

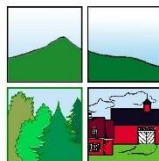
Winchester Hazard Mitigation Plan Update 2022



Winchester, NH Town Hall

FEMA Final Approval (add date)

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EXECUTIVE SUMMARY

The Winchester 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 Winchester Hazard Mitigation Work Group.

Natural hazards are addressed as follows:

- Inland Flooding
- Drought
- Earthquake
- Extreme Temperatures
- High Wind Events
- Infectious Disease
- Landslide
- Lightning
- Severe Winter Weather
- Solar Storms & Space Weather
- Tropical Storms & Hurricanes
- Wildfire

The Winchester Hazard Mitigation Work Group, as shown per Chapter 5, identified *Critical Facilities* and *Areas at Risk* as follows:

Critical Facilities

- Emergency Operations Center (EOC)
- Emergency services facilities
- Water-based facilities and utilities
- Evacuation routes
- Town generators
- Power stations, sub-stations, transmission lines
- Telephone facilities and transmission lines
- Helicopter landing sites
- Medical facilities
- Transfer station
- School/shelters
- Problem culverts/ditches

Areas at Risk

- Special needs population
- Nursing homes/ adult living facilities
- Schools & day care centers
- Historical/cultural facilities
- Religious facilities
- Mobile homes/manufactured homes
- Large employers
- Recreational facilities, parks, beaches, camping
- Isolated and/or at-risk residential areas/units
- Hazardous materials storage/risk areas
- Dam structures
- Bridge/Road improvements needed

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

- Floodplain District Zoning Ordinance
- Town Emergency Operations Plan
- USACE Flood Emergency Plan
- Wellhead Protection Program
- Aquifer Protection District
- Storm Drain Maintenance
- Wetlands Protective Measures

- Fire & Rescue, Ambulance, Emergency Management, and Police Departments
- School Evacuation Plan
- Mobile/Manufactured Homes regulations
- Town-adopted Building Code
- Zoning Ordinances
- Flood Warning System
- Emergency Back-up Power Program.
- River Stewardship
- Eversource of NH Tree Trimming Program for Power Lines
- Lifeline Assistance Program
- Emergency Snow Removal Program
- Hazardous Material Procedures
- National Flood Insurance Program
- Water Rescue Task Force

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

- Participate in NFIP training offered by the State and/or FEMA (or in other training) that addresses flood hazard planning and management.
- Update the Town website to improve public awareness of NFIP. Include preparedness and mitigation methods for residents to reduce the impact of all natural disasters. Include links to the FEMA and NH HSEM website.
- Obtain updated FIRM maps.
- Training/materials needed for Fire Dept. for the Hazardous Materials Plan.
- Identify problems and potential solutions for problem culverts, prioritize the list, and identify funding sources.
- Upsize culvert on Back Ashuelot Road (Jones culvert).
- Upsize culverts on Forest Lake Road.
- Upsize culvert at Westport Road (north of substation).
- Upsize culvert at Watson Road (near beaver dam).
- Upsize culvert at South Drive and Naramore Brook.
- Update the EOP in 2023.
- Install a flood gauge in Myrie Brook.
- Provide information to residents about proper use of generators and the importance of maintaining the heating system to prevent carbon monoxide poisoning and fires.
- Provide information to residents about water conservation, drought resistant landscaping and/or rain gardens.
- Continue to provide increased access to and upkeep of water sources for fire protection. Work with the Planning Board to encourage installation with new developments.
- Continue the Fire Prevention Program including carbon monoxide, fire and evacuation information.
- Provide outreach information on proper disposal of hazardous household materials and medicines.
- Obtain updated copies of the Flood Emergency Plans of Surry Dam and Otter Brook from USACE.
- Reference this hazard mitigation plan in the Winchester Master plan.
- Obtain additional generators. Potential locations include the Town Hall and school, however, there may be other locations also.

- Restock and maintain emergency supplies and personal protective equipment.
- Renovate Forest Lake Dam to bring it up to standards.
- Dredge drainage between NH 119 to Winchester Police Department.
- Dredge drainage between Mechanic Street and NH 10.

Chapter 1

Introduction

Methodology and Public Involvement

Purpose

The Winchester Hazard Mitigation Plan Update 2022 is a planning tool to be used by the Town of Winchester, 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 grants 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 Winchester, 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 Winchester Hazard Mitigation Plan Update 2017, the Winchester Hazard Mitigation Work Group updated the content of the Winchester Hazard Mitigation Plan Update 2022. The Work Group held five meetings, open to the public.

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. The Winchester Board of Selectmen appointed the Work Group members.

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 5, Critical Facilities Analysis, 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 (Chapter 3). 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 results are found in Chapter 7, Mitigation Strategies. The Work Group then developed the Mitigation Action Plan (Chapter 8), 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 Winchester that this plan be monitored and updated annually or after a presidentially declared disaster. Chapter 9 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 and the Federal Emergency Agency Region 1 Office, for review. On (add date) the Winchester Board of Selectmen held a duly-noticed public hearing to adopt the Winchester Hazard Mitigation Plan Update 2022. Copies were made available at the Town Offices and the Town website for public review.

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 Winchester Town Hall on the following dates: July 26, August 9, August 30, October 11, and November 15, 2022.

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 Hall to encourage public participation.

Public Participation

In addition, an article was printed in the Southwest Region Planning Commission Newsletter prior to the first meeting to inform the members of the community as well as surrounding communities and other interested stakeholders in 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 is 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 430 addresses, including neighboring communities, county, businesses, and academia. The email contains notices of public meetings and events.

A copy of the draft plan was made available for public review and input at the Town Hall from (add dates) 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. All comments from the public were incorporated into the plan.

Resource List for the Hazard Mitigation Work Group

Winchester’s Emergency Management Director (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 were given the opportunity to attend Work Group meetings or provide input and guidance through virtual meeting, telephone conversation or printed material. Training support has been offered by some of those on this resource list.

New Hampshire Homeland Security and Emergency Management: Field Representative: Jill Piwoski Mitigation Planner: Lynne Doyle	1-800-852-3792 (603) 223-3626 (603) 227-8780
New Hampshire Department of Transportation: John Kallfelz (District 4) Swanzey, NH	(603) 352-2302
Eversource Utility: Laurel Boivin Keene, NH	(603) 357-7309 Ext. 5115
Winchester Elementary School (K-8): 85 Parker Street, Winchester, NH Dr. Lynn Carey, Principal	(603) 239-4381
Keene High School: 43 Arch Street, Keene, NH Cindy Gallagher, Principal	(603) 352-0640

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:

- Ch. 1 - Introduction - updated Methodology, Acknowledgements, etc., and added Plan Updates;
- Ch. 2 - Community Profile - NFIP policies updated, added Continued Compliance with NFIP;
- Ch. 3 - Assessing Probability, Severity, and Risk - updated risk assessment;
- Ch. 4 - Hazard Identification - updated hazards and their location;
- Ch. 5 - Critical Facilities - updated locations;
- Ch. 6 - Existing Mitigation Strategies and Proposed Improvements - updated chart and other data, updated chart for Status of Previous Mitigation Action Items;
- Ch. 7 - Proposed Mitigation Strategies - updated STAPLEE chart;
- Ch. 8 - Prioritized Implementation Schedule - updated Action Plan;
- Ch. 9 - 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 Winchester Board of Selectmen extends special thanks to the Winchester Hazard Mitigation Work Group as follows:

Richard LaPoint, *Winchester Emergency Management Director*
Herb Stephens, *Winchester Board of Selectmen, Emergency Management*
Dale Gray, *Winchester Highway Superintendent*
Dave Johnson, *Forest Lake Association*
Rick Meleski, *Winchester Water/Sewer Superintendent*
Karey Miner, *Winchester Town Administrator*
Dan Robinson, *Winchester Highway Department*

The Winchester 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.

Hazard Mitigation Goals

The Winchester Hazard Mitigation Work Group reviewed the goals set forth in the New Hampshire 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.

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

1. To improve upon the protection of the general population, the citizens of the Town of Winchester 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 Winchester'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 Winchester's economy, natural resources, historic/cultural treasures, and private property.
4. To improve the Town of Winchester's Emergency Preparedness and Disaster Response and Recovery Capability.
5. To reduce the Town of Winchester'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 Winchester'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.
9. To provide a safe educational environment to students of Winchester's public schools.

Chapter 2 Community Profile

Town Overview

The Town of Winchester, New Hampshire is located in Cheshire County in the Southwest Region of the State of New Hampshire. Winchester is bordered by the Town of Chesterfield on the north, Town of Swanzey on the north and east, Town of Hinsdale on the west, Town of Richmond on the east, and the Towns of Northfield and Warwick, Massachusetts on the south.

Winchester has a total land area of 35,556 acres. The topography of Winchester is dominated by the highlands of Mount Pisgah and the Ashuelot River Valley, which flows through the middle of town in a south-westerly direction. Elevations range from 1,427 feet above mean sea level at the summit of Mount Pisgah to 242 feet above mean sea level where the Ashuelot River flows into Hinsdale on the west-side of Winchester. According to U.S. Climate Data, the average high temperature in 2015 was 31°F in January and 83°F in July. The annual precipitation in 2015 was 43.6 inches of rainfall and 55 inches of snowfall.



Source: SWRPC GIS Database

Existing Land Uses

Examination of the Town's existing land use indicates that there is a considerable amount of undeveloped land, primarily of wooded and brush-covered areas, many of which have substantial development constraints.

Residential and agricultural uses comprise the most significant amount of developed land, roughly 76% of all the developed land. The residential pattern consists of the Town Center and Ashuelot Village, as well as the Scotland Road area, Forest Lake and the Barber District. More recent development has been occurring in the form of new subdivisions along the outlying Class V roads and the three State Roads.

Commercial and industrial development is located for the most part around the center of town, as well as along Routes 10, 119 and 78. In the late 1970's and early 80's Kulick's Mall, a small shopping center with professional office space, was developed on Route 78 close to the intersection of Route's 78, 10 and 119. This area has primarily been where the majority of the commercial development has taken place over the last 20+ years.

Consideration for Development

Several factors have played, and will continue to play, an important role in the development of Winchester. These include: the existing development pattern and availability of land for future development; the present road network; physical factors such as steep slopes, poor soil conditions, the Ashuelot River its tributaries and floodplains; and the availability of utilities such as public water and sanitary sewers. These factors have an important impact, both individually and cumulatively, on where and how new development occurs.

Population Trends

The table below shows population in Winchester for each decennial from 1970 to 2020 according to the US Census. There was a population increase in each of the decades from 1970 to 2000, however the rate of increase has declined. The change in population between 2010 and 2020 however was a loss of 141 residents resulting in a 4% decline in total population.

Population Trend 1970-2020

	1970	1980	1990	2000	2010	2020
Population	2,869	3,465	4,038	4,144	4,341	4,150
% Change	---	21%	17%	3%	5%	-4%

Source: US Census 2020

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. Therefore, population projections should only be used as a basis to begin planning for the future.

The New Hampshire Office of Planning and Development (NH OPD) prepares population projections for each community in New Hampshire. The projections for Winchester are presented below in five-year intervals up to the year 2040. Using these projections, Winchester is expected to experience a slow growth of 1.2% between 2020 and 2040 similar to Cheshire County (2%) and below the New Hampshire population projection of 8%.

Winchester Population Projections

2020	2025	2030	2035	2040	Change 2020-2040
4345	4357	4375	4388	4396	1.2%

Source: NH Office of State Planning-Municipal Population Projections, Fall 2019

Current Development Trends

Winchester remains a rural community with three distinct population/village centers: the Town Center, Ashuelot Village, and the Barber District. There has been increased residential development outside these centers and additional commercial activity has developed along Routes 10 north and 78 east. New residential growth includes a substantial number of single-family homes dispersed throughout town and in the Barber District., around Forest Lake, Old Rixford Road, Fullam Pond Road, Gunn Mountain Road, Clark Road, Old Westport Road, and Back Ashuelot Road.

Industrial activity continues to be concentrated west of the Town Center on Route 119, Snow Road and off of Route 78, although the largest industrial facility is located on Pump Road off of Route 119.

The commercial activity consists of a continuation of convenience-oriented facilities that serve the day-to-day retail and personal needs of the local residents, as well as activity along NH Routes 10 and 78 that is geared to attract and accommodate the traveling public.

Several notable improvement projects have occurred in Town which may have an impact on future development potential. These include a \$250,000 water main extension along Maple and Michigan Streets in 2000, a \$750,000 sewer/water expansion and road improvement project for the Plumpak plant, a \$250,000 water/sewer project at the Elm Street Coop in 2000, and a water main extension along back Ashuelot Road in 2001. More recently in 2010 there was \$4.4 million in renovations to the sewer plant, a Transportation Enhancement grant for \$300,000 for the renovation and expansion of sidewalks, and a \$500,000 Wheelock Brook bridge replacement.

