent	highway@greenvillenh.org
Brian Golec	Water/Sewer Consultant	Brian.golec@utilitypartnersllc.com
Kayla Henderson	NH HSEM	Kayla.henderson@dos.nh.gov
Liz Gilboy	NH HSEM	Elizabeth.gilboy@dos.nh.gov
Lisa Murphy	SWRPC	lmurphy@swrpc.org

Greenville Hazard Mitigation Plan Update
Meeting #4
AGENDA
June 18, 2020
9:00 a.m.

To join this Zoom Meeting click:
https://bit.ly/June18GHMWG20

Meeting ID: 890 5545 6055
Password: 867487
Telephone: (646) 558-8656 or (312) 626-6799

1. Hazard Mitigation Goals

   a. Determine the goals for the updated hazard mitigation plan.

2. Identify Gaps in Coverage

   a. Review the existing coverage for mitigation strategies and determine if there are any gaps.

3. Results of the Risk Assessment

   a. Review the results of the Risk Assessment exercise and determine if changes are needed.

4. Potential Date for Next Meeting - Wednesday, June 30th at 9:00 a.m.

Greenville Hazard Mitigation
Meeting # 4
June 18, 2020

Sign-In Sheet

Name	Title/Affiliation	Email
Ed White	EMD/ Planning Board Chair	Gfd03@yahoo.com
Helen Burke	Deputy EMD	Gfd03@yahoo.com
Tara Sousa	Town Administrator	administrator@greenvillenh.org
Greg Eastman	Highway Department	highway@greenvillenh.org
Brian Golec	Water/Sewer Consultant	Brian.golec@utilitypartnersllc.com
Kayla Henderson	NH HSEM	Kayla.henderson@dos.nh.gov
Liz Gilboy	NH HSEM	Elizabeth.gilboy@dos.nh.gov
Lisa Murphy	SWRPC	lmurphy@swrpc.org

Greenville Hazard Mitigation Plan Update
Meeting #5
AGENDA
July 1, 2020
9:00 a.m.

To join this Zoom Meeting click:
https://bit.ly/July1GHMPWG20

Meeting ID: 861 6272 5455
Password: 941785
Or by phone: (646) 558-8656 or (301) 715-8592

1. Identify and Prioritize Mitigation Actions for Each Hazard

    a. Identify specific locations to be added to the Action Plan.
    b. Use the STAPLEE Chart to identify and rank actions for each hazard.

2. Prepare an Action Plan

    a. Determine the *Who*, *When*, and *Funding Source* for each action identified in the STAPLEE Chart.

3. Potential Date for Next Meeting: July 29, 2020 at 9:00 a.m.

Greenville Hazard Mitigation
Meeting # 5

July 1, 2020

Sign-In Sheet

Name	Title/Affiliation	Email
Ed White	EMD/ Planning Board Chair	Gfd03@yahoo.com
Helen Burke	Deputy EMD	Gfd03@yahoo.com
Tara Sousa	Town Administrator	administrator@greenvillenh.org
Greg Eastman	Highway Department	highway@greenvillenh.org
Brian Golec	Water/Sewer Consultant	Brian.golec@utilitypartnersllc.com
Kayla Henderson	NH HSEM	Kayla.henderson@dos.nh.gov
Liz Gilboy	NH HSEM	Elizabeth.gilboy@dos.nh.gov
Lisa Murphy	SWRPC	lmurphy@swrpc.org

Greenville Hazard Mitigation Plan Update
Work Group

Meeting #6
AGENDA
July 29, 2020
9:00 a.m.

To join this Zoom Meeting click:
https://bit.ly/July29GHMPWG20

Meeting ID: 896 7095 6726
Password: 519385

Or by phone: (646) 558-8656 or (301) 715-8592

1. Prepare an Action Plan

   a. Determine the *Who, When*, and *Funding Source* for each action identified in the STAPLEE Chart.

