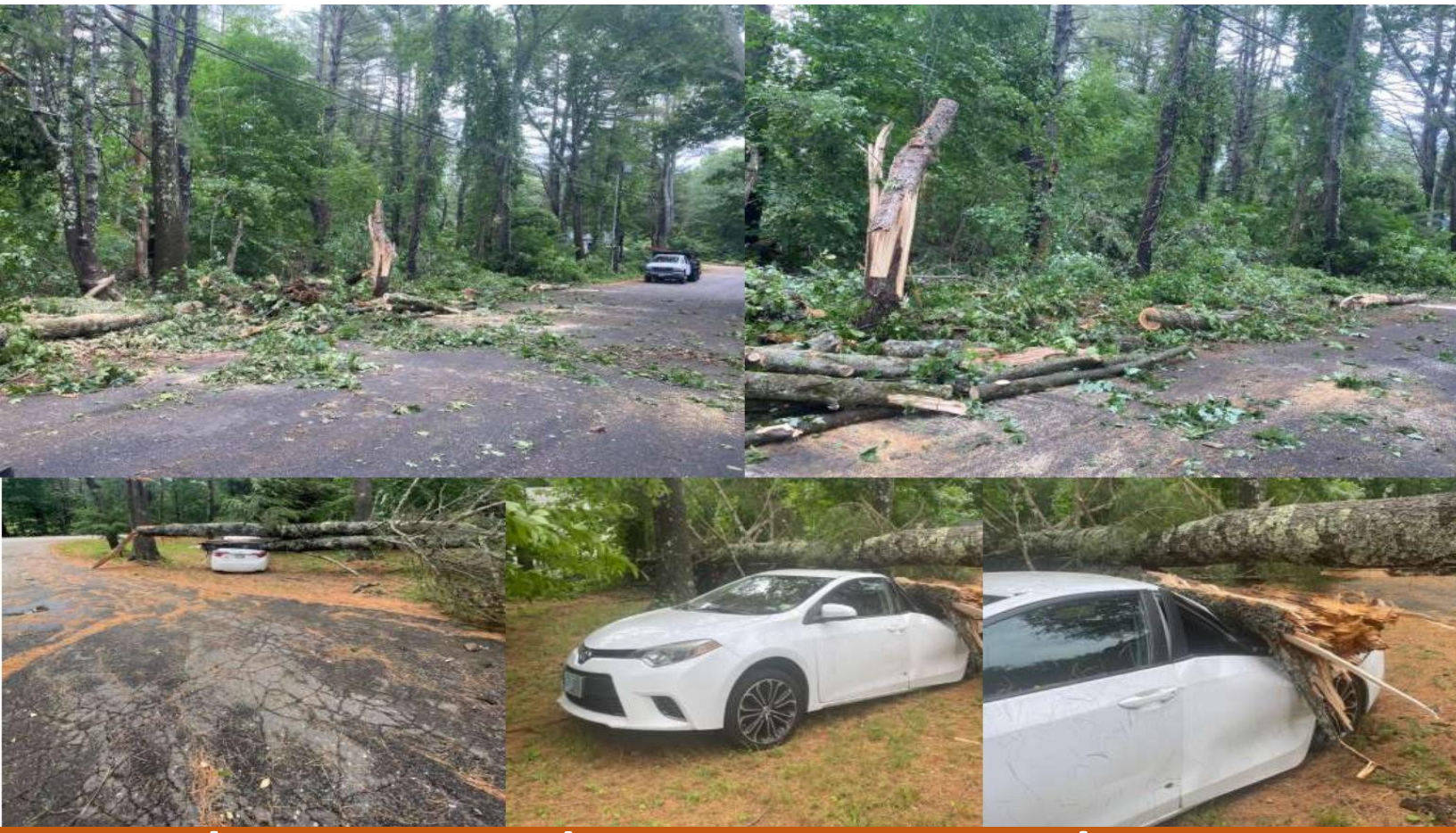


Multi-Hazard Mitigation Plan Update

2025

Town of Madbury, NH

Plan updated by the
Town of Madbury, NH
with Strafford Regional Planning Commission

Acknowledgments

This project was funded by a Building Resilient Infrastructure and Communities (BRIC) Fiscal Year 2021 grant which was awarded to the Department of Safety, Division of Homeland Security and Emergency Management (HSEM) from the Federal Emergency Management Agency (FEMA).

The following individuals have contributed invaluable assistance and support to this project:

2025 Hazard Mitigation Planning Team
Mark Avery, Select Board, Chair
Justin Corrow, Building Inspector
Elizabeth Durfee, Contract Planner
Eric Fiegenbaum, Town Administrator
Marcia Goodnow, Planning Board Chair
Mat Paugh, Road Agent
Tom Perley, Fire Chief/EMD

New Hampshire Homeland Security Emergency Management (HSEM)
Austin Brown, Chief of Mitigation | State Hazard Mitigation Officer
Lauren Morgan, Hazard Mitigation Coordinator
Lynne Doyle, State Hazard Mitigation Planner
Virginia Clasby, Hazard Mitigation Program Assistant

Strafford Regional Planning Commission (SRPC)
Blair Haney, Principal Planner

Cover image: Impacts of Microburst event in June 2024 – provided by Town of Madbury

Adopted 2006
Updated October 22, 2014
Updated September 6, 2019
Updated June 11, 2025

Date of Approval Pending Adoption from FEMA: May 16, 2025
Date of Adoption by Town: June 6, 2025
Date of Final Approval from FEMA: June 11, 2025

Glossary of Terms

According to FEMA guidance, words, phrases, abbreviations, and acronyms relevant to hazard mitigation and emergency management should be defined. Many terms in emergency management planning have special meanings, so it is important to establish precise definitions.

Access and functional needs: Refers to persons who may have additional needs before, during, and after an incident in functional areas, including but not limited to: maintaining health, independence, communication, transportation, support, services, self-determination, and medical care. Individuals in need of additional response assistance may include those who have disabilities; live in institutionalized settings; are older adults; are children; are from diverse cultures; have limited English proficiency or are non-English speaking; or are transportation disadvantaged.