It is expected that future development will gravitate towards areas within close proximity to the three existing centers, since this is where the available infrastructure is located. There is also a considerable amount of landlocked area which could be developed, given the availability of new access roads and infrastructure.

Changes in Development

The demographic trends in the previous sections indicate that Winchester’s population and development is increasing at a slower rate than in previous decades. This provides an opportunity to plan for future events rather than react as they occur. 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. As the intensity of storms continues to increase though, it is important to review the existing programs and strategies, and improve upon areas that are needed. The plan was revised with this in mind and strategies were considered during the Work Group meetings.

Development in Hazard Areas

Hazards identified in this plan are regional risks and, as such, all new development falls into the hazard area. The exception to this is flooding. Currently, there are 196 structures located within the Special Flood Hazard Area (SFHA) in Winchester. According to the Community Information System (CIS) of FEMA, there have been 18 development permits and no variances granted within the SFHA since 1987, the earliest records kept in the CIS for the Town of Winchester. Most of these permits were issued prior to 1991. The trend in Winchester has been less development in the SFHA over time, and this trend is expected to continue.

National Flood Insurance Program (NFIP) (update numbers)

Winchester is a participating member of the National Flood Insurance Program (NFIP). Flood Insurance Rate Maps (FIRM) bearing the initial effective date of April 15, 1981 were used in the original plan and Digital Flood Insurance Rate Maps (DFIRMS) dated May 23, 2006 are currently used for flood insurance purposes. The most recent flood insurance study was done on August 2, 2007. As of September 27, 2016, there are 39 NFIP Policies totaling \$5,518,900. There have been 9 paid losses totaling \$37,689, however, there are currently no “Repetitive Loss Properties” insured under the NFIP within the Town of Winchester. Per 44 CFR 201.6(c)(3)(ii) of the Federal Register, the Hazard Mitigation Planning Work Group reviewed the requirements that the mitigation strategy must address for the jurisdiction’s participation in the NFIP. As noted, the Town of Winchester already is a member of the NFIP and has been for 40 years.

Continued Compliance with NFIP Requirements

The Town of Winchester acknowledges the importance of maintaining the 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 Status of Previous Priority Mitigation Actions in Chapter 6 shows measures that have already been taken including an ongoing flood education program, river stewardship, erosion and sedimentation control measures, anchoring manufactured housing, maintenance to culverts around town, and a hydrological study for Myrie Brook. These measures have made Winchester less vulnerable to flooding hazards since many of the culverts have been upsized to handle an increase in flow.

The Town of Winchester proposes a number of mitigation strategies in this Plan Update that support continued compliance with the National Flood Insurance Program. These include participating in NFIP training offered by the State and/or FEMA or in other training that addresses flood hazard planning and management; distribute information about NFIP; and to identify problems, potential solutions, and mitigate culvert issues in town.

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

Assessing Probability, Severity and Risk

Method for Rating Potential Hazardous Impacts

The Winchester Work Group members completed a risk assessment of the types of hazards that could occur in Town. The *Severity* was calculated by determining the average of the human, property and business impacts. *Risk* was calculated by multiplying severity by probability. Low, Medium and High risk was assigned as shown below. Appendix B provides explanations for the risk assessment measures.

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 - 2 Inconvenience, reduced service/productivity, minor damages, non-life-threatening injuries (Low)
- 3 - 4 Moderate to major damages, temporary closure and reduced service/productivity, numerous injuries and deaths (Medium)
- 5 - 6 Devastation and significant injuries and deaths, permanent closure and/or relocation of services, long-term effects (High)

Probability of Occurrence: The Probability of Occurrence is a numeric value that represents the likelihood that the given hazard will occur within the next ten 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:

Probability Scoring

- 1 - 2 0-33% probability of occurring within 10 years (Low)
- 3 - 4 34-66% probability of occurring within 10 years (Medium)
- 5 - 6 67-100% probability of occurring within 10 years (High)

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. This will allow the Working Group to use the overall risk ratings to develop targeted mitigation actions that allocate funding and resources to the highest rated hazards first. 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 + High Risk

Risk Assessment Chart

Threat/Hazard	Classification	Human Impact	Property Impact	Economic/ Business Impact	Average Impact Score	Probability of Occurrence	Overall Risk	
Natural Hazards	Inland Flooding	High	5	5	4	4.6	6	28
	Drought	High	4	3	4	3.7	6	22
	Earthquakes	Low	1	1	1	1	1	1
	Extreme Temperatures	Medium	2	2	2	2	5	10
	High Wind Events	High	4	4	4	4	5	20
	Infectious Disease	Medium	4	1	4	3	5	15
	Landslide	Low	1	1	1	1	1	1
	Lightning	High	2	4	2	2.7	6	16
	Severe Winter Weather	Medium	2	1	1	1.3	6	8
	Solar Storms & Space Weather	Low	1	1	1	1	6	6
	Tropical Storms & Hurricane	High	3	4	4	3.7	6	22
	Wildfire	Medium	2	2	2	2	5	10
Technological Hazards	Aging Infrastructure	High	4	5	6	5	6	30
	Conflagration	Medium	3	3	3	3	3	9
	Dam Failure	High	4	4	5	4.3	6	26
	Known & Emerging Contaminants	Medium	3	3	3	3	3	9
	Hazardous Materials	Medium	3	3	3	3	3	9
	Long-term Utility Outage (1 weeks)	High	4	2	4	2.7	6	16
	Radiological	Low	3	3	3	3	2	6
Human-Caused Hazards	Cyber Attack	Medium	2	2	3	2.3	5	12
	Mass Casualty Incident	Medium	4	4	2	2.3	4	13
	Terrorism/Violence	Medium	4	2	2	2.7	5	14
	Transport Accident	Medium	4	2	2	2.7	5	14

Chapter 4

Past and Potential Hazards

Hazard Identification and Assessment

The Winchester Hazard Mitigation Work Group discussed hazard events that have occurred within the last five years. They also looked at the type of hazards that could occur within Town. These hazards were identified by using the New Hampshire Hazard Mitigation Plan (2018), the Federal Emergency Management Agency website, the previous Winchester Hazard Mitigation Plan, and the Winchester Hazard Risk Assessment. From this list, the Work Group developed a summary for each hazard type to provide information on past and potential events, risk and impact. In some instances, specific locations of hazard events that have occurred within the past five years have been recorded.

Information in this chapter is only given for the medium and high-risk natural hazards identified in the previous chapter. These include: flooding, drought, extreme temperatures, high wind events/tornados, infectious disease, lightning, severe winter weather, tropical storms/hurricanes, and wildfires. Hazards that ranked as low-risk hazards are not included in the remaining chapters of this plan because the Winchester Hazard Mitigation Work Group felt that the risk was so minimal that resources and efforts would be better utilized on the higher-ranking hazards. The low-risk natural hazards include: earthquake, landslide and solar storms and space weather. The Work Group also identified the following medium and high-ranked technological hazards and human-caused hazards that have occurred in Town or have the potential to occur: aging infrastructure, conflagration, dam failure, known and emerging contaminants, hazardous materials, long-term utility outage, cyber event, mass casualty incident, terrorism/violence, and transport accident.

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.

Flooding

Risk: High

Impact: High

Future Probability: High

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.

Past Events:

July 1-2, 2017: FEMA Disaster Declaration #4329 for Grafton County. Heavy rains occurred, but no local impact to Town services and no structural damages, injuries, or death were reported due to this event.

October 29, 2017 to November 1, 2017: Heavy rains occurred, but no local impact to Town services and no structural damages, injuries, or death were reported due to this event.

March 2, 2018: Heavy rains occurred. There were many downed trees, but no report of structural damage; The impact to Town services included: police department road blocks, highway department road clearings, and minor power outages.

July 17-19, 2021: FEMA Disaster Declaration #4622. Winchester received approximately five inches of rain in a period of less than sixteen hours. The heavy rainfall caused culverts and drainage systems to become overwhelmed with water and at times plugged with debris. This caused water to overtop roads resulting in several washouts and the erosion of some gravel roads, paved roads and shoulders. Gravel, stone and debris had to be removed from numerous roads throughout Town. The Winchester Highway Department crew mobilized in an effort to make roads passable. Impact to the Town include:

Watson Road - The road was closed for two days.

Forest Lake Road - The road was closed for one day.

Forest Lake Dam - dam was sand banked to stop breaching and prevent additional breaching.

Old Westport Road - The road was closed for three days; the riverbank eroded and washed out 150’ of road.

Winchester Treatment Plant - The solar field was under water.

July 29-30, 2021: FEMA Disaster Declaration #4624. Winchester received an additional 2 to 3 inches of heavy rain overnight resulting in more erosion and damage. Local impact was generally the same as the above event.

Potential Occurrences:

Annual events due to heavy rains and snow melt continue to challenge the capacity and integrity of the existing stormwater infrastructure. This is especially a concern in areas along the Ashuelot River and smaller streams throughout Town.

Potential Impact:

- There is a potential for injuries and loss of life, structural damage and interruption of services.
- There is potential for damage/repair to the road surface and flooding of roads due to accumulation of heavy rain and runoff which could cause a delay in the response time of emergency services.

Drought

Risk: High

Impact: Medium

Future Probability: High

Droughts are a natural hazard that impacts the entire Town. 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. The severity of droughts can be found by referring to the Palmer Drought Severity Index and can be viewed at: http://www.cpc.ncep.noaa.gov/products/monitoring_and_data/drought.shtml. Below is the intensity scale that is used with the Palmer Drought Severity Index to describe the observed impact with each category.

Palmer Drought Severity Index

Category	Intensity	Impact
D0	Abnormally Dry	Crop growth is stunted; fire danger is elevated; lawns brown and gardens wilt; surface water levels are lower.
D1	Moderate Drought	Wildfires and brush fires increase; increased use of irrigation for crops; hay and grain yields are lower; honey production declines; trees and fish are stressed making them susceptible to disease; water conservation is recommended.
D2	Severe Drought	Water quality and quantity declines; irrigation ponds are dry and hay crops are impacted causing economic hardship to farms; crop yields and size of fruit are reduced; outdoor burning is limited; air quality is poor; impact on the health of trees and wildlife is observed.
D3	Extreme Drought	Crop loss, farms are stressed and are experiencing a financial impact; extremely reduced flow or ceased flow of water; river temperatures are warm; wildlife disease is increased; many wells are dry; new and deeper wells are needed.
D4	Exceptional Drought	NH has little or no experience in D4, so no impacts have been recorded at this level.

Source: NOAA

Past Events:

- Summer 2022 - Drought conditions existed throughout New Hampshire. The drought had an impact to Forest Lake causing a cyanobacteria bloom and an impact to agriculture fields causing small crops and an increased cost for irrigation.
- Summer 2021 - Drought conditions existed throughout New Hampshire which had an impact to the agricultural fields causing small and immature crops.
- Summer of 2020 - Drought conditions existed throughout New Hampshire. Impact to agriculture fields causing small crops and an increased cost for irrigation.
- Summer of 2018 - Drought conditions existed throughout New Hampshire. There was no local impact. Impact to agriculture fields causing small crops and an increased cost for irrigation.

Potential Occurrences:

- This is a recurring event that impacts the entire Town. Areas that are most impacted from droughts are farms and residents with wells.

Potential Impact:

- 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.
- Some private wells may run dry.
- Minimal impact to Town services.

Extreme Temperatures

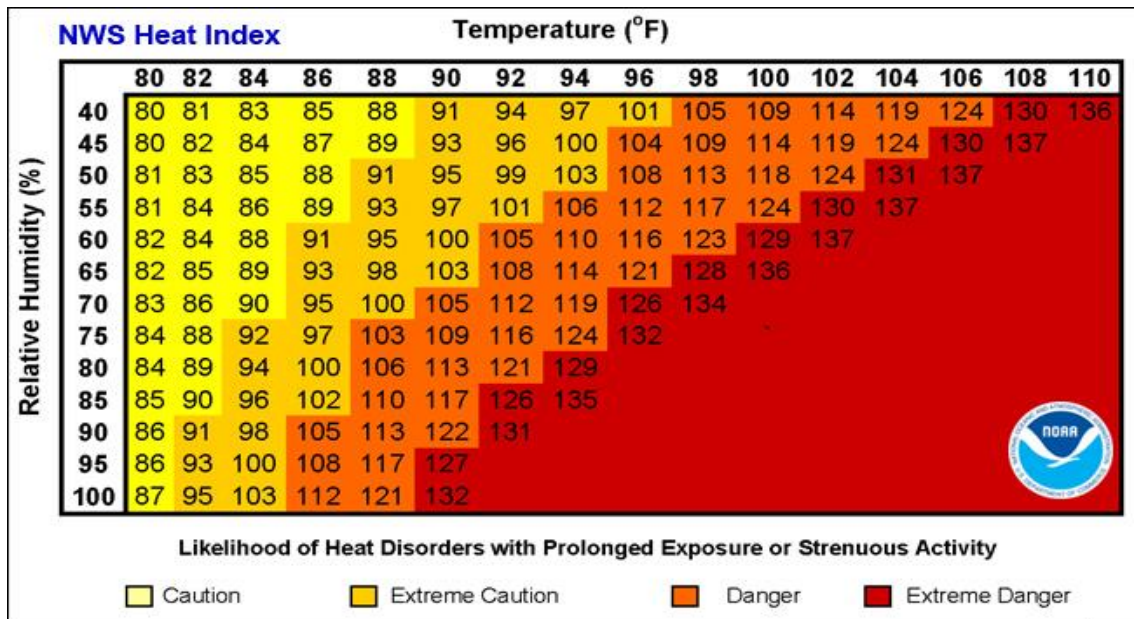
Risk: Medium

Impact: Low

Future probability: High

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 Winchester 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. The NWS Heat Index is an indicator of the likeliness of heat disorders with prolonged exposure or strenuous activity, especially for those with a history of stroke and heart issues.