2. Potential Date for Next Meeting: September 2, 2020 at 9:00 a.m.

Greenville Hazard Mitigation
Meeting # 6

July 29, 2020

Sign-In Sheet

Name	Title/Affiliation	Email
Ed White	EMD/ Planning Board Chair	Gfd03@yahoo.com
Helen Burke	Deputy EMD	Gfd03@yahoo.com
Tara Sousa	Town Administrator	administrator@greenvillenh.org
Thomas Plourde	Road Agent	highway@greenvillenh.org
Brian Golec	Water/Sewer Consultant	Brian.golec@utilitypartnersllc.com
Kayla Henderson	NH HSEM	Kayla.henderson@dos.nh.gov
Liz Gilboy	NH HSEM	Elizabeth.gilboy@dos.nh.gov
Lisa Murphy	SWRPC	lmurphy@swrpc.org

Greenville Hazard Mitigation Plan Update
Work Group
Meeting #7
AGENDA

September 2, 2020
9:00 a.m.

To join this Zoom Meeting click: https://bit.ly/Sept2GHMWG20
Meeting ID: 834 9920 9604

Or by phone: (646) 558-8656

1. Review the Draft Plan

   a. Make final edits to the draft plan.

2. Discuss the Next Steps

Greenville Hazard Mitigation
Meeting # 7

September 2, 2020

Sign-In Sheet

Name	Title/Affiliation	Email
Helen Burke	Deputy EMD	Gfd03@yahoo.com
Tara Sousa	Town Administrator	administrator@greenvillenh.org
Thomas Plourde	Road Agent	highway@greenvillenh.org
Brian Golec	Water/Sewer Consultant	Brian.golec@utilitypartnersllc.com
Kayla Henderson	NH HSEM	Kayla.henderson@dos.nh.gov
Liz Gilboy	NH HSEM	Elizabeth.gilboy@dos.nh.gov
Lisa Murphy	SWRPC	lmurphy@swrpc.org


3:40
LTE
AA
greenvillenh.org
Search
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Home
Hazard Mitigation Plan - Public Viewing & Comment Period
POSTED ON: MARCH 17, 2021 - 1:04PM
The draft of the Town's Hazard Mitigation Plan update is available at the link below for public review and comment. Please contact the Selectmen's Office by phone at 878-2084, or via email, at administrator@greenvillenh.org, with any commenst or questions.
Attachment
Size
final_draft_greenville_hazmit_2021.docx.pdf
2.08 MB
Greenville New Hampshire
Town Hall