Alert: Time-sensitive tactical communication sent to parties potentially impacted by an incident to increase preparedness and response. Alerts can convey 1) urgent information for immediate action, 2) interim information with actions that may be required in the near future, or 3) information that requires minimal or no action by responders.

At-risk individuals: At-risk individuals are people with access and functional needs that may interfere with their ability to access or receive medical care before, during, or after a disaster or emergency. At-risk individuals may include children, older adults, pregnant women, and individuals who may need additional response assistance. Examples of these populations may include but are not limited to individuals with disabilities, individuals who live in institutional settings, individuals from diverse cultures, individuals who have limited English proficiency or are non-English speaking, individuals who are transportation disadvantaged, individuals experiencing homelessness, individuals who have chronic medical disorders, and individuals who have pharmacological dependency.

Contamination: The undesirable deposition of a chemical, biological, or radiological material on the surface of structures, areas, objects, or people.

Dam: A barrier built across a watercourse for the purpose of impounding, controlling, or diverting the flow of water.

Damage Assessment: The process used to appraise or determine the number of injuries and deaths, damage to public and private property, and the status of key facilities and services such as hospitals and other health care facilities, fire and police stations, communications networks, water and sanitation systems, utilities, and transportation networks resulting from a man-made or natural disaster.

Disaster: An occurrence of a natural catastrophe, technological accident, or human-caused event that has resulted in severe property damage, deaths, and/or multiple injuries.

EMD: Emergency Management Director.

EOC: Emergency Operations Center.

EOP: Emergency Operating Plan. A document that: describes how people and property will be protected in disaster and disaster threat situations; details who is responsible for carrying out specific actions; identifies the personnel, equipment, facilities, supplies, and other resources available for use in the disaster; and outlines how all actions will be coordinated. This is sometimes referred to as the LEOP (Local Emergency Operating Plan).

Hazard mitigation: Any action taken to reduce or eliminate the long-term risk to human life and property from hazards. The term is sometimes used in a stricter sense to mean cost-effective measures to reduce the potential for damage to a facility or facilities from a disaster event.

Jurisdictions: Planning areas, such as towns, cities, counties, states, regions, territories, and freely associated states.

Preparedness cycle: A continuous cycle of planning, organizing, training, equipping, exercising, evaluating, and taking corrective action to ensure effective coordination during incident response. This cycle is one element of a broader National Preparedness System to prevent, respond to, and recover from natural disasters, acts of terrorism, and other disasters.

Recovery: The long-term activities beyond the initial crisis period and emergency response phase of disaster operations that focus on returning all systems in the community to a normal status or to reconstitute these systems to a new condition that is less vulnerable.

Warning: The alerting of emergency response personnel and the public to the threat of extraordinary danger and the related effects that specific hazards may cause. A warning issued by the NWS (e.g., severe storm warning, tornado warning, tropical storm warning) for a defined area indicates that the particular type of severe weather is imminent in that area

Watch: Indication by the NWS that, in a defined area, conditions are favorable for the specified type of severe weather (e.g., flash flood watch, severe thunderstorm watch, tornado watch, tropical storm watch).

TABLE OF CONTENTS

EXECUTIVE SUMMARY

In the United States, millions of dollars are spent each year on disaster response and recovery. By undertaking activities which reduce the impact of future disasters, known as hazard mitigation, local governments can reduce the costs of New Hampshire's response and recovery costs as well as minimize the impacts of future disaster events.

Madbury's Multi-Hazard Mitigation Plan Update 2025 is an update to the Town's 2019 Multi-Hazard Mitigation Plan and follows the planning requirements as found in the FEMA Local Mitigation Planning Policy Guide, released April 19, 2023, and pursuant to 44 CFR §201.6, which states that Local Mitigation Plans must contain the following information:

- Planning Process
- Hazard Identification and Risk Assessment
- Mitigation Strategy
- Plan Maintenance
- Plan Update
- Plan Adoption

The purpose of this Plan is to update the 2019 hazard mitigation plan to encourage changes in development that seek ways to reduce or eliminate the long-term risk to human life and property from the hazards identified within the Hazard Identification and Risk Assessment (HIRA) before, during, and after an incident or disaster. The Plan was developed by Madbury's Hazard Mitigation Planning Team with assistance from the Strafford Regional Planning Commission (SRPC), as well as input from the New Hampshire Department of Safety (DOS) Division of Homeland Security and Emergency Management (HSEM) Planning Section, other federal and state agencies, and the public.

The Town's plan has five overarching goals, which are adapted from the State of New Hampshire Multi-Hazard Mitigation Plan, and include:

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

This Plan considers Natural, Technological, and Human-caused Hazards (Figure ES-1). The 2023 State of New Hampshire Multi-Hazard Mitigation Plan update consolidated and renamed several hazards for consistency and added five new hazards to the State HMP update. Of those hazards in the State Plan, the Madbury Planning Team identified 21 hazards across the three hazard types to analyze. The 2025 Madbury Plan update addresses the hazards listed in Figure ES-1.

Figure ES-1: 2025 Identified Hazards in Madbury

Natural Hazards	Technological Hazards	Human-caused Hazards
Inland Flooding	Dam Failure	Cyber Threats
Drought	Hazardous Material Spill	Mass Casualty
Earthquakes	Known and Emerging Contaminants	Terrorism/Violence
Extreme Temperatures	Long-Term Utility Outage	Transport Accident
High Wind Events	Radiological	
Infectious Diseases		
Landslides		
Lightning		
Severe Winter Weather		
Solar Storms & Space Weather		
Tropical and Post-Tropical Cyclones		
Wildfire		

CHAPTER 1: PLANNING PROCESS

Basic Methodology

The Plan was developed and updated using FEMA's 2023 Local Mitigation Planning Policy Guide and corresponding Handbook (2023), which sets forth a nine-task planning process (Figure 1-1) to update a Local Hazard Mitigation Plan. Completing this new multi-hazard plan required significant planning preparation and represents the collaborative efforts of the Town of Madbury, Hazard Mitigation Planning Team (HMPT), and Strafford Regional Planning Commission (SRPC).