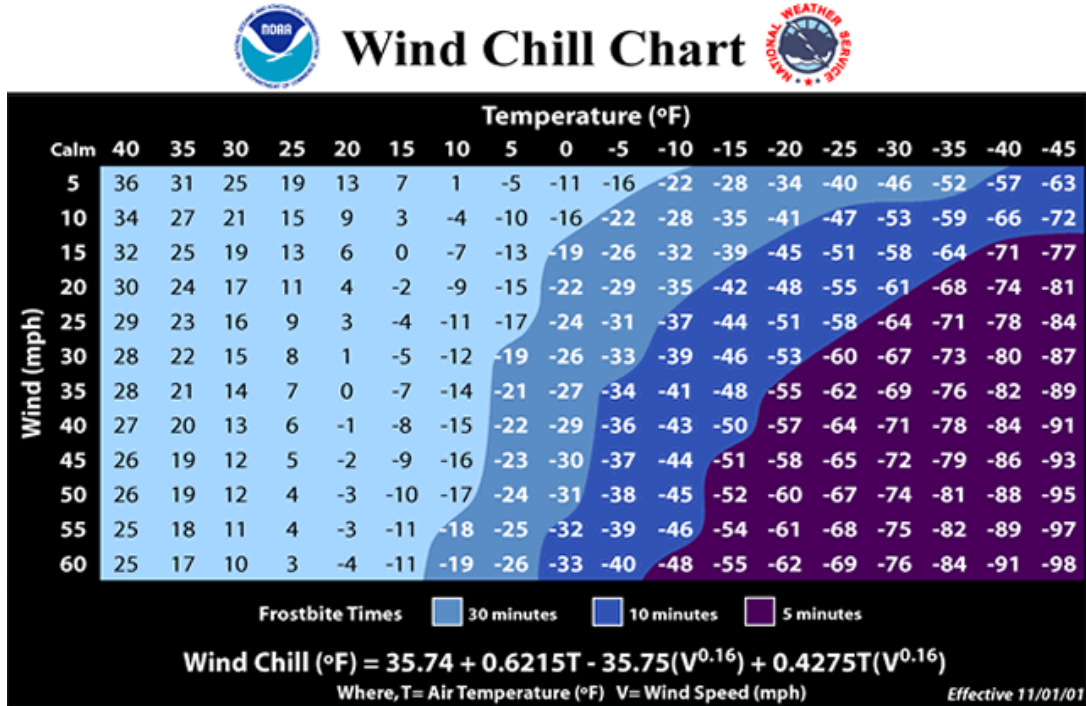
NWS Heat Index



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.

The Wind Chill Chart on the next page shows the impact that wind and cold temperatures can have by indicating the number of minutes until frostbite strikes.



Source: National Weather Service

Past Events:

- There have been no impactful events of extreme heat or cold that the Work Group recalled since the last plan update.

Potential Occurrences:

- Extreme temperatures are a town-wide event.

Potential Impact:

- Higher elevations are impacted more by extreme temperatures.
- Vulnerable populations are at greater risk.
- High heat causes an increase in EMS calls.

High Wind, Tornado, Downburst

Risk: High
Impact: Medium
Future probability: High

Risk from tornados is considered to be medium in Cheshire County. The Enhanced Fujita Scale is used to determine the intensity of tornadoes. Most tornadoes are in the F0 to F2 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.

Past events (regional):

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 loss of life. Therefore, this is a real hazard and the damage it could inflict should not to be taken lightly.

Local events:

- August 2019 - Severe wind caused several downed trees at Musterfield Park; a fallen tree damaged a trailer on South Parish Road; power loss for 3 - 4 days.

Potential Occurrences:

- River corridors and hill tops are more susceptible.
- This is a town wide event; therefore, no specific locations are listed.

Potential Impact:

- There is a potential for structural damage;
- There is a potential for loss of life and property as well as disruption of utility service; and
- Such events cause small blocks of downed timber.

The **Enhance Fajita Scale** is used to rate the intensity of a tornado by examining the damage caused by the tornado once it has passed.

- EF-0:** Wind speed 65-85 mph.; frequency 53.5%. Minor damage.
- EF-1:** Wind speed 86-101 mph.; frequency 31.6%. Moderate damage.
- EF-2:** Wind speed 111-135 mph.; frequency 10.0%. Considerable damage.
- EF-3:** Wind speed 136-165 mph.; frequency 3.4%. Severe damage.
- EF-4:** Wind speed 166-200 mph.; frequency 0.7%. Extreme damage.
- EF-5:** Wind speed >200 mph.; frequency 0.1%. Total destruction.

Infectious Disease

Risk: Medium

Impact: Medium

Future probability: High

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)

Extent:

The magnitude and severity of infectious diseases is described by its speed of onset (how quickly people become sick or cases are reported) and how widespread the infection is. Some infectious diseases are inherently more dangerous and deadly than others, but the best way to describe the extent of infectious diseases relates to the disease occurrence:

- Endemic - Constant presence and/or usual prevalence of a disease or infection agent in a population within a geographic area
- Hyperendemic - The persistent, high levels of disease occurrence
- Cluster - Aggregation of cases grouped in place and time that are suspected to be greater than the number expected even though the expected number may not be known
- Epidemic - An increase, usually sudden, in the number of cases of a disease above what is normally expected
- Outbreak - The same as epidemic, but over a much smaller geographical area
- Pandemic - Epidemic that has spread over several countries or continents, usually affecting many people

Past Events:

January 20, 2020 and continuing; COVID-19 PANDEMIC (DR-4516-NH) Major Disaster Declaration declared on April 3, 2020. The Covid-19 Pandemic that began in 2020 resulted in numerous residents to become ill and also some deaths in Town. In addition, it created economic hardship for many due to loss of work, school closures and business closures. Some meetings were temporarily switched to remote meetings. This pandemic is still occurring, so data will be forthcoming in the next update of this Plan.

Potential Occurrences:

- This is a town wide event; therefore, no specific locations are listed.

Potential Impact:

- Those with weakened immune systems are at greater risk during these events.
- There is a potential for injury or death to people, domestic animals and wildlife.
- There is a potential for risk to waterbodies and wildlife habitat.
- There is a potential for loss of crops and vegetation, and economic disparity.

Lightning

Risk: High

Impact: Medium

Future probability: High

Lightning is a natural hazard that is unpredictable. It could strike anywhere during a storm and potentially start a forest fire, especially in periods of drought. High elevations and areas around waterbodies may be more susceptible to lightning strike incidents. The table on the next page 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 but thunderstorms are dry.	16 - 25

Source: NOAA

Past Events:

A lightning strike in Pisgah State Park occurred in 2022 causing a wildfire of approximately three acres. Mutual Aid from Hinsdale assisted in extinguishing the fire. No injuries, deaths or structural damage was recorded.

Potential Occurrences:

- Lightning could occur town wide, therefore, no specific locations are identified; however, river corridors, hilltops and forested areas are more susceptible.
- 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.

Potential Impact:

- Forested areas with a high fuel load are a high risk for forest fire during lightning storms.
- Telephone and power outages often occur when transformers are hit by lightning or when a tree gets struck and falls onto the lines.
- There is a potential for damage to structures.
- There is a potential for injury or death.

Severe Winter Weather

Risk: Medium

Impact: Low

Future probability: High

Three types of winter events that cause concern are heavy snow, ice storms and extreme cold. Winchester’s recent history has not recorded any loss of life due to the extreme winter weather. These random events are difficult to set a cost to repair or replace any of the structures or utilities affected.

To help prepare for these events, the Sperry Piltz Ice Accumulation Index was created.

ICE DAMAGE INDEX	DAMAGE AND IMPACT DESCRIPTIONS
0	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
1	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
2	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
3	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1-5 days.
4	Prolonged and widespread utility interruptions with extensive damage to main distribution feeder lines and some high voltage transmission lines/structures. Outages lasting 5-10 days.
5	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.

Past Events:

- March 14-15, 2017 - Heavy snow and wind occurred throughout the state. There were no injuries or structural damage reported as a result of the storm.
- March 13-14, 2018 - Heavy snow storm but no local impact. FEMA Disaster Declaration # DR-4371 for Carroll, Strafford and Rockingham Counties.

Potential Occurrences:

- This is a town wide event; therefore, no specific locations are listed, however, roads with moderate to steep grades are a concern for driver safety.

Potential Impact:

- There is a potential for interruption of service.
- There is a potential of damage to structures.
- There is a potential for injury or death.
- The freezing and thawing increases repair and maintenance costs on the town budget.

Solar Storms and Space Weather

Risk: Low

Impact: Low

Future probability: High

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 chart on the next page shows the level of severity of space weather as it relates to the impact on radio communications. The National Oceanic and Atmospheric Administration (NOAA) uses this chart to alert those who depend on radio communications such as first responders and airlines on days that could create life threatening situations if their radios are impacted.

Radio Blackout

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

Source: National Oceanic and Atmospheric Administration (NOAA)

This is a new hazard that has been added to this plan. It is anticipated that this will be discussed further in future plans.

Past Events:

- This is a hazard that is difficult to detect and the Work Group was not aware of any specific dates of occurrence. There have been no incidents of damage or interruption of communication services recorded in Winchester.

Potential Occurrences:

- The entire Town is at risk for solar storms and space weather. There is a concern for disruption in emergency services communications and businesses that rely on the internet.

Potential Impact:

- There is a potential for interruption of service.
- Solar storms and space weather can impact the connections for emergency services. It can also impact the wells and tanks which communicate by radio.

Tropical Storm/Hurricane

Risk: High

Impact: Medium

Future probability: High

There is concern for tropical storms and hurricanes to impact Winchester. Winchester’s inland location in southwestern New Hampshire reduces the risk of extreme high winds that are associated with hurricanes. A major hurricane can cause significant damage to a community. Most of the damage is caused by high water and high winds.

Past Events from 2014 to present:

- August 2020 - remnants of Tropical Storm Isaias - many power outages, for less than 24 hours, monitoring the need for opening the emergency shelter, downed trees and road clean-up.

Potential Occurrences:

- River corridors and hill tops are more susceptible.
- This is a town wide event; therefore, no specific locations are listed.

Potential Impact:

- There is a potential for injury or death;
- There is a potential for structural damage and disruption of utility service.
- There is a potential for flooding of evacuation routes and other roads.

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, and require preventative measures.

Category 1

Wind Speed: 74 - 95 mph, 64 - 82 kts

Very dangerous winds will produce some damage. 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. 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. 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. 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. 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>

Wildfire

Risk: Medium

Impact: Low

Future probability: High

The whole Town is at risk for wildfires. 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 and debris builds up on the ground, the potential for wildfire increases town-wide.

Past Events:

A lightning strike in Pisgah State Park occurred in 2022 causing a wildfire of approximately three acres. Mutual Aid from Hinsdale assisted in extinguishing the fire. No injuries, deaths or structural damage was recorded.

Potential Occurrences:

- The potential for a wildfire is higher in the forested areas of Winchester;
- A lack of direct access to many remote areas within Town adds to the danger.

Potential Impact:

- There is a potential for the risk of life and property loss;
- There is a potential for loss of wildlife habitat and timber; and
- There is a potential for disruption of utility service.

Wildfires are classified according to size: Class A - one-fourth acre or less; Class B - greater than one-fourth 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 Winchester have mostly been small in nature and caused by lightning strikes (Class A or B).

Dam Failure

Risk: High

Impact: Medium

Future probability: High

Potential Occurrences:

Forest Lake Dam - NID NH00297/NH DES 255.07: Classified as a Low Hazard Dam at 8 feet in height and needing to meet the 50-year storm event. A 2021 Hydrologic Study by HL Turner Group Inc. has confirmed that the dam is not capable of meeting the 50-year event as it stands today. Further the dam, originally constructed in 1927/1928 needs structural refurbishment at the spillway and the right-side earthen wall. An additional 10 feet of discharge capacity, added to the current 10.5 feet of capacity, is required for the dam to meet the 50-year storm event criteria. Continued stress from high water events such as the July 2021 event when the lake surface level (WESL) rose 38 inches and topped the dam, will continue to place the Forest Lake Dam at the top of the Winchester Risk Assessment Chart where it currently is listed as the #3 Overall Risk.