Appendix F:
Project Status Sheets

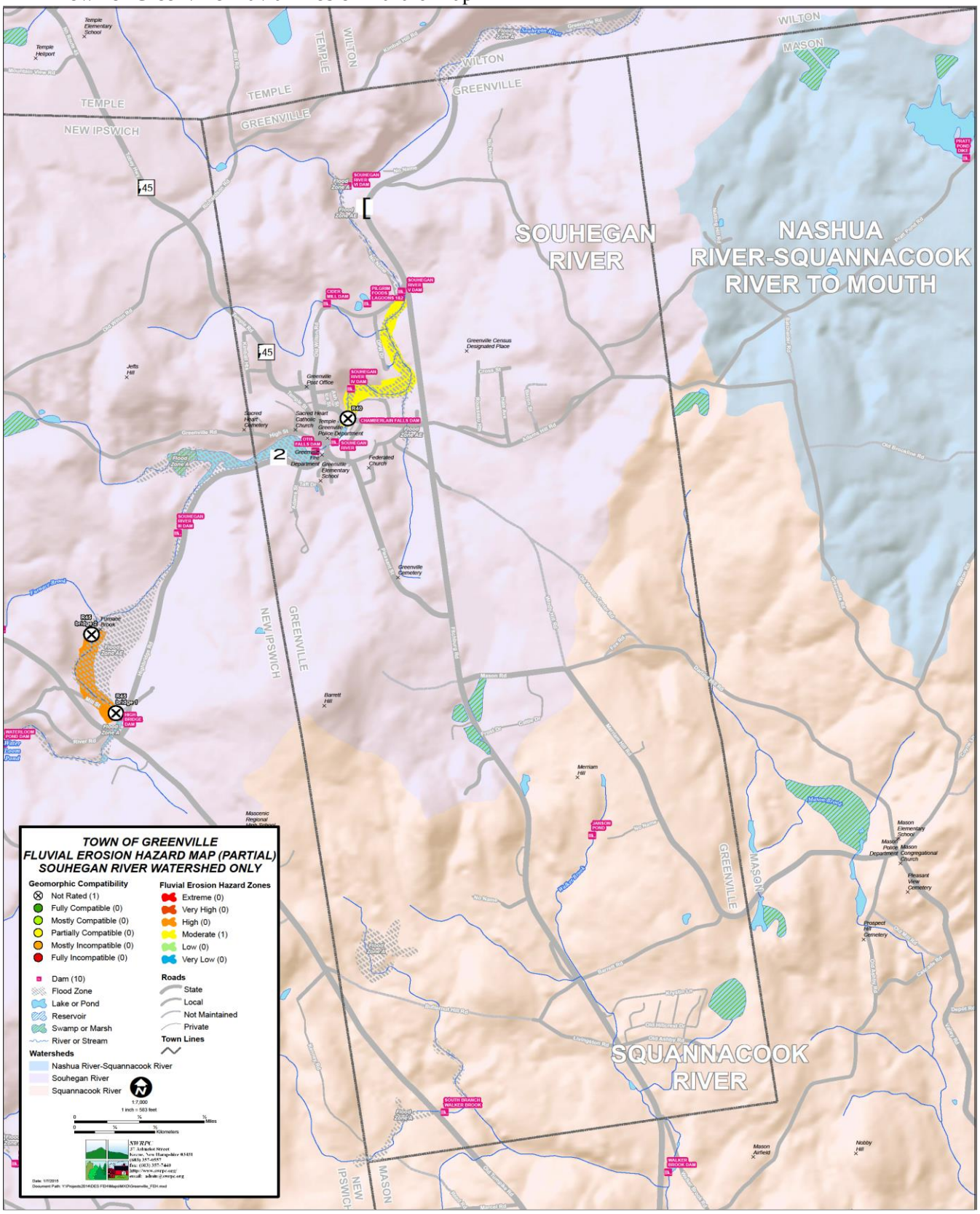
The following form can be used to keep track of projects identified in the hazard mitigation plan that are in progress or that have been completed.

Hazard Mitigation Plan- Project Status

Project Title	Page # in Plan	Date of Project Completion	Comments

Appendix G: Fluvial Erosion Hazard Map and Descriptions

Town of Greenville Fluvial Erosion Hazard Map



Description of FEH Zones and Color Scheme

The fluvial erosion hazard zone, or meander belt, data is provided to you for river reaches that have been assessed for a project within New Hampshire. For each identified river reach herein, a suite of river geomorphology (condition) data is collected that provides an understanding of the river channel's sensitivity to future change (inclusive of bed and bank erosion) as a result of high flow events. Sensitivity for a reach can be in any one of six categories, based on its condition, ranging from Very Low to Extreme. Sensitivity can be defined as the potential of a river to respond to flood events, through bank erosion and lateral migration (across the floodplain) processes. Rivers, as a result of the combination of their geologic context and extent of historical development, will vary in their likelihood to experience flood-event driven rapid changes. Past activities, such as channel straightening, can increase the potential for change in a flood. Reaches already experiencing erosion are prone to such rapid changes, given the exposed bank materials available for the power of water to erode into. The occurrences of such features are incorporated into the sensitivity rankings, where generally, the greater number of features present that can cause changes, the higher the sensitivity to change. Broadly, assignment of an Extreme category means a reach that is experiencing considerable erosion of its beds and banks, and typically has flood chutes and meander cutoffs that maximize the potential for changing flow paths and further erosion during a large flood. Conversely, a rating of Very Low is typically found in a bedrock gorge, where the flow path will not change on time scales of concern to people.

Colorization Scheme

The following color scheme was used to depict each of the following six sensitivity categories of Fluvial Erosion Hazard Areas for mapping and display purposes:

Extreme: Red
Very High: Orange Red
High: Orange
Moderate: Yellow
Low Pale: Green
Very Low: Turquoise

The following color scheme was used to depict each of the following five categories of Geomorphic Compatibility (culverts & dams) for mapping and display purposes:

Fully Incompatible: Red
Mostly Incompatible: Orange
Partially Compatible: Yellow
Mostly Compatible: Lime Green
Fully Compatible: Green