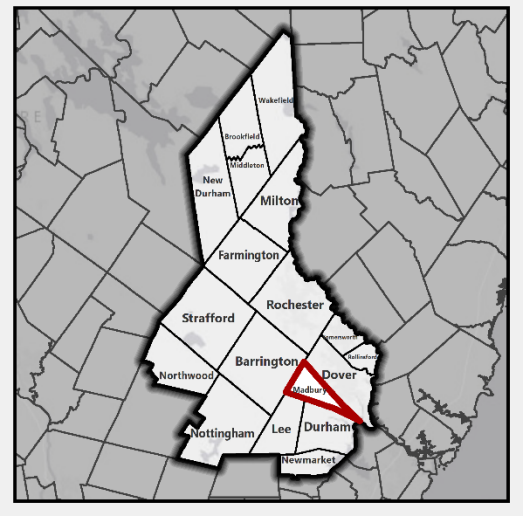
Figure 1-1: Local Mitigation Planning Handbook Tasks

Task 1	Determine the Planning Area and Resources
Task 2	Build the Planning Team
Task 3	Create an Outreach Strategy
Task 4	Review Community Capabilities
Task 5	Conduct a Risk Assessment
Task 6	Develop a Mitigation Strategy
Task 7	Keep the Plan Current
Task 8	Review and Adopt the Plan
Task 9	Create a Safe and Resilient Community

Several of the tasks were accomplished independently, while others were completed sequentially. While the 2025 update of the Plan was a complete overhaul to meet FEMA's updated Local Mitigation Planning Policy Guide, much of the historical information came from the 2019 Plan and associated previous editions. During the planning process, careful consideration was given to the new policy guidance to ensure the plan and planning process met the specific requirements.

Jurisdiction

The Plan addresses only one jurisdiction—the Town of Madbury, NH. After the HMPT approved the plan, it was forwarded to HSEM for review and edits before submitting it to FEMA. Upon approval pending adoption (APA) by FEMA, the Madbury Select Board held a public meeting to consider public comments and sign a Resolution to Adopt the Plan. The Plan was sent to FEMA for final approval.



Hazard Mitigation Planning Team and Public Meetings

The Town formed a team of staff and volunteers to update the 2019 Plan, referred to as the Hazard Mitigation Planning Team (HMPT). Additionally, completing this multi-hazard plan update required collaboration with other agencies, including Federal Emergency Management Agency (FEMA), New Hampshire Homeland Security and Emergency Management (HSEM), and Strafford Regional Planning Commission (SRPC). Figure 1-2 shows town representatives on the HMPT.

Figure 1-2: Madbury Hazard Mitigation Planning Team

Staff/Volunteer	Department/Position
Mark Avery	Select Board, Chair
Justin Corrow	Building Inspector
Elizabeth Durfee	Contract Planner
Eric Fiegenbaum	Administrator
Marcia Goodnow	Planning Board Chair, volunteer
Mat Paugh	Road Agent
Tom Perley	Fire Chief/EMD

The HMPT met five times between October 2024 and March 2025 to discuss the range of hazards included in this plan and brainstorm mitigation needs and strategies to address these hazards and their impacts on people, businesses, and infrastructure in the Town. All meetings were geared to accommodate brainstorming, open discussion, and an increased awareness of potential threats to the Town. This process results in significant cross-talk regarding all natural and man-made hazards. SRPC staff incorporated all feedback from participants into the Plan.

The Town publicly posted all HMPT meetings. No public attended any of the public HMPT meetings, and no other communities chose to participate. Supporting documentation on the planning process, including sign-in sheets and a table of agenda items, can be found in Appendix B: Planning Process Documentation.

Public Outreach & Engagement

The HMPT launched a comprehensive outreach effort to gather feedback from residents and stakeholders. The Team designed a survey that solicited information about awareness and preparedness, used the town's monthly newsletter to promote the survey and to request review of the draft Plan update, solicited comments from the EMDs of adjacent communities, and shared links to local social media groups. The Plan update and survey were also included on SRPC's website, social media, and weekly newsletter. In total, public outreach and engagement included:

- Five public meetings of the Hazard Mitigation Planning Team;
- 10-day public comment period notified on Town and SRPC websites and newsletters, and direct emails to all Town boards and commissions;
- Notification to residents via the Town website and newsletter; and local businesses and non-profits via SRPC website and newsletter; and
- Public survey on risk concerns and household preparedness hosted by SRPC and posted on Town website and newsletter.

Survey to Residents and Stakeholders

The HMPT published a community-wide survey to ask residents about perceived risk and preparedness. The short survey assessed concerns for the various natural disasters and weather events as well as household preparedness for these events.