Dam and Breach Failure (External to Winchester)

In addition to the dam structures identified in this Plan that are located within the Town of Winchester, two major dams located outside of the Town of Winchester would have even more catastrophic results than breach and/or failure of those facilities within the Town of Winchester. These two dams are the Surry and Otter Brook dams, which are operated and maintained by the U.S. Army Corp of Engineers (USACE).

If either of these facilities were to breach and/or fail, there would be damages to property and structures outside the limits of the 100-year floodplain. The Town of Winchester has had paper maps of the USACE Flood Emergency Plan for both the Surry and Otter Brook Dams. In the Action Plan in Chapter 9, we have added a mitigation action to obtain a current copy of Flood Emergency Plans for both dams, as well as inundation maps.

Status of Dams in Winchester

The table below shows the dam classifications and status for the dams registered with NH Department of Environmental Services (NHDES). NM - Non-menace; L - Low hazard; S - Significant hazard; H - High Hazard. Generally, all Class H dams need to have Emergency Action Plans, and most Class S dams also require them. There is one Class H dam and one Class S dam according to the Department of Environmental Services Dam Bureau. The Class H dam is the Pisgah Reservoir Dam and the Class S dam is the Paper Mills Holding Pond Dam.

Dam	Haz. Class	Status	Name	River	Height Ft.	Impound. Ac.	Dam Owner
D255001	L	Active	Ashuelot Paper Mill Dam	Ashuelot River	18	2.5	Private
D255002	L	Active	Lower Robertson Dam	Ashuelot River	19.8	8.6	Private
D255003	---	Not Built	Upper Robertson Hydro Dam	Ashuelot River	16	---	Private
D255004	---	Removed	Ashuelot River Dam	Ashuelot River	10	---	Private

Dam	Haz. Class	Status	Name	River	Height Ft.	Impound. Ac.	Dam Owner
D255005	---	Ruins	Mirey Brook Dam	Mirey Brook	---	---	Private
D255006	---	Ruins	Roaring Brook Dam	Roaring Brook	---	---	Private
D255007	L	Active	Forest Lake Dam	Ashuelot River	8	93	Private
D255008	---	Ruins	Broad Brook Dam	Broad Brook	---	---	Private
D255009	L	Active	Kilburn Pond Dam	Kilburn Brook	15	37	Hinsdale Water Dept.
D255010	---	Removed	Winchester Town Dam	Ashuelot River	5	25	Town of Winchester
D255011	H	Active	Pisgah Reservoir Dam	Tufts Brook	33	110	NH DNCR
D255012	NM	Active	Conservation Pond Dam	Unnamed Brook	10	0.16	Private
D255013	---	Not Built	Tufts Brook Dam	Tufts Brook	10	---	Private
D255014	NM	Active	Recreation Pond Dam	Unnamed Stream	6	0.03	Private
D255015	---	Breached	Fish Pond Dam	Unnamed Stream	---	---	Private
D255016	NM	Active	Farm Pond Dam	Unnamed Stream	10	0.33	Private
D255017	NM	Active	Wildlife Pond Dam	Unnamed Stream	16	0.14	Private
D255018	---	Exempt	Recreation Pond Dam	Unnamed Stream	3.8	0.25	Private
D255019	NM	Active	Snow Brook Dam	TR Snow Brook	23	0.7	Private
D255020	NM	Active	Wildlife Pond Dam	Unnamed Stream	12	0.25	Private
D255021	S	Active	Paper Mills Holding Pond Dam	Unnamed Stream	20	3	Private
D255022	---	Breached	Tufts Pond Dam	Tufts Brook	6	5	NH DNCR

Source: NH Department of Environmental Services Dam Bureau

Chapter 5

Critical Facilities

Category and Location

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 Winchester was initially developed using an identified critical facilities list provided by the State Hazard Mitigation Officer. It has been updated based on input provided by the Hazard Mitigation Planning Work Group. The Critical Facilities Map at the end of this Plan identifies these facilities. Both the critical facilities list and map have been updated to reflect the hazard mitigation plan update process.

Winchester's Hazard Mitigation Work Group has broken up 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 Winchester. The third category contains facilities/populations that the Work Group identified which may need protection in the event of a disaster. The fourth category contains potential resources, which can provide services or supplies in the event of a disaster.

Category 1 - Emergency Response Services and Facilities:

The Town has identified the emergency response facilities and services as the highest priority in regards to protection from natural and man-made hazards.

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. Town Emergency Operations Center - 6 Parker Street
2. Fire & Rescue Facilities - Winchester Fire Station (6 Parker Street) and Ashuelot Fire Station (181 Ashuelot Main Street)
3. Police Station - 6 Parker Street
4. Shelters
 - School - 85 Parker Street
 - E.L.M.M. Center - 21 Durkee Street
 - Town Hall - 1 Richmond Street
5. Emergency Generators - EOC (6 Parker Street), town wells (433 Keene Road and 2 Pump Road, sewage treatment facility (64 Duso Road), portable
6. Dry Hydrants, Fire Ponds & Water Sources (see map for locations)

7. Primary Evacuation Routes
 - Main Street - State Route 10
 - State Route 119
 - State Route 78
8. Town Garage - 14 Forest Lake Road
9. Power stations, sub-stations, transmission lines
 - Cross-town transmission lines
 - Hydro-power facilities located on Ashuelot
 - Underground fiber optic lines
 - Solar panels at 64 Duso Road
10. Telephone facilities and transmission lines
 - Building in town Michigan Street
 - Switching stations in South Parrish and Forest Lake area
11. Helicopter Landing Sites (see map)
12. Hospitals/Emergency Care
 - Dartmouth-Hitchcock Clinic Regional Facility - 20 Warwick

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 Winchester.

1. Water-based facilities and utilities
 - Dry hydrants (see map)
 - Wellheads
 - Land north of Forest Lake - water recharge area
 - Water Supply & Distribution Systems
 - Waste Water Treatment Facility - 64 Duso Road
 - Pump Road - Water recharge area
2. Winchester School - 85 Parker Street
3. Problem Culverts/Ditches
 - Manning Hill Road (culverts)
 - Westport Road (multiple culverts)
 - Forest Lake Road (culverts)
 - Ditch between Mechanic Street and NH 10
 - Ditch on Michigan Street to Police Department
 - Back Ashuelot Street (culverts)
 - Forest Lake Road/Naramore Brook (culvert)
 - Watson Road (culvert)
 - Pursell Road (underground brook/culvert)
4. Transfer Station - 105 Forest Lake 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

List available at the Emergency Operations Center. List may include:

- Oxygen-dependent people
- People on a lifeline
- People assisted by Home Health
- Shut-ins and disabled
- Mentally challenged
- Elderly
- Hearing or sight impaired

2. Nursing Homes

- Harborside Health Care - 8 Snow Road

3. Adult congregate living facilities

- Sunrise Village - 76 N. Main Street
- Winchester Senior Housing - NH 78

4. School

- Winchester School - 85 Parker Street

5. Day care centers

- The Learning Center - 109 Keene Road
- Ashuelot Head Start - 161 Ashuelot Main Street

6. Historical facilities

- Historic district - downtown Winchester & Ashuelot
- Town Library -111 Main Street
- Thayer Public Library - 3 Ashuelot Main Street
- Town Hall - 1 Richmond Street
- Covered Bridges; Ashuelot and Coombs

7. Commercial economic impact areas

- Kulick's Mall - 30 Warwick Road
- Innovative Machines - 40 Snow Road
- Rite Aid - 10 Main Street
- Goodnow's Trucking - Route 78
- Keeney Holdings, LLC - 75 Plumpak Drive
- Winchester Precision - 1 Precision Court

8. Religious Facilities

- St. Stanislaus - 68 Richmond Road
- United Church of Winchester - 99 Main Street
- Grace Christian Fellowship - 81 Ashuelot Street
- Center Church - 5 Michigan Street

9. Mobile/Manufactured Home Parks
 - Green Valley - North Route 10
 - New Beginnings - 260 Keene Road
 - Elm Street Coop- Willow Ct. and Elm Ct.
 - South Parrish Park - South Parrish Road
10. Large Employers
 - Applewood Healthcare - Snow Road
 - Keeney Holdings, LLC - 75 Plumpak Drive
 - Kulick's Mall - 30 Warwick Road
 - Winchester Precision Technology - Hildreth Street
 - Innovative Machine
11. Recreational Facilities
 - E.L.M.M. Center - 21 Durkee Street
 - Veterans of Foreign Wars (VFW) - 35 Keene Road
 - Monadnock Speedway - 840 Keene Road
 - Winchester Speed Park (2) - 517 Keene Road
12. Parks
 - Pisgah State Park
 - School Ball Fields
 - Musterfield Park
13. Beaches
 - Forest Lake Beach Town Park
 - Forest Lake Campground Beach
14. Camping Areas
 - Forest Lake Campground
15. Isolated and/or at-risk residential units/areas
 - Snow Brook Meadows - 52 Warwick Road
16. Hazardous materials storage/risk areas
 - Recycling center/transfer station - 105 Forest Lake Road
 - Bob's Fuel - Forest Lake Road
 - Sewage treatment plant and lagoons - 64 Duso Road
 - Keeney Holdings, LLC - 75 Plumpak Drive
 - Aubuchon's Hardware - 30 Warwick Road
 - Applewood Healthcare - 8 Snow Road
17. Low Hazard Dam Structures (ownership)
 - Ashuelot Paper Mill Dam (Ashuelot River Hydro, Inc.)
 - Lower Robertson Dam (Ashuelot River Hydro, Inc.)
 - Forest Lake Dam (Forest Lake Improvement Assoc.)
 - Kilburn Pond Dam (Hinsdale Water Works)
18. Significant Hazard Dam Structures (ownership)
 - Atlantic Paper Holding Pond (Atlantic Paper)

19. High Hazard Dam Structures (ownership)
 - Pisgah Reservoir Dam
20. Bridge/Road improvements needed (potential washouts and isolation)
 - Bridge over Ashuelot River (closed due to condition/needs replacing) - Bridge Street
 - Private Bridge over Ashuelot River - Atlantic Paper
 - Bridge over Ashuelot River - Route 10
 - Box Culvert Old Westport Road - Old Westport Road
 - Very Brook Road - Washout problems

Category 4 - Potential Resources

Contains facilities that provide potential resources for services or supplies.

1. Food/water
 - Kulick's Market - 30 Warwick Road
 - Mr. Mikes - Keene Road
 - Rite Aid - 10 Main Street
 - Main Street market - 104 Main Street
 - Duncan Donuts - 4 Warwick Road
2. Water (for firefighting)
 - Numerous locations - see Critical Facilities Map at the end of the Plan
3. Hospitals/Medical Supplies
 - Cheshire Medical Center (Court Street in Keene)
 - Dartmouth-Hitchcock Clinic - NH 78 near Warwick Road
 - Rite Aid - 10 Main Street
4. Gravel Pits
 - All State Material Sand & Gravel - NH 10
 - SUR - Old Swanzey Road
 - Lawrence Pit - Old Swanzey Road
 - Cooks - Manning Hill Road
 - Lawrence Sand & Gravel - Fairgrounds Road
 - Town of Winchester - Pump Road
 - Gravel Pit - Scotland Road
5. Gas/ diesel
 - Highway Garage - Forest Lake Road
 - All Town - Keene Road
 - Kulick's Sunoco - Warwick Road
6. Heating Fuel
 - Bob's Fuel - Warwick Road
7. Building Material and Heavy Equipment Suppliers
 - Local contractors available
8. Miscellaneous Resources

Emergency Broadcast & Television: Television station - WMUR Ch. 9

Radio: 92.7, 98.7, 103.7, 104.9

Transportation: Buses - First Student in Keene
 Trucks - Local Contractors, National Guard, Keene

Emergency transportation available by Town Highway and Fire Departments to relocate residents to safe area.

Beds, Cots, Blankets:

- National Guard
- Red Cross
- Coordination with EMD's

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. Twenty-five identified critical facilities fall within the 100-year floodplain. The facilities are identified in the following table.