Town of Madbury - Hazard Mitigation Assessment

Assessment of Risk & Preparedness

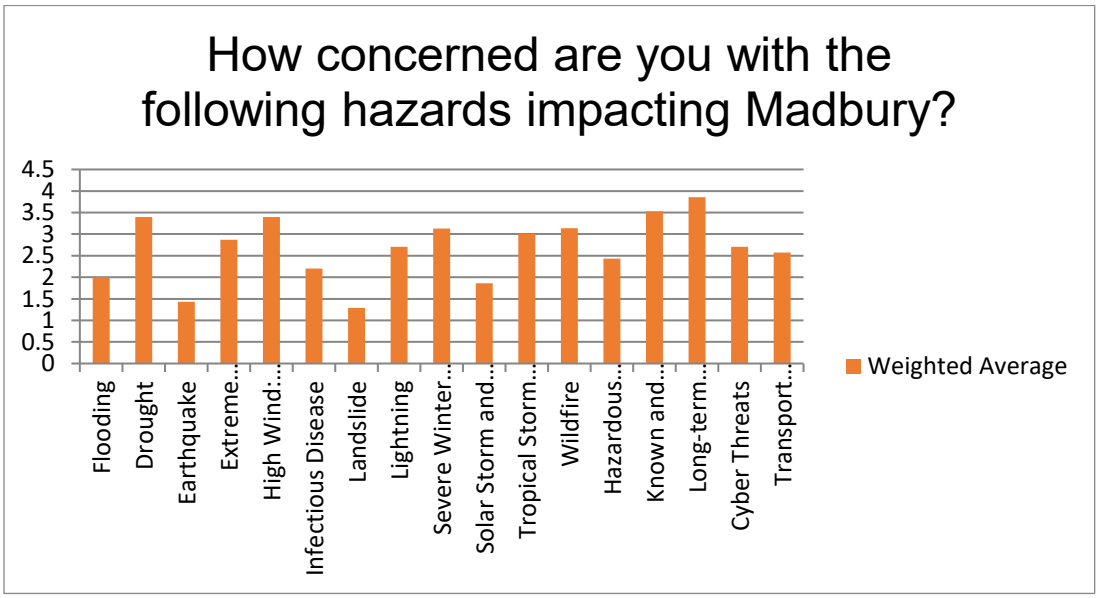
The Town of Madbury is updating the 2019 Hazard Mitigation Plan (HMP). This is a short survey to assess risks and preparedness for a natural disaster, severe weather event, or technological hazard in Madbury.

The survey should take approximately four (4) minutes to complete. Thank you for taking the time to answer all the questions.

1. How concerned are you with the following hazards impacting Madbury?

	Not concerned	Somewhat concerned	Very concerned
Flooding	○	○	○
Drought	○	○	○
Earthquake	○	○	○

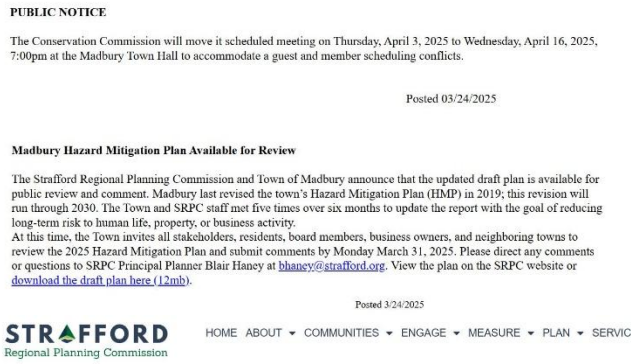
The survey received 15 responses, all Madbury residents with a balanced age range between ages of 30 to 65+. When asked how prepared they are for a disaster, 12 of 15 checked “somewhat prepared,” 2 “very prepared,” and 1 “not prepared.” The figure below shows the distribution of responses to specific hazards and potential impacts. The natural hazards of drought and high winds ranked high, as did known and emerging contaminants and long-term power outages (highest). The Mitigation Plan addresses each of these hazards with action items or on-going capabilities.



Public Comment Opportunities

Before submitting the Plan for conditional approval, Madbury staff publicly noticed the draft report for comment in accordance with RSA 91-A, including a public posting in the Town Hall explaining where stakeholders could find the draft plan on the Town's website, how to review a hard copy of the plan during business hours, and how to submit comments.

The 10-day public comment period, March 20 to March 31, 2025, solicited comments from the community, including local non-profits, business groups, and adjacent communities. The Town reached these groups using the SRPC weekly newsletter, website, and social media sites. The Town used this same method to reach underserved populations (as a low-population, rural community, Madbury does not have detailed data or resources to reach population sub-sets such as underserved or vulnerable groups, but the community attempted to reach them through posting on the Town website, community email newsletter, and local social media groups).



PUBLIC NOTICE

The Conservation Commission will move it scheduled meeting on Thursday, April 3, 2025 to Wednesday, April 16, 2025, 7:00pm at the Madbury Town Hall to accommodate a guest and member scheduling conflicts.

Posted 03/24/2025

Madbury Hazard Mitigation Plan Available for Review

The Strafford Regional Planning Commission and Town of Madbury announce that the updated draft plan is available for public review and comment. Madbury last revised the town's Hazard Mitigation Plan (HMP) in 2019; this revision will run through 2030. The Town and SRPC staff met five times over six months to update the report with the goal of reducing long-term risk to human life, property, or business activity.
At this time, the Town invites all stakeholders, residents, board members, business owners, and neighboring towns to review the 2025 Hazard Mitigation Plan and submit comments by Monday March 31, 2025. Please direct any comments or questions to SRPC Principal Planner Blair Haney at bhaney@strafford.org. View the plan on the SRPC website or download the draft plan here (12mb).

Posted 3/24/2025

Bits and Pieces: A Weekly Update from the Strafford Region - 3/21/2025

Strafford Regional Planning Commission <strafford@straffordregionalplanningcommission.ccsend.com>
To: Blair Haney

If there are problems with how this message is displayed, click here to view it in a web browser.

BITS AND PIECES
A Weekly Update from the Strafford Region

Planning

Madbury Hazard Mitigation Plan Available for Review
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STRAFFORD
Regional Planning Commission

HOME ABOUT COMMUNITIES ENGAGE MEASURE PLAN SERVIC

Public Comment Period: Madbury Hazard Mitigation Plan Upda

March 25, 2025

NOTICE OF PUBLIC COMMENT PERIOD

The Strafford Regional Planning Commission and Town of Madbury announce that the updated draft plan is available for public review and comment. Madbury last revised the town's Hazard Mitigation Plan (HMP) in 2019; this revision will run through 2030. The Town and SRPC staff met five times over six months to update the report with the goal of reducing long-term risk to human life, property, or business activity.
At this time, the Town invites all stakeholders, residents, board members, business owners, and neighboring towns to review the 2025 Hazard Mitigation Plan and submit comments by Monday March 31, 2025. Please direct any comments or questions to SRPC Principal Planner Blair Haney at bhaney@strafford.org. View the plan on the SRPC website or download the draft plan here (12mb).

Please see the town's website for the official Public Notice here: http://townofmadbury.com/PublicNotices.html

Notice Categc

Additionally, the Town circulated the draft plan update to its land use boards that regulate or review development proposals, including the Planning Board, Zoning Board of Adjustment, and Conservation Commission. All town departments, including those that receive development applications and comment on those applications, received the plan draft as well. All feedback from the stakeholders was incorporated into the Plan.

The public will have the opportunity for future involvement as the Plan will be periodically reviewed and invited to participate in all future reviews and updates. There will be a public meeting before each formal review and before any change or update is sent to FEMA/HSEM. Copies of the Plan will remain on file at the Strafford Regional Planning Commission in both digital and paper format.

Accomplishments Since Prior Plan Approval

Figure 1-3 displays mitigation strategies identified during the development of Madbury's Multi-Hazard Mitigation Plan. The HMPT provided a status update for each mitigation strategy for the 2025 Plan. These accomplishments since 2019 have helped reduce the impact of hazards on people, property, and businesses.

Figure 1-3: Accomplishments Since Last Plan Adoption

Proposed Mitigation Actions from 2019	**Status Update 2025** (Completed, Removed, or Deferred/Revise)
As part of the ongoing update to the master plan, the town should identify areas that may be susceptible to environmental hazards, including but not limited to steep slopes, wildfire, and flooding to determine where development should and should not occur.	Completed. Town updated the Housing & Demographic Master Plan chapter and the Land Use chapter will be updated in 2025. The Housing chapter included climate resilience.
Add current floodplain map to the Planning Board's website under the "Maps" section, and to the town's subdivision regulations to coincide with Article XIII Special Flood Hazard Area Requirements.	Completed. Maps uploaded to the Town website.
Improve the way in which all hazards education on mitigation techniques and preparedness are disseminated to residents. This may include exploring additional ways to send out information that doesn't rely solely on having power and an internet connection (NH Alerts & Code Red), advocating for more residents to sign up for emergency alerts, creating neighborhood route maps, and developing a list of addresses (using assessing data) for door-to-door notification.	Deferred/revise. Divide action item into multiple tasks. This task = emergency notification system; next task = community outreach (non-emergency). Utilize "Civics Plus" feature of new Town website to communicate with residents. 1) Identify ways to send out information that doesn't rely solely on having power and an internet connection (NH Alerts & Code Red), for example, developing a list of addresses (using assessing data) for door-to-door notification. 2) Create neighborhood route maps and disseminate to new residents.
Consider developing a process or actions that would improve engagement with first time homebuyers and ensure they are aware of existing resources during an emergency. The town may include providing information in the community calendar or an additional step when new residents register to vote.	Deferred/revise. Divide action item into multiple tasks. Town Clerk does not provide information on resources available but does provide community contact info. Inform new residents about Fire Department and Recreation Department Facebook pages for real-time updates. Community Club provides community updates and might be resource. 1) Develop a process to provide first-time homebuyers and new residents with information pertaining to existing resources for an emergency, for example, an additional step when new residents register to vote. 2) Improve the communication tools for the Town to all residents, such as providing information in the community calendar, or advocate for more residents to sign up for emergency alerts.
Work with the Strafford Regional Planning Commission to overlay the dam inundation layer with the most recent tax parcels to develop a list of owners that would be impacted if the Bellamy Dam were to fail. As a follow up, the town should ensure that those owners are aware they are within the dam inundation zone and provide information on flood insurance options.	Removed. Portsmouth owns the dam and manages it.
Update existing site and subdivision regulations to include more stringent language on the criteria and maintenance of fire aid infrastructure and other water resources that would ensure adequate fire protection for new development.	Removed. No trigger/threshold in current regs for this to happen; SUB regulations require Fire Dept to review and work with applicants and Planning Board to identify adequate fire protection on a case-by-case basis. Not much land to develop.

Seek funding to conduct a floodplain analysis that would assess the major river systems in town. The study should mimic what has been recently completed in the Town of Lee and include various build-out scenarios and use increased precipitation projections to delineate flood zones based on future conditions.	Deferred. Utilize the Northeast Regional Climate Center at Cornell University projections to analyze river systems better. Geosyntec conducted a study for Lee.
Investigate the feasibility of setting up a shelter at the Moharimet Elementary School, which would include addressing capacity and resource challenges.	Completed.
Research options to create a Community Emergency Response Team (CERT) for the town to have a list of volunteers that meet certain requirements, including training to handle emergency situations.	Removed. Not practicable.
Use the culvert analysis referenced in the C-RiSe vulnerability assessment to prioritize future culvert replacements and repairs.	Deferred/revised. No priority plan exists, add to on-going list. Road Agent completed a lot of maintenance and inspections.
Purchase and install lightning rod at the Emergency Operations Center to protect all back-up systems in case of a strike and associated power surge.	Completed.
* Explore ways to improve and streamline the process in which the town would request and receive emergency resources from state/federal agencies through WebEOC, including sandbags, fuel, vehicles, and additional manpower, during the first 72-hours of a major event. This may include additional WebEOC training for emergency personnel and improved coordination between local departments.	Completed. Add continued training to the on-going list.
* Develop a list of options on how to address ongoing maintenance activities and preventative cleanup challenges along the railroad to reduce future wildfire risk. One action could be to involve the regional planning commission to determine if this is a regional challenge and if a regional approach is most suitable.	Completed. Move maintenance to on-going list.

CHAPTER 2: EXISTING AND POTENTIAL POLICIES, PROGRAMS, AND RESOURCES

During the 2025 hazard mitigation update process, the HMPT discussed Madbury's existing programs, policies, and regulations to evaluate effectiveness and consider new ideas. To administer these capabilities, the HMPT identified gaps, proposed changes, and reviewed their available resources.

This discussion helped the HMPT determine the Town's ability to identify potential opportunities to enhance specific programs, policies, or regulations; and to implement its hazard mitigation strategies. The evaluation included existing plans, studies, and reports, participation in the National Flood Insurance Program (NFIP), gap assessment, changes to development patterns, and integration of land use planning mechanisms. The final table shows the full assessment of pre- and post-disaster mitigation capabilities.