Facility Name	Type of Facility	Address
Dams (3)	Dams	Two dams on the Ashuelot River in and around Ashuelot Village and one at Forest Lake
Bridge	Bridge	NH 10 bridge south of Parker Street
Bridge	Bridge	Bridge to Paper Service Ltd. On Recycle Way in Ashuelot
Covered Bridge	Covered bridge	Gunn Mountain Road
Covered Bridge	Covered bridge	Coombs Bridge Road
Bridge	Bridge	NH 10 just north of Westport Village Road
Bridge	Bridge	Bridge St, (closed due to condition)
Bridge	Bridge	Elm Street
Bridge	Bridge	Hinsdale Road/NH 119 west of intersection
Sunrise Village	Senior apartments	NH 78 just north of town center
E.L.M.M.	Private recreation facility	21 Durkee Street
Dartmouth-Hitchcock Clinic	Medical facility	20 Warwick Road
Natural Gas Storage	Fuel storage	30 Warwick Road
Kulick's Mall	Commercial center	30 Warwick Road
Four Corners Shopping Center	Commercial center	15 Warwick Road
Winchester Senior Housing	Senior apartments	NH 78
Snow Brook Meadow Village	Apartment complex	52 Warwick Road
Rite Aid	Pharmacy, medical supplies, food	10 Main Street

Facility Name	Type of Facility	Address
Winchester Town Hall	Vital records and services	1 Richmond Road
Emergency Services Building	EOC, Fire, Rescue, Ambulance, Police	6 Parker Street
Keeney Holdings, LLC.	Large Employer	75 Plumpak Road
Public Water Supply	Public Water Supply	2 Pump Road/433 Keene Road
Wastewater Treatment Facility	Wastewater Treatment Facility	64 Duso Road

Chapter 6

Existing Mitigation Strategies and Proposed Improvements

Mitigation Protection Strategies

Description of Existing Strategies

Below is a description of the strategies currently being used by the Town of Winchester. These are further reviewed in the Existing Protection Matrix to determine the effectiveness and changes needed.

Existing Mitigation Strategies

- Floodplain District Zoning Ordinance - has been adopted as part of the Zoning Ordinance. Overlay of the floodplain map indicates 221 properties in the floodplain area.
- Town Emergency Operations Plan - The purpose of the EOP is to have a set structure for carrying out necessary functions in order to provide for the common defense and to preserve the lives and property of the people of Winchester from the threat of harm in the event of any natural or man-made disaster. (Winchester Town EOP, Emergency Management Ordinance)
- USACE Flood Emergency Plan (Otter Brook Dam and Surry Mountain Dam) - outlines the procedures to be used as a guide in the event that critical conditions develop which may lead to failure of the facility resulting in an uncontrolled release of water resulting in downstream damage. (USACE Flood Emergency Plan)
- Wellhead Protection Program - as designed by DES has been instituted by the Town's Board of Selectmen.
- Aquifer Protection District - A zoning ordinance designed to protect Winchester's Stratified Drift Aquifer as delineated by the USGS.
- Storm Drain Maintenance - Informal program conducted every spring to clean out storm drains and the town's storm-water conveyance system.
- Wetlands Protective Measures - Winchester maintains a wetlands ordinance as part of their land use plan which is coordinated with current state regulations. Two buffer measurements are in effect; one of 100 feet for poorly drained soils and one of 75 feet for regular soils. Citizen knowledge of local and state wetland regulations needs to be increased through educational outreach programs.
- Fire & Rescue, Ambulance, Emergency Management, and Police Departments - Winchester's public safety and emergency services departments. The Town is actively seeking grants for upgrades of apparatus, equipment, and training.
- School Evacuation Plan - Designated plan to evacuate the school in the event of an emergency or disaster addressing bussing, transportation routes (primary and alternative), traffic & crowd control, end destination and parental notification. The Town is working with the State to update the Plan.
- Mobile/Manufactured Homes regulations have been adopted as part of the Land Use Plan and are restricted to being located in all areas.

- Town-adopted Building Code - Winchester maintains a building inspector and has adopted provision of the NH Life Safety Code and BOCCA. Current program is working.
- Zoning Ordinances - Winchester has twelve zoning districts to govern the development and growth of the town in a sustainable manner. The following directly apply to the Hazard Mitigation Plan: Floodplain, Aquifer Protection, Shoreland Protection, and Wetlands Districts.
- Flood Warning System - Gauges on water bodies strategically placed to monitor the rising and falling of river levels to provide an advance warning of a potential flood hazard.
- Emergency Back-up Power Program - Town supplied generators for public Critical Facilities; Portable or fixed. Generators currently exist at the Emergency Operation Center, school, wastewater treatment plant, and at all 3 wells for the town's public water supply.
- River Stewardship - Winchester serves on the Ashuelot River Local Advisory Committee.
- Eversource of NH Tree Trimming Program for Power Lines - Tree trimming program for power line maintenance administered by Public Service of NH.
- Lifeline Existence Program - List of residents that are either elderly or disabled maintained by the Director of Emergency Management in the event that there is a situation that they might need help for any given situation including a natural disaster. (Mutual Aid is primary contact)
- Emergency Snow Removal Program - An informal plan in place to contract assistance in the event of an excessive snowfall in Winchester.
- Hazardous Material Procedures - State Regulations, Town Enforced.
- National Flood Insurance Program - A federally backed program that encourages communities to enact and enforce floodplain regulations. Winchester has 29 current policies out of approximately 196 structures located within the 100-year floodplain.
- Water rescue Task Force - Winchester recently joined the task force that partners with other local towns for water rescue missions.
- 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 intelligent growth.
- Mutual Aid - Provides assistance to all aspects of Winchester Emergency Management Services/ Highway Department/whole town. This program facilitates cooperation between towns to be able to respond most effectively in the event of an emergency.
- Fire and Rescue Training - training for paid staff and volunteer in all aspects of emergency services.

Existing Protection Matrix

The Winchester Hazard Mitigation Work Group prepared the summary matrix of existing hazard mitigation strategies. This matrix, a summary of the preceding information, includes the type of existing protection (Column 1), a description of the existing protection (Column 2), the responsible local agent (Column 3), the effectiveness and or enforcement of the strategy (Column 4), and the identified improvements or changes needed (Column 5).

Effectiveness of the Existing Protection is rated Poor, Average, Good, or Unknown: Poor - needs improvements; Average - meets some expectations; Good - meets or exceeds expectations; Unknown - not yet used or unable to quantify effectiveness.

Existing Protection Matrix

Existing Protection	Area Covered	Responsible Local Agent	Effectiveness	Improvements Needed/Comments
Floodplain District Ordinance	Floodplain District	Planning Board and Code Officer	Good	Expand education with brochures; encourage enrollment in NFIP.
Town Emergency Operations Plan	Townwide	Emergency Management Director (EMD)	Good	Needs to be updated in 2022-2023.
USACE Dams Flood Emergency Plan (Surry and Otter Brook Dams)	Dam inundation areas	USACE and EMD	Unknown	Town needs copies of plans and an update from USACE.
Wellhead Protection Program	Town well sites	State enforced	Good	No changes needed at this time.
Aquifer Protection District	Aquifer District	Code Officer	Good	No changes needed at this time.
Storm Drain Maintenance	Townwide	Highway Department	Good	No changes needed at this time.
Wetlands Protective Measures	Covers all wetlands	Code Officer, Planning Board, Conservation Com.	Good	No changes needed at this time.
Fire/Rescue, Ambulance, Emergency Management, and Police Department	Townwide	Police & Fire Chiefs, EMD	Good	The Town is actively seeking grants for upgrades of equipment and training.
Mobile Homes and/or Manufactured Homes Regs.	Townwide	Code Officer	Good	No changes needed at this time.
Building Codes/Code Officer	Townwide	Code Officer	Good	No changes needed at this time.
Zoning Ordinances	Townwide	Code Officer	Good	No changes needed at this time.
Flood Warning System	Major waterways	EMD	Good	No changes needed at this time.
Emergency Back-up Power	Emergency generators at the EOC, sewer plant, and at all three wells.	EMD	Poor	Currently seeking a grant for the school.

Existing Protection	Area Covered	Responsible Local Agent	Effectiveness	Improvements Needed/Comments
River Stewardship (preventative program)	Areas adjacent to the Ashuelot River, and related tributaries	Ashuelot River Local Advisory Committee	Good	No changes needed at this time.
Eversource Tree Trimming Program	Townwide	Eversource	Good	No changes needed at this time.
Lifeline Existence Program	Townwide	EMD	Good	No changes needed at this time.
Emergency Snow Removal Plan	Townwide	Highway Superintendent	Good	No changes needed at this time.
Hazardous Materials Procedures	Townwide	EMD	Good	No changes needed at this time.
School Evacuation Plan	Local schools	EMD	Good	A new plan is pending.
National Flood Insurance Program	Floodplain areas	EMD	Good	Needs to be promoted better to get better participation.
Water Rescue Task Force	Townwide	Fire Chief	Good	No changes at this time.
Town Master Plan	Townwide	Planning Board	Average	Chapters are being updated on a rotating basis.
Mutual Aid	Townwide	Fire Chief, Police Chief, EMD, and Road Agent	Good	Southwestern NH Mutual Aid and Tri-State Mutual Aid
Fire and Rescue Training	Townwide	Fire Chief, Police Chief, EMD, and Road Agent	Good	No changes needed at this time.

Status of Previous Mitigation Actions

The following table provides a status update for the mitigation actions identified in the previous hazard mitigation plan. Previously identified mitigation actions are noted as completed, deleted, or deferred to the updated Plan's new mitigation strategies list. Some actions are deferred or are ongoing actions that have been prioritized with new actions in Chapter 7 and added into the Action Plan in Chapter 8.

Mitigation Action	Status	Explanation of Status
Participate in NFIP training offered by the State and/or FEMA (or in other training) that addresses flood hazard planning and management.	Complete and continue*	This is an ongoing action and will be included in the new Action Plan.
Prepare, distribute or make available NFIP, insurance and building codes explanatory pamphlets or booklets.	Complete and continue*	This is an ongoing action and will be included in the new Action Plan.
Obtain updated FIRM maps.	Defer*	Map updates have not been made by FEMA. Continue action.
Improve maintenance on the culvert on Manning Hill.	Delete	This is not a town road.
Provide information to residents on water conservation/drought resistant landscaping and/or rain gardens.	Complete and continue*	This is an ongoing action and will be included in the new Action Plan.
Provide outreach and education for radon testing of air and water.	Delete	This action has been deleted for lack of interest.
Install a flood gauge in Myrie Brook.	Defer*	This action will be included in the new Action Plan.
Add this plan as a chapter or appendix to the Winchester Master Plan.	Defer*	This action will be included in the new Action Plan.
Obtain updated copies of Flood Emergency Plans of Surry Dam and Otter Brook Dam from USACE.	Defer*	This action will be included in the new Action Plan.
Upsize culverts on Forest Lake Road.	Defer*	Some drainage work has been done. This action will be included in the new Action Plan.
Inspect the road embankments for signs of erosion and undermining of the road and address the needs at: Burt Hill Rd., Manning Hill Rd., NH 10 at Swanzey town line, Forest Lake Rd./Rabbit Hollow Rd.	Complete	Road embankments are routinely checked.
Obtain additional generators. Potential locations include the Town Hall and school, however, there may be other locations also.	Defer*	Grants have been denied in the past. This action will be included in the new Action Plan.
Dredge drainage between Mechanic Street and NH 10.	Defer*	Some work has been done. This action will be included in the new Action Plan.

Mitigation Action	Status	Explanation of Status
Dredge drainage between Michigan Street to Winchester Police Department.	Defer*	Some work has been done. This action will be included in the new Action Plan.
Identify problems and potential solutions for problem culverts, prioritize the list, and identify funding sources.	Complete and continue*	This is an ongoing action and will continue in the new Action Plan.
Upsize or replace culvert at Westport Road.	Complete and continue*	This action will be included in the new Action Plan.
Upsize culvert on Back Ashuelot Road.	Complete	This culvert has been completed.
Upsize culvert at Watson Road (near beaver dam).	Defer*	This action will be included in the new Action Plan.

**These actions will be added to the Action Plan in this plan and reprioritized.*

Chapter 7

Proposed Mitigation Strategies

Identifying Gaps in Coverage

In addition to the programs and activities that Winchester is currently undertaking to protect its residents and property from natural and manmade disasters, a number of additional strategies were identified by the Local 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 existing strategies. Potential new strategies were identified for each general hazard type using the following categories: Prevention (programs and policies), Property Protection, Structural Projects, and Public Information.

The Work Group brainstormed actions for specific potential hazard areas identified in Chapter 4. The section below shows proposed mitigation actions for both general hazard types and specific potential hazard areas. Each strategy was discussed to determine realistic strategies to be included in the STAPLEE chart.

Hazard Type	Prevention	Property Protection/ Structural Projects	Emergency Services	Public Information
Flooding	Dredge drainage area between Mechanic Street and NH 10; and area between Michigan Street and Police Dept.	Upsize culverts on: Manning Hill Road, Westport Road, Back Ashuelot Road, Watson Road, Naramore Brook, Persells Road, and others.	Continue to participate in NFIP training offered by the State and/or FEMA (or in other training) that addresses flood hazard planning and management.	Continue to provide information to the public about NFIP.
	Perform a culvert inventory and assessment.	Add a river gauge on Myrie Brook.		
Drought	Consider adding water conservation regulation & voluntary water ban if necessary.		Determine a location for water distribution.	Provide information to residents on water conservation/ drought resistant landscaping and/or rain gardens.
Earthquakes		Retrofit public buildings with earthquake standards.		Provide a link of FEMA's website on the town website.
Extreme Temperatures	Maintain an updated list of addresses of the older residents and special needs populations.	Update heating and cooling, insulation, windows, etc.	Consider locations for heating, cooling and charging center.	