Review of Existing Plans, Studies, and Reports

The HMPT reviewed all available reports that overlap with the Hazard Mitigation Plan. This review of primary documents includes the Town Master Plan, Capital Improvements Program, Zoning Ordinance, Land Use Subdivision and Site Plan Regulations, C-Rise Vulnerability Assessment, and Emergency Action Plan Bellamy Reservoir Dam (see Appendix A). Each plan impacts how the Town can reduce vulnerability or carry out a strategy, capability, or mitigation action. The Town updates the plans at different intervals. At each update, the Town pledges to integrate the goals of the HMP, if Town has jurisdiction.

The Town incorporates the Zoning Ordinance, Subdivision Regulations, and Site Plan Review Regulations with this Plan Update when reviewing and listing capabilities and strategies. The Town notes its need to update the Master Plan, which includes chapters on Land Use and Natural Resources. Currently, the Town is updating its Housing and Demographics chapter. The Capital Improvement Plan includes funds for the Freshet Road bridge/culvert replacement. The HMPT recommends that the Town pursue updating the Local Emergency Operations Plan and incorporate the HMP update.

Integration with Other Plans

This HMP will only enhance mitigation if balanced with all other Town plans. Madbury will take the necessary steps to incorporate the mitigation strategies and other information contained in this plan with other plans. Since the 2019 Plan, the Town has primarily utilized the HMP document for the Capital Improvement Plan, where the CIP Committee considers funding requests. Town staff will update and share the final HMP with all Boards and Commissions to ensure changes in board policies consider the Hazard Mitigation Plan.

The EMD/Fire Chief initiates the annual HMP review and solicits input from other department heads and boards/commissions for opportunities to integrate the 2025 HMP findings and/or recommendations into any plan updates they will be leading. The Town will review and note instances when this has been done and include it as part of its annual review of the Plan.

National Flood Insurance Program

Communities participating in the National Flood Insurance Program (NFIP) adopt and enforce community floodplain regulations, including the Flood Insurance Rate Maps (FIRM) and Flood Insurance Study (FIS).

The Flood Insurance Rate Map (FIRM) identifies vulnerable elevations as Special Flood Hazard Areas (SFHA) and is determined by the Flood Insurance Study (FIS). SFHAs are defined as areas inundated by a flood event that has a 1-percent chance of being equaled or exceeded in any given year and are shown on the FIRMs as the A or V Zones. Currently, Madbury has only one (1) address with a flood insurance policy and zero (0) structures with repetitive losses.

Figure 2-2: Community, Policy, and Claims Information

Policies in Force	Insurance in Force	Number of Paid Losses	Total Amount of Paid Losses
1 (Total)	$350,000	0	$0

Figure 2-3: Repetitive Loss Information

Number of Repetitive Loss Buildings	Total Number of Repetitive Losses	Total Amount of Repetitive Loses	Occupancy Type of RL Loss Buildings			
			Residential	Commercial	Institutional	Other Non-Residential
0	0	0				

NFIP Status

Madbury entered the National Flood Insurance Program (NFIP) on March 4, 2010. Portions of the Town lie in the 100-year floodplain along the Bellamy River, Bellamy Reservoir, and Gerrish Brook. The Town adopted the latest effective FIRM, dated September 30, 2015, and the Flood Insurance Study for the County of Strafford, N.H. dated September 30, 2015. The Town incorporated these into the Madbury Zoning Ordinance.

NFIP in Town Regulations

Madbury Town Meeting adopted higher standards in their Zoning Ordinance than the minimum floodplain management regulations. Madbury limits or prohibits new habitable structures within the floodplain, except with a Special Exception approval. Looking ahead, the Town will use this HMP update to determine where past hazards have been documented and try to steer potential development away from these hazard areas.

The Madbury Zoning Ordinance (Article XXI) outlines how the Town implements and enforces local floodplain management regulations to regulate and permit development in SFHAs (see: Flood Hazard Area Overlay District). These regulations apply to all lands designated as Special Flood Hazard Area (SFHA) by FEMA. In this Article, Section 4 - Permits designates the Building Inspector to oversee the administration and enforcement.

The regulations require applicants to obtain elevation data for all new and substantially improved structures in a SFHA if the elevation is known. Community permitting officials must review this elevation data to ensure floodplain development complies with the regulations.

NFIP Compliance

The Town's last Community Assistance Visit (CAV) occurred in June 2010 and the results did not find any major problems with the existing floodplain management regulations or any other problems in the Town's floodplain management program. The Emergency Management Director (EMD), Building Inspector, and Planning Board should initiate a request and manage the process for a Community Assistance Contact (CAC) and set up a CAV.

To remain compliant with the NFIP, Madbury implemented several activities over the last 10 years, including:

- In 2015, the town adopted new floodplain maps delineated as part of the Coastal NH Floodplain Mapping Update to include all lands designated as special flood hazard areas by the Federal Emergency Management Agency (FEMA) in its "Flood Insurance Study for the County of Strafford, NH" dated September 30, 2015, are declared to be part of the Madbury Zoning Ordinance and are hereby incorporated by reference.
- In 2017, the town partnered with the SRPC to plan, design, publicize, and implement a public outreach workshop to discuss concerns and actions related to extreme precipitation and flooding, drought and water supply, and emergency preparedness. A follow-up meeting to the fall workshop focused on discussing concerns and actions that the town could take to help reduce its vulnerabilities. Topics discussed at the follow-up meeting included which actions should be included in the town's annual report and how the water board could incentivize water quality testing. The planning team also discussed drafting an emergency preparedness/contact list that could be distributed on a refrigerator magnet or other type of giveaway for town residents. The results of the meeting were forwarded to the town's new contract planner in order to take advantage of potential opportunities to integrate the concerns, needs, and action ideas raised by the workshop participants into the town's master plan.
- In 2017, Madbury was one of ten communities to complete a vulnerability assessment report as part of the Climate Risk in the Seacoast (C-RiSe) project. Using the latest sea-level rise projections, this report identified key assets and resources that may be affected from flooding by one or more of the sea-level rise and/or coastal storm surge scenarios. Assets included, but are not limited to: state and municipal infrastructure, municipal facilities, transportation routes and roadways, and natural resources. As part of this vulnerability assessment, UNH researchers conducted a detailed analysis of culvert flow capacity, function, and fish passage based on current and projected increases in precipitation.
- The Town has completed various flood mitigation infrastructure improvements since the 2019 HMP update, including:
    - Replaced Nute Road bridge over Bellemy River
    - Funded and permitted the replacement of Freshet Road bridge/culvert (construction to be completed in 2025/26)

To continue to comply with the NFIP, the Town commits to:

- Sharing any collected data on local flood elevations or modeling with all Town departments and land use boards.
- Monitoring structures in the SFHAs for encroachments or violations.
- Share this HMP update with all Town departments and land use boards, as well as posting on the Town website to help educate and raise awareness with the residents and local stakeholders.

Substantial Improvement and Substantial Damage

Madbury designated the Building Inspector as responsible for determining substantial improvement and substantial damage following a disaster declaration. These determinations are made for all development in a special flood hazard area that proposes to improve an existing structure including alterations, movement, enlargement, replacement, repair, additions, rehabilitations, renovations, repairs of damage from any origin (such as, but not limited to flood, fire, wind, or snow) and any other improvement of or work on such structure including within its existing footprint.

The Building Inspector, in coordination with any other applicable community officials, shall be responsible for the following:

1. Determine if a substantial damage (SD) determination needs to be made and communicate SD and permit requirements to property owners.
2. Verify the cost of repairs to the structure.
3. Verify the market value of the structure.
4. Make the SD determination and issue it to the property owner.
5. Permit development/ensure compliance with community ordinance.
6. Inspect development and maintain as-built compliance documentation post construction.

Capability Assessment

As part of the update process, the Hazard Mitigation Planning Team reviewed and evaluated the effectiveness of both the pre- and post-disaster mitigation capabilities, including local land use programs, emergency preparedness planning, and infrastructure operations and maintenance. As shown in Figure 2-4, each capability was reviewed and identified as either “Excellent, Good, Average, or Poor”. The HMPT discussed changes and improvements since the 2019 Plan. Specific capabilities were removed/deleted as they no longer exist or were specifically preparedness/response oriented. During this process, gaps were identified and considered in developing the 2025 mitigation actions.

Gaps in Prior Assessment

The HMPT discussed gaps that developed since the 2019 plan.

- The Local Emergency Operations Plan expired and requires funding to update;
- New road agent should inspect when possible private driveways that cross public drainage swales for obstructions, and should make note of downed or dead trees to minimize power outages;
- Consider succession planning for the retiring Fire Chief;
- Develop a process to communicate readiness and preparedness information to new residents, for example, an additional step when new residents register to vote.
- Improve the communication tools for the Town to all residents, such as providing information in the community calendar, advocate for more residents to sign up for emergency alerts, or switch to the "Civics Plus" feature of new Town website
- Identify ways to send out information that doesn’t rely solely on having power and an internet connection (NH Alerts & Code Red)
- Town wants to communicate best practices for residential/personal back-up generators, such as noise control and proper installation/maintenance to ensure safety

Changes in Development Patterns in Hazard Prone Areas

Since the 2019 Plan, Madbury received permit applications to build an average of two (2) new homes per year. According to available GIS data, building permit data, and aerial imagery, there has been no development within these areas since the prior HMP update. Additionally, no changes to land use regulations removed restrictions to development in hazard-prone areas or gave increased permissions to develop in these areas.

Madbury has successfully steered almost all new developments away from existing and potential flooding dangers; therefore, the community's vulnerability has been reduced. However, as more extreme precipitation and other hazard events are projected to occur throughout the region, Madbury will need to continue to plan for future disaster scenarios in town proactively.

Assessment of Pre- and Post-Disaster Mitigation Capabilities

Figure 2-4 below shows the local land use programs, emergency preparedness policies, and infrastructure operations and maintenance programs (collectively known as "capabilities") currently in effect. The HMPT discussed the effectiveness of each capability and responsible entity(s) since the 2019 Plan and considered new suggestions. Finally, the HMPT identified the necessary changes and improvements to each capability and whether the community has the necessary resources.

The EMD, Highway, Fire, Police, and Building departments manage most of the capabilities and conduct post-event inspections for future consideration. The Town Administrator reviews funding and budget matters alongside the Select Board.

Effectiveness Scale

Excellent - The existing program works as intended and is exceeding its goals
Good - The existing program works as intended and meets its goals
Average - The existing program does not work as intended and/or does not meet its goals
Poor - The existing program is negatively impacting the community

Figure 2-4: Mitigation Capability Assessment

Madbury Capability Assessment 2025

Capability (Program, Policy, Regulation)	Responsibility	Hazard	Description	*Effectiveness*	*Changes since 2019 Plan*	*Changes Needed & Ability to Implement*
Building Codes	Building Inspection/ Code Enforcement, Fire Department	All	Establishes regulations for the design and installation of building systems	Good	*Town updated to 2021 IBC which incorporates more energy efficient codes.*	*Town continues to review plans for compliance with building codes and zoning regulations.*
Local Emergency Operations Plan (LEOP)	Police Chief/EMD, and Fire Department	All	Defined notification procedures and actions that should be taken in different emergency situations.	Average	*Town has not updated the plan since 2015.*	*Town is pursuing a grant to update the plan.*
Evacuation and Notification	Planning Board, Building Inspection/ Code Enforcement	All	Evacuation and notification procedures are defined in Madbury's LEOP	Average	*None*	*Town needs to pursue a grant to update the plan.*
Emergency Backup Power	Planning Board, Building Inspection/ Code Enforcement	All	Offers temporary shelter during extended periods without power	Good	*Increase to private homeowners installing personal backup power generators.*	*No changes needed*
Fire Department Mutual Aid Program	Fire, TA	All	Seacoast Chief Fire Officers Mutual Aid District.	Good	*Town upgraded hardware, vehicle radios, and portable radios.*	*No changes needed*
Police Department Mutual Aid Program	Police, TA	All	Strafford County Chiefs and State Police (Mutual Aid)	Good	*None*	*No changes needed*
Identifying Future Dry Hydrants and Cisterns	Fire Department	All	Determine location of future potential fire aid to avoid damage to existing infrastructure	Average	*None*	*Town needs to work with private landowners and Planning Board to identify opportunities.*