Hazard Type	Prevention	Property Protection/ Structural Projects	Emergency Services	Public Information
Extreme Temperatures	Maintain an updated list of addresses of the older residents and special needs populations.	Update heating and cooling, insulation, windows, etc.	Consider locations for heating, cooling and charging center.	
High Wind Events	Prepare and implement a written Tree Inventory.	Continue to enforce the tie-down requirement on all mobile & manufactured homes.		Provide information for residents to understand ways to mitigate potential damage during a tornado/ severe wind/downbursts..
Infectious Disease			Equip the EOC and shelters with materials to handle a wide-spread infectious disease event.	Conduct a public information workshop on emergency preparedness for short-term and long-term quarantine.
Landslide			Stabilize steep slopes with plantings, retaining walls, and rip rap.	
Lightning		Install grounding equipment on public & historic buildings.		Include a link of FEMA's website on the town website.
Severe Winter Weather	Update the Emergency Snow Removal Plan.	Trim tree branches near critical facilities, town structures, and roadways.	Review current and future needs for emergency backup power.	Disseminate information to residents about proper use of generators and the importance of maintaining the heating system to prevent carbon monoxide poisoning and fires.
Solar Storms and Space Weather			Consider alternative means of communication.	Post links to the FEMA and NH HSEM website.
Tropical Storms and Hurricane	Identify hazardous trees and prepare a written removal plan.	Continue to enforce the Tie-down requirement on all mobile homes.		Continue to provide information to the public about NFIP

Hazard Type	Prevention	Property Protection/ Structural Projects	Emergency Services	Public Information
Wildfire	Install Fire Danger/Risk level sign at trailheads and other locations.	Continue to provide increased access to, and upkeep of water sources for fire protection.	Continue the Fire Prevention Program including carbon monoxide, fire and evacuation information.	Provide residents with information on fire safety & prevention (such as Fire Wise).
Dam Failure	GPS/GIS mapping of beaver dams.		Obtain updated plans and digital maps of Surry Dam and Otter Brook Dam.	

Prioritization of Proposed Mitigation Strategies: STAPLEE Chart

The goal of each strategy identified in the previous list 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. The following questions were asked about the proposed mitigation strategies and discussed in the table:

- 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.

<p style="text-align: center;">STAPLEE CHART</p> <p>Mitigation Strategy</p>	Is it Socially acceptable?	Is it Technically feasible & potentially successful?	Is it Administratively workable?	Is it Politically acceptable?	Is there Legal authority to implement?	Is it Economically beneficial?	Is it Environmentally beneficial?	Total Score
Participate in NFIP training offered by the State and/or FEMA (or in other training) that addresses flood hazard planning and management.	3	3	3	3	3	3	3	21
Update the Town website to improve public awareness of NFIP. Include preparedness and mitigation methods for residents to reduce the impact of all natural disasters. Include links to the FEMA and NH HSEM website.	3	3	3	3	3	3	3	21
Obtain updated FIRM maps.	3	3	3	3	3	3	3	21
Training/materials needed for Fire Dept. for the Hazardous Materials Plan.	3	3	3	3	3	3	3	21
Identify problems and potential solutions for problem culverts, prioritize the list, and identify funding sources.	3	3	3	3	3	3	3	21
Upsize culvert on Back Ashuelot Road (Jones culvert).	3	3	3	3	3	3	3	21
Upsize culverts on Forest Lake Road.	3	3	3	3	3	3	3	21
Upsize culvert at Westport Road (north of substation).	3	3	3	3	3	3	3	21
Upsize culvert at Watson Road (near beaver dam).	3	3	3	3	3	3	3	21
Upsize culvert at South Drive and Naramore Brook.	3	3	3	3	3	3	3	21
Update the EOP in 2023.	3	3	3	3	3	3	3	21
Install a flood gauge in Myrie Brook.	3	3	3	3	3	3	3	21
Provide information to residents about proper use of generators and the importance of maintaining the heating system to prevent carbon monoxide poisoning and fires.	3	3	3	3	3	3	3	21
Provide information to residents about water conservation, drought resistant landscaping and/or rain gardens.	3	3	3	3	3	3	3	21
Continue to provide increased access to and upkeep of water sources for fire protection. Work with the Planning Board to encourage installation with new developments.	3	3	3	3	3	3	3	21
Continue the Fire Prevention Program including carbon monoxide, fire and evacuation information.	3	3	3	3	3	3	3	21

STAPLEE CHART	Is it Socially acceptable?	Is it Technically feasible & potentially successful?	Is it Administratively workable?	Is it Politically acceptable?	Is there Legal authority to implement?	Is it Economically beneficial?	Is it Environmentally beneficial?	Total Score
Mitigation Strategy								
Provide outreach information on proper disposal of hazardous household materials and medicines.	3	3	3	3	3	3	3	21
Obtain updated copies of the Flood Emergency Plans of Surry Dam and Otter Brook from USACE.	3	3	3	3	3	3	3	21
Reference this hazard mitigation plan in the Winchester Master plan.	3	3	3	3	3	3	3	21
Obtain additional generators. Potential locations include the Town Hall and school, however, there may be other locations also.	3	3	3	3	3	3	3	21
Restock and maintain emergency supplies and personal protective equipment.	3	3	3	3	3	3	3	21
Renovate Forest Lake Dam to bring it up to standards.	3	2	2	3	3	3	3	19
Dredge drainage between NH 119 to Winchester Police Department.	3	3	3	2	1	1	3	16
Dredge drainage between Mechanic Street and NH 10.	3	3	3	2	1	1	3	16

Chapter 8

Prioritized Implementation Schedule

Action Plan

The Winchester 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.

Mitigation Actions that were identified in Chapter 7 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. Also, as additional information becomes available regarding project leadership, timeline, funding sources, and/or cost estimates, the plan will be reviewed and amended accordingly.

The Work Group created a prioritized schedule for implementation of the plan. The following terms are used to provide a general timeframe to complete the actions: Short-term: 1-2 years; Mid-term: 3-4 years; Long-term: 4-5 years. Some actions do not have a completion date and are considered to be ongoing actions that will continue through the duration of the plan.

Implementation/Action Plan

Mitigation Action	Leadership (Who)	When	How
Participate in NFIP training offered by the State and/or FEMA (or in other training) that addresses flood hazard planning and management.	Town Administrator	Short-term Annually	Grants
Update the Town website to improve public awareness of NFIP. Include preparedness and mitigation methods for residents to reduce the impact of all natural disasters. Include links to the FEMA and NH HSEM website.	Town Administrator	Short-term Quarterly	Town budget
Obtain updated FIRM maps.	Town Administrator	Short-term (when available)	Town budget

Mitigation Action	Leadership (Who)	When	How
Training/materials needed for Fire Dept. for the Hazardous Materials Plan.	Fire Chief	Short-term Annually	Grants
Identify problems and potential solutions for problem culverts, prioritize the list, and identify funding sources.	Highway Superintendent	Short-term	Town budget & grants
Upsize culvert on Back Ashuelot Road (Jones culvert).	Highway Superintendent	Short-term	Town budget & grants
Upsize culverts on Forest Lake Road.	Highway Superintendent	Short-term	Town budget & grants
Upsize culvert at Westport Road (north of substation).	Highway Superintendent	Long-term	Town budget & grants
Upsize culvert at Watson Road (near beaver dam).	Highway Superintendent	Long-term	Town budget & grants
Upsize culvert at South Drive and Naramore Brook.	Highway Superintendent	Long-term	Town budget & grants
Update the EOP in 2023.	Town Administrator	Short-term	Grants
Install a flood gauge in Myrie Brook.	Town Administrator	Long-term	Town budget & grants
Provide information to residents about proper use of generators and the importance of maintaining the heating system to prevent carbon monoxide poisoning and fires.	Fire Chief	Short-term	Town budget
Provide information to residents about water conservation, drought resistant landscaping and/or rain gardens.	Water Superintendent	Short-term	Town budget
Continue to provide increased access and upkeep of water sources for fire protection. Work with the Planning Board to encourage installation with new developments.	Fire Chief & Planning Board	Long-term	Town budget
Continue the Fire Prevention Program including carbon monoxide, fire and evacuation information.	Fire Chief	Short-term	Town budget
Provide outreach information on proper disposal of hazardous household materials and medicines.	Police Department & Town Administrator	Short-term	Town budget
Obtain updated copies of the Flood Emergency Plans of Surry Dam and Otter Brook from USACE.	Emergency Management Director	Short-term	Town budget
Reference this hazard mitigation plan in the Winchester Master plan.	Town Administrator	Short-term	Town budget
Obtain additional generators. Potential locations include the Town Hall and school, however, there may be other locations also.	Town Administrator	Long-term	Town budget & grants
Restock and maintain emergency supplies and personal protective equipment.	Emergency Management Director	Short-term	Town budget & grants

Mitigation Action	Leadership (Who)	When	How
Renovate Forest Lake Dam to bring it up to standards.	Forest Lake Association	Short-term (in progress)	Grants
Dredge drainage between NH 119 to Winchester Police Department.	Highway Superintendent	Long-term	Town budget & grants
Dredge drainage between Mechanic Street and NH 10.	Highway Superintendent	Long-term	Town budget & grants

Chapter 9

Adoption, Implementation, Monitoring & Updates

Plan Maintenance

Adoption

The Winchester Board of Selectmen adopted the Winchester Hazard Mitigation Plan on (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 prioritized implementation schedule (action plan) in the previous chapter 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 Hall prior to the Selectmen meeting. Any comments were considered and addressed prior to adoption of the Plan.

Implementation

The top priority mitigation strategies that were identified by the Winchester Hazard Mitigation Work Group will be implemented through the Board of Selectmen with assistance from the Emergency Management Director, to ensure that the appropriate person or group that was identified in the plan in Chapter 8 succeeds in the implementation of the activity. These activities will be reviewed to ensure that they correspond to the existing programs and land use regulations. This will ensure that the actions taken are done in the best interest of the Town.

It is their responsibility to make sure the mitigation strategies when implemented conform to the Master Plan and land use regulations of the Town.

Monitoring and 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 Action Plan (Chapter 8), it is recommended that the Town revisit the Winchester Hazard Mitigation Plan Update 2022 annually, or after a hazard event. The Emergency Management Director is responsible for initiating this review and should consult with the Select Board 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 STAPLEE, the timeframe, the community’s priorities, and funding resources. Priorities that did not make the implementation list, but identified as potential mitigation strategies, should be reviewed as well during the monitoring and update of this Plan to determine feasibility of future implementation. The public will continue to be invited and involved during this process. The Winchester Hazard Mitigation Plan Update 2022 must be reviewed, revised as appropriate, and resubmitted to FEMA for approval every five years in order to maintain eligibility for all Hazard Mitigation Assistance (HMA) funding. Approval of this Plan was granted by FEMA on (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 Winchester Hazard Mitigation Plan receives the attention it requires for satisfactory use.

Master Plan

Implementation of the Master Plan has been ongoing since its most recent adoption in 2008 and is currently being updated, therefore, the previous Hazard Mitigation Plan was not incorporated into it. Recommendations from the Winchester Hazard Mitigation Plan Update 2022 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 Winchester Hazard Mitigation Plan Update 2022 is adopted as a chapter or appendix of the Master Plan.

Capital Improvements Program

The Capital Improvements Program (CIP) is reviewed and updated annually by the CIP Committee. Each town department refers to the CIP when developing its annual budget. Strategies or purchases requiring capital improvements from the Winchester Hazard Mitigation Plan Update 2022 will be inserted into the Capital Improvements Program. A Capital Reserve Fund for Hazard Mitigation Program Projects will be established to set aside funding for the projects identified in the Winchester Hazard Mitigation Plan Update 2022. The Local Hazard Mitigation Work Group will oversee the process to begin working with the Planning Board to incorporate the various projects into the yearly CIP. Projects that have a substantial cost, such as bridges, culverts and road work will be included in the CIP.

Local Emergency Operations Plan

The Board of Selectmen adopted the current Town of Winchester Emergency Operations Plan (EOP) in 2017. The EOP provides a framework for a coordinated emergency response to a disaster. The Town recognizes the importance of mitigation to the emergency response framework, and as such has included the Winchester Hazard Mitigation Plan as Appendix D in their 2017 Local Emergency Operations Plan.

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 may be utilized for public involvement include:

- Provide personal invitations to Budget Committee members;
- Post notices of meetings at the Town Hall, Library, Town website, and local businesses;
- Post flyers of the project at the Town Hall, Library, and local businesses; and
- Submit newspaper articles for publication to the Keene Sentinel and the Monadnock Ledger.

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, communities, and organizations will be invited to participate in the yearly process of updating the Winchester Hazard

Mitigation Plan. 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 Hazard Mitigation Plan, the public will be noticed per New Hampshire's Right-to-Know Law, RSA 91-A, and the meetings will be open to the public.

The Winchester Hazard Mitigation Plan Update must be reviewed, revised as appropriate, and resubmitted to FEMA for approval every five years in order to maintain eligibility for all Hazard Mitigation Assistance (HMA) funding. Approval of this plan was granted by NH HSEM and FEMA on (add date).

CERTIFICATE OF ADOPTION
WINCHESTER, NEW HAMPSHIRE
BOARD OF SELECTMEN
A RESOLUTION ADOPTING THE
WINCHESTER HAZARD MITIGATION PLAN UPDATE 2022

WHEREAS, the Town of Winchester has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for the Winchester Hazard Mitigation Plan Update 2022 under the requirements of 44 CFR 201.6; and

WHEREAS, public and Work Group meetings were held between (add dates) regarding the development and review of the Winchester Hazard Mitigation Plan Update 2022; and

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

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

WHEREAS, adoption of this Plan will make the Town of Winchester eligible for funding to alleviate the impacts of future hazards; now therefore be it RESOLVED by the Board of Selectmen:

1. The Plan is hereby adopted as an official plan of the Town of Winchester;
2. The respective officials identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;
3. Future revisions and Plan maintenance required by 44 CFR 201.6 and FEMA are hereby adopted as a part of this resolution for a period of five (5) years from the date of this resolution.

IN WITNESS WHEREOF, the undersigned has affixed his/her signature and the corporate seal of the Town of Winchester this ____ day of _____, 2023

Winchester Board of Selectmen Chairman

Winchester Board of Selectmen

Winchester Board of Selectmen

ATTEST _____

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:
 - Overflow of inland or tidal waters
 - Unusual and rapid accumulation or runoff of surface waters from any source
 - 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: 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 contaminants 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 contaminants 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 contaminants.

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 Winchester, NH’s Hazard Mitigation Plan Update 2016

Agencies

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

NH Department of Business and Economic Affairs (NHDBEA):	603-271-2411
Economic Development.....	603-271-2629
Travel and Tourism.....	603-271-6870
NH Department of Natural and Cultural Resources (NHDNCR):	603-271-2411
Division of Forests and Lands	603-271-2214
Division of Parks and Recreation	603-271-3556
Design, Development, and Maintenance	603-271-2411
NH Department of Transportation (NHDOT)	603-271-3734
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	603-225-1411
US Geological Survey	603-225-4681
US Army Corps of Engineers (USACE)	978-318-8087
US Department of Agriculture:	
Natural Resource Conservation Service (NRCS)	603-868-7581
Cheshire County, Walpole.....	603-756-2988
Sullivan County, Newport	603-863-4297
Hillsborough County, Milford	603-673-2409 Ext. #4

Mitigation Funding Resources

404 Hazard Mitigation Grant Program (HMGP)	NH HSEM
406 Public Assistance and Hazard Mitigation	NH HSEM
Community Development Block Grant (CDBG).....	NH HSEM, NH OPD, also refer to RPC
Dam Safety Program.....	NHDES
Emergency Generators Program by NESEC [‡]	NH HSEM
Emergency Watershed Protection (EWP) Program	USDA, NRCS
Flood Mitigation Assistance Program (FMAP)	NH HSEM, NH OPD
Flood Plain Management Services (FPMS).....	USACE
Mitigation Assistance Planning (MAP)	NH HSEM
Mutual Aid for Public Works.....	NHMA
National Flood Insurance Program (NFIP) [†]	NH OPD, NH HSEM
Power of Prevention Grant by NESEC [‡]	NH HSEM
Project Impact	NH HSEM
Roadway Repair & Maintenance Program(s)	NHDOT
Section 14 Emergency Stream Bank Erosion & Shoreline Protection.....	USACE
Section 103 Beach Erosion	USACE
Section 205 Flood Damage Reduction.....	USACE
Section 208 Snagging and Clearing.....	USACE
Shoreline Protection Program	NHDES
Various Forest and Lands Program(s).....	NHDNCR
Wetlands Programs	NHDES

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

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/MSK/statemap.htm>

Flood Map Modernization

<http://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/map-modernization>

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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>

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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/hurricane/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 Work Group (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 Place <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

Marilyn Hilliard, Senior Planner

Phone: (617) 956-7536

Email: marilyn.hilliard@fema.dhs.gov

Nan Johnson, Community Planner

Phone: 617-956-7672

Email: nan.johnson@fema.dhs.gov

Massachusetts; Rhode Island; Vermont

Brigitte Ndikum-Nyada, Community Planner
Phone: 617-956-7614
Email: brigitte.ndikum-nyada@fema.dhs.gov
Connecticut; Maine; New Hampshire
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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	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.

Sponsor	Internet Address	Summary of Contents
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

John Kennelly, Chief, Special Studies Section (for Flood Plain Management Services activities), Phone: (978) 318-8505, Fax: (978) 318-8080, E-mail: John.R.Kennelly@usace.army.mil

Mike Keegan, Chief, Project Planning Section (for Section 14, 103, and 205 authorities), Phone: (978) 318-8087, Fax: (978)318-8080, E-mail: Michael.F.Keegan@usace.army.mil

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

Dr. J-C Tatinclaux, Chief, Ice Engineering Research Division

Phone: (603) 646-4187 Fax: (603) 646-4477

E-mail: Jean-Claude.Tatinclaux@cr102.usace.army.mil

Website: <http://www.crrel.usace.army.mil/ierd/>

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

Gerald J. Lang, Technology Leader; Phone: (603) 868-7581, Fax: (603) 868-5301

E-mail: gerald.lang@nh.usda.gov

Edward Hansalik, Civil Engineer; Phone: (603) 868-7581, Fax: (603) 868-5301

E-mail: ehansalik@nh.usda.gov

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)

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

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, lightning, 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

Winchester Hazard Mitigation Plan Update Work Group

Meeting #1

AGENDA

June 9, 2021
10:00 a.m.

Join Zoom Meeting
<http://bit.ly/Jun9SwHMWG21>

Meeting ID: 865 1617 0069
Passcode: 306487
or
Join by Phone: (646) 558-8656

1. Introduction
 - a. Discuss the process to update the plan and 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
 - b. Add any new hazards that have occurred since the previous plan was adopted
 - c. Add any potential hazard concerns
4. Future Meetings
 - a. Meeting #2 - July 14, 2021 at 10:00 a.m.
 - b. Meeting #3 - August 11, 2021 at 10:00 a.m.
 - c. Meeting #4 - September 15, 2021 at 10:00 a.m.
 - d. Meeting #5 - October 20, 2021 at 10:00 a.m.

Winchester Hazard Mitigation Work Group

June 9, 2021

Meeting #1

Sign-in Sheet

Name	Title
Pam Fortner	EMD and Health Officer
Eric Mattson	Deputy Fire Chief/Inspector
Mike Jasmine	Code Enforcement Officer
Joe DiRusso	Public Works Director
Tom DeAngelis	Police Chief
Michael Branley	Town Administrator
Sly Karasinski	Board of Selectmen
Lisa Murphy	Senior Planner, SWRPC
Liz Gilboy	NH HSEM Field Representative

Winchester Hazard Mitigation Plan Update

Work Group

Meeting #2

AGENDA

July 14, 2021
10:00 a.m.

Join Zoom Meeting

<https://bit.ly/Jul14SwHMWP21>

Meeting ID: 861 5598 7912

Passcode: 444380

Or

Join by Phone: (646) 558-8656

1. Introduction
2. Identify Existing Mitigation Strategies
 - a. Complete the Existing Mitigation Matrix
3. Critical Facilities
 - a. Provide address or location information for critical facilities
4. Future Meetings
 - a. Meeting #3 - August 11, 2021 at 10:00 a.m.
 - b. Meeting #4 - September 15, 2021 at 10:00 a.m.
 - c. Meeting #5 - October 20, 2021 at 10:00 a.m.

Winchester Hazard Mitigation Work Group

July 14, 2021

Meeting #2

Sign-in Sheet

Name	Title
Pam Fortner	EMD and Health Officer
Michael Branley	Town Administrator
Mike Jasmine	Code Enforcement Officer
Matthew Bachler	Town Planner
Sly Karasinski	Board of Selectmen
Lisa Murphy	Senior Planner, SWRPC

Winchester Hazard Mitigation Plan Update

Work Group

Meeting #3

AGENDA

August 11, 2021
10:00 a.m.

Join Zoom Meeting

<https://bit.ly/Aug11SwHMWG21>

Meeting ID: 843 9811 0450
Passcode: 156447

1. Potential Strategies: Filling Gaps in Coverage
 - a. Review the potential strategies matrix and determine which are needed in the Action Plan
2. Develop a List of New Strategies
 - a. Consider adding new strategies to the STAPLEE chart
3. Final Review of Critical Facilities
 - a. Review and update the list of critical facilities
4. Hazard Mitigation Goals
 - a. Review the Winchester hazard mitigation goals
5. Future Meetings
 - a. Meeting #4 - September 15, 2021 at 10:00 a.m.
 - b. Meeting #5 - October 20, 2021 at 10:00 a.m.

Winchester Hazard Mitigation Work Group

August 11, 2021

Meeting #3

Sign-in Sheet

Name	Title
Pam Fortner	EMD and Health Officer
Joe DiRusso	Public Works Director
Tom DeAngelis	Police Chief
Mike Jasmine	Code Enforcement Officer
Michael Branley	Town Administrator
Sly Karasinski	Board of Selectmen
Eric Mattson	Fire Inspector/Deputy Chief
Lisa Murphy	Senior Planner, SWRPC
Liz Gilboy	NH HSEM Field Representative

Winchester Hazard Mitigation Plan Update

Work Group

Meeting #4

AGENDA

September 15, 2021
10:00 a.m.

Carpenter Hall
or by zoom
www.zoom.us

Meeting ID: 829 5493 7677
Passcode: 729341

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. Next Meeting: October 20, 2021 at 10:00 a.m.

Winchester Hazard Mitigation Work Group

September 15, 2021

Meeting #4

Sign-in Sheet

Name	Title
Pam Fortner	EMD and Health Officer
Mike Jasmine	Code Enforcement Officer
Joe DiRusso	Public Works Director
Matthew Bachler	Town Planner
James Cemorelis	Police Lieutenant, Officer in Charge
Sly Karasinski	Board of Selectmen, Chair
Eric Mattson	Fire Inspector/Deputy Chief
Lisa Murphy	Senior Planner, SWRPC

Winchester Hazard Mitigation Plan Update
Work Group

Meeting #5

AGENDA

October 20, 2021
10:00 a.m.

Carpenter Hall
or by zoom

<https://bit.ly/Oct20SwHMWG21>

Meeting ID: 827 8567 0780
Passcode: 504675

1. Review Key Chapters of the Draft Plan
 - a. Review and edit chapters 3, 4, 7, and 8
 - b. Review other parts of the Plan as needed
2. Discuss the final steps to FEMA approval

Winchester Hazard Mitigation Work Group

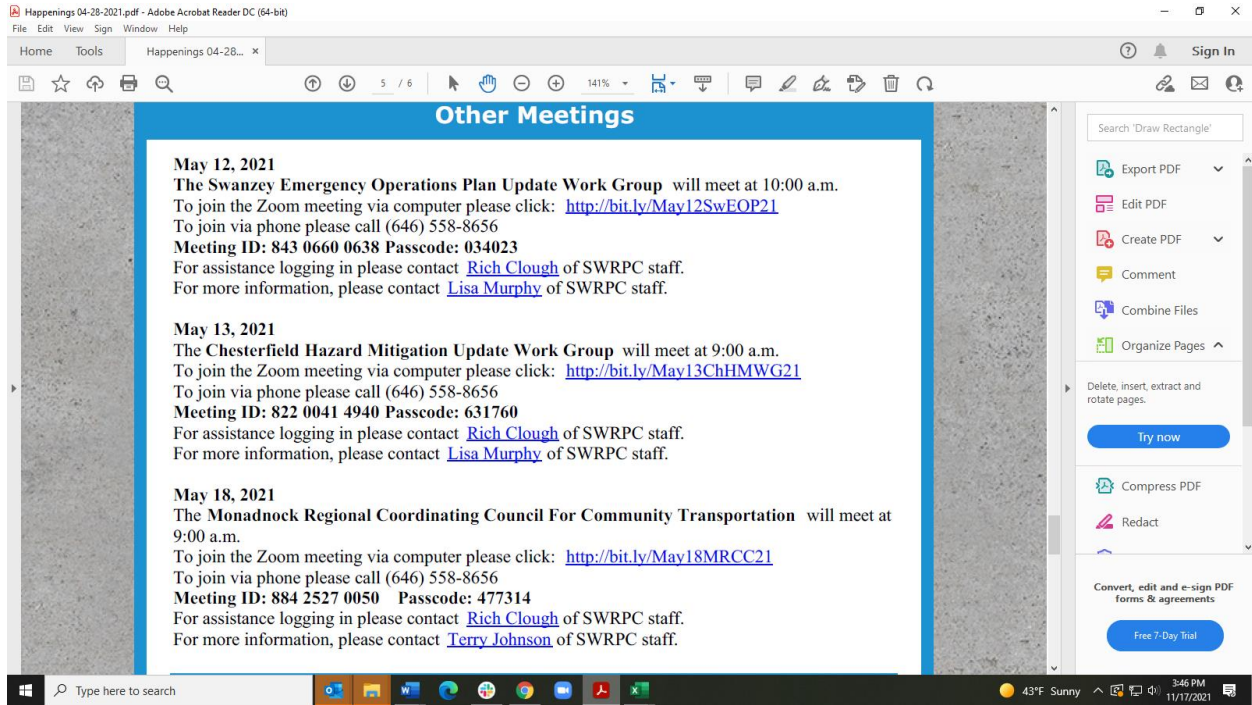
October 20, 2021

Meeting #5

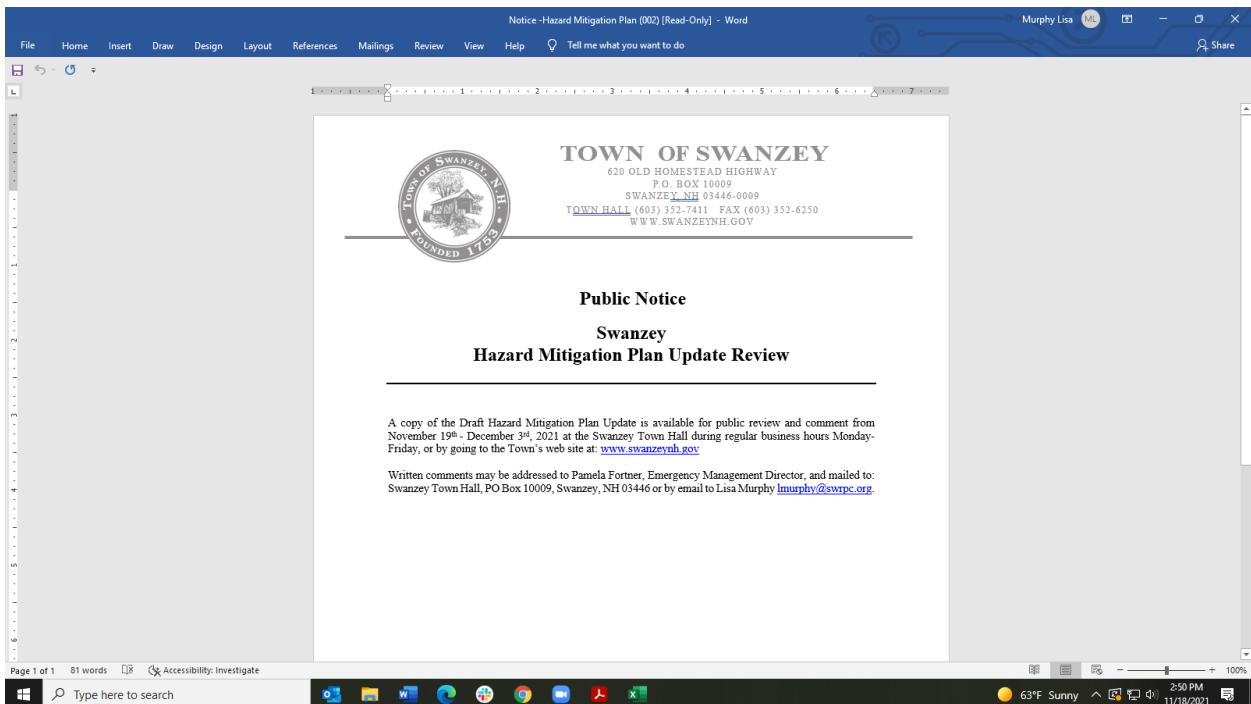
Sign-in Sheet

Name	Title
Pam Fortner	EMD and Health Officer
Mike Jasmine	Code Enforcement Officer
Joe DiRusso	Public Works Director
Matthew Bachler	Town Planner
Michael Branley	Town Administrator
Sly Karasinski	Board of Selectmen, Chair
Lisa Murphy	Senior Planner, SWRPC

Example of one of the meeting notifications



Public Viewing Period Notice



Appendix F

Project Status Sheet

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.

Project Title	Page # in Plan	Date of Project Completion	Comments

Appendix G

July 2021 Storm Damage

July 2021 Flood Damage, Town of Winchester

On July 17, 2021 and July 18, 2021, the Town of Winchester received approximately 5 inches of rain in a period of less than 16 hours. The heavy rainfall caused culverts and drainage systems to become overwhelmed with water and at times plugged with debris. This caused water to overtop roads resulting in numerous washouts and the erosion of numerous gravel roads, paved roads and shoulders. Gravel, stone and debris had to be removed from numerous roads throughout town. On July 18, 2021, at 0600 hours, Winchester Department of Public Works crew mobilized in an effort to make roads passable.

The crew worked from July 18th to July 24th repairing the damage and cleaning up debris.

The following roads were impacted by the rains:

Carlton Road (Asphalt Surface)

The South Branch of Ashuelot River overtopped Carlton Road. As a result, Carlton Road was closed for 3 days until the river receded. The shoulders of Carlton Road sustained significant damage and had to be reconstructed. Gravel was hauled in with DPW dump trucks and the DPW backhoe was utilized to reconstruct the shoulder. 150' L x 10' W x 1' D

Richmond Road (Asphalt Surface)

The Bridge Brook overwhelmed the culvert and overtopped Richmond Road. This caused erosion to the southwest shoulder of the road and it slightly undermined the pavement. The pavement sustained minor damage. Gravel had to be hauled in with DPW dump trucks and the shoulder was reconstructed utilizing the DPW backhoe.

Measured by FEMA

Oliver Hill Road (Gravel Surface)

The brook (unnamed) on Oliver Hill Road overwhelmed the culvert in the area just north of # 60. The water washed out Oliver Hill Road and the culvert headwalls sustained significant damage. In addition, approximately 250 feet of the drainage ditch was eroded. Gravel was hauled in with DPW dump trucks and the road was temporarily reconstructed utilizing the DPW backhoe. The road will need further reconstruction and the culvert will need to be replaced.

Measured by FEMA

Whitcomb Road (Paved Surface)

Whitcomb Road is located south/below the above-mentioned Oliver Hill Road culvert. The water from Oliver Hill Road ran down through the woods and overwhelmed two culverts and the shoulder/ slope. One of the culvert headwalls was significantly damaged. This has not been repaired yet. The repair will require brush trimming, reconstruction of the headwall, approximately 150 yards of gravel and the rental of an excavator to complete the work.

Measured by FEMA

North Winchester Street (Paved Surface)

North Winchester Street had sustained some erosion to the shoulder and slope at the intersection of Route 10 prior to the July rains. The rains in July exacerbated the condition. The July rains caused three pieces of concrete pipe to break off and a significant portion of the slope to washout. The repair will require a large excavator to be moved in and approximately 100 yards of rock to be hauled in to rebuild the slope and reinstall the drainage pipe.

Measured by FEMA

Atkinson Hill Road (Gravel Surface)

Atkinson Hill sustained significant erosion over the entire length of the road. Gravel was hauled in utilizing DPW dump trucks and both the DPW backhoe and grader were used to reconstruct the road. The road is in need of further grading, but will need to dry out before this work is completed.

Measured by FEMA

Winch Hill Road (Gravel Surface)

Winch Hill Road sustained erosion damage to the ditches in the area of the Richmond Town Line. Approximately one quarter mile of ditch line eroded. Gravel was hauled in with DPW dump trucks and the DPW backhoe was utilized to reconstruct the road. The road is in need of further grading, but will need to dry out before this work is completed. 300' L x 3' W x 3' D

East Shore Road (Gravel Surface)

East Shore Road sustained erosion damage to the ditches in the area just south of Christian Hill Road. Gravel was hauled in with DPW dump trucks and the DPW backhoe was utilized to reconstruct the road. The road is in need of further grading, but will need to dry out before this work is completed.

On July 28, 2021, a beaver dam on the northeast side of East Shore Road washed out causing a steady flow of water to overtop East Shore Road. This resulted in significant erosion to the road surface and shoulder. The road had to be closed for approximately 20 hours. Gravel was hauled in with DWP dump trucks and the DPW grader was utilized to reconstruct the road. 125' L x 20' W x 1' D

Christian Hill Road (Paved Surface)

The area of Christian Hill Road where the road changes from pavement to gravel surface sustained significant erosion when a culvert pipe was overwhelmed with water. This resulted in erosion of both the paved surface of Christian Hill Road and the gravel shoulder. Gravel was hauled in with DPW trucks and the DPW backhoe was utilized to temporarily reconstruct the road. The road is in need of further grading and a culvert replacement, but will need to dry out before this work is completed. 125' L x 5' W x 3' D

Cobble Hill Road (Gravel Surface)

Wheelock Brook overwhelmed the culverts on Cobble Hill Road and overtopped the road causing significant erosion to the road's surface and shoulder. Gravel was hauled in and DPW dump trucks and the DPW backhoe was utilized to reconstruct the road. The road is in need of further grading, but will need to dry out before this work is completed. 150' L x 20' W x 1' D

Forest Avenue (Paved Surface)

Bailey Brook overwhelmed the culvert on Forest Avenue and overtopped the road causing erosion to the shoulders and a resident's driveway. Gravel was hauled in and DPW dump trucks and the DPW backhoe were utilized to reconstruct the road. 500' L x 4' x 2' D

West Street (Gravel Surface)

The entire length of the gravel portion of West Street (approximately 1200 feet) was completely washed out and impassable. Gravel was hauled in with DPW dump trucks and the DPW grader was utilized to reconstruct the road. 1200' L x 20' W x 3' D

California Brook Road (Paved Surface)

The Bailey Brook overtopped California Brook Road and eroded approximately 50 feet of shoulder and damaged the headwall. Gravel was hauled in with DPW dump trucks and the DPW backhoe was utilized to reconstruct the headwall and shoulder. 50' L x 3' W x 4' D

Marcy Hill Road and Fox Run Rd (Paved Surface)

Approximately 500' of drainage ditch and shoulder was eroded. This repair has not been completed yet. It will require gravel and the DPW backhoe. 500' L x 4' W x 3' D

As a result of the above-mentioned rains, the Town of Winchester gravel roads sustained significant damage to the gravel surface and ditched. The Department of Public Works maintains 11 miles of gravel roads and grades them two times annually; once in the spring and once in the fall. In addition to grading the roads the drainage ditches are cleaned. Due to the damage caused by the rains, all 11 miles of the gravel roads will need to be graded an additional time in 2021. The gravel roads are approximately 129,000 square yards.

On July 29, 2021 into July 30, 2021, the Town of Winchester received an additional 2 to 3 inches of heavy rain overnight resulting in more erosion and damage. The following roads were damaged and needed repair:

Richmond Road (Asphalt Surface)

The Bridge Brook overwhelmed the culvert a second time and overtopped Richmond Road. This caused erosion to the southwest shoulder of the road and it slightly undermined the pavement. The pavement sustained minor damage. Gravel was hauled in with DPW dump trucks and the shoulder was reconstructed utilizing the DPW backhoe.

Measured taken by FEMA

Honey Hill Road (Gravel Portion)

Honey Hill Road sustained erosion to the gravel portion of the road. Gravel was hauled in with DPW dump trucks and the road was reconstructed utilizing the DPW backhoe. 400' L x 20' W x 3' D

Forest Avenue (Paved Surface)

Bailey Brook overwhelmed the culvert on Forest Avenue and overtopped the road causing erosion to the shoulders and a resident's driveway a second time. Gravel was hauled in with DPW dump trucks and the DPW backhoe was utilized to reconstruct the road.

Forest Avenue also sustained erosion to the southwest shoulder of the road. Approximately 100 feet of the shoulder washed away. Gravel was hauled in with DPW dump trucks and the DPW backhoe was utilized to reconstruct the road. 100' L x 4' W x 2' D

Winch Hill Road (Gravel Surface)

During this storm, approximately 350 feet of ditch line eroded. Gravel was hauled in with DPW dump trucks and the DPW backhoe was utilized to reconstruct the road. The road is in need of further grading, but will need to dry out before this work is completed. 300' L x 3' W x 3' D

In addition to the above-mentioned damages sustained, the rains created additional issues. Crew members had to remove gravel, stone and other debris from the road surface on several occasions. The rain caused the town's drainage ditches to be filled with debris and silt. They are in need of significant maintenance before winter. Prior to the July rains, the majority of the gravel roads were graded, the ditches were cleaned, and calcium was applied to the road's surface for summer. The rains deteriorated these roads significantly and will result in more than regular maintenance prior to winter.