Road Safety Improvements	Road Agent	All	Work with NHDOT to identify road safety improvements	Average	*None*	*Town requires funds and manpower to maintain roads.*
Hazardous Materials Response Team	Highway Super	Hazardous Material Spills	On-going training, education and acquisition of resources for emergency response	Good	*None*	*The town does not currently have a member on the START Hazardous Materials Emergency Response Team*
Stormwater Infrastructure Maintenance	Planning Board, Road Agent/Public Works	Inland flooding	Responsible for catch basins, culverts cleaning, ditch maintenance, structure upkeep and maintenance	Good	*The continues to address overdue maintenance to stormwater infrastructure*	*Town must devise an approach to work with private landowners not maintaining their stormwater infrastructure.*
Tree Maintenance	Police Chief/EMD, and Fire Department	High Winds, Ice/Winter Storms	Utility companies (Eversource) and the Town have tree maintenance programs to clear trees and limbs from power lines and roadways.	Good	*Many trees removed or trimmed which has contributed significantly to reducing power outages.*	*Many dead trees continue to exist in town, which requires collaboration with electric utility companies and homeowners.*
Floodplain Management	Police Chief/EMD, and Fire Department	Inland flooding	Local ordinance to regulate development in the floodplain, and other activities to reduce risk.	Good	*Ordinance updates since 2019 to strengthen regulation*	*No changes needed*
Master Plan	Planning Board	All	A guiding document used to manage Madbury's growth and development through local land use regulations.	Good	*Town updated the Housing & Demographic chapter.*	*Town anticipates updating the Land Use chapter in 2025. Town needs funds through CIP to update remaining chapters.*
Capital Improvements Program (CIP)	TA	All	A program that helps to address improvement projects over a period of time.	Good	*Updated every year to show 5-year projection.*	*No changes needed.*

CHAPTER 3: HAZARD IDENTIFICATION

The impact of expected, but unpredictable, natural, technological, and human-caused events can be reduced through emergency management and strategic planning. That planning must be grounded in the rational evaluation of the hazards and the risks they pose to prioritize actions designed to mitigate their effects. The first step in hazard mitigation is to identify the threats and hazards that have the potential to impact the Town of Madbury. The following threats are included, assessed, and reviewed in the 2024 Plan.

2025 Plan Update Hazard Identification

As a result of input from Hazard Mitigation Planning Team, SRPC, and HSEM, revisions were made including the consolidation and renaming of several hazards for consistency with the NH State Plan; a general re-organization of hazards into three categories (natural, technological, and human-caused); and the addition of four new hazard to make a total of 21 hazards. The following threats are included, assessed, and reviewed in the 2024 Plan.

Figure 3-1: Identified Hazards - 2019

Hazards	
Flooding (Riverine/Extreme Rain Event)	Earthquake & Landslides
Winter Storms	Public Health Threats
Severe Thunderstorms	Drought
Extreme Temperatures	Flooding (Dam Failure)
Hurricanes and Tropical Storms	Wildfire
Tornado/Microbursts	Hazardous Material Threat

Figure 3-2: Identified Hazards - 2025

Natural Hazards	Technological Hazards	Human-Caused Hazards
Inland Flooding	Dam Failure	Cyber Threats
Drought	Known & Emerging Contaminants	Mass Casualty
Earthquakes	Hazardous Material Spill	Terrorism/Violence
Extreme Temperatures	Long-term Utility Outage (1 week)	Transport Accident
High Wind Events	Radiological	
Infectious Disease		
Landslide		
Lightning		
Severe Winter Weather		
Solar Storms & Space Weather		
Tropical Storms & Hurricane		
Wildfire		

Revisions to Hazard Names and Categories in State HMP

The following is a summary of revisions made in the 2023 NH State HMP update that changed hazard names and a general re-organization of hazards into three categories (natural, technological, and human-caused); these ones affected the 2025 Madbury HMP update.

Figure 3-3: Summary of Hazard Revisions

2019 HMP	2025 HMP	Change
Flooding	Flooding	No change
Dam Failure	Dam Failure	Moved to Technological Hazards
Hurricanes & Tropical Storms	Tropical Storm and Hurricane	Changed name
Tornado & Downburst	High Wind Event	Changed name
Severe Winter Weather	Severe Winter Weather	No change
Wildfire	Wildfire	No change
Extreme Temperatures	Extreme Temperatures	No change
Drought	Drought	No change
Public Health Threats	Infectious Disease	Changed name
Hazardous Materials	Hazardous Materials	No change
Earthquake & Landslide	Earthquake	Split hazard name/category
	Landslide	Split hazard name/category
	Lightning	New hazard
	Solar Storms & Space Weather	New hazard
	Long-term Utility Outage	New hazard
	Cyber Threats	New hazard
	Mass Casualty	New hazard

Disaster Declarations in Strafford County

Strafford County, where Madbury is located, has experienced 21 total disaster declarations since 1990. These were the result of multiple hazard types, such as flooding, winter snowstorm, hurricane/tropical storm, ice, and a pandemic. Since the 2019 Plan, Strafford County received one disaster declaration for the Covid-19 Pandemic. Madbury has not received direct funds from FEMA as part of a recovery claim in the last ten years.

List of Major Disaster Declarations in Strafford County

Figure 3-4: Major Disaster Declarations - Strafford County - 1990 - 2024

Date Declared	Event	Incident Period	Source	Program	Amount (Statewide)	Remarks
9-Sep-91	Hurricane Bob	August 18-20, 1991	FEMA 917-DR	PA	$2,293,449	Severe storm and wind; no power, trees knocked down.
29-Oct-96	Severe Storms & Flooding	Oct 20-23, 1996	FEMA 1144-DR	PA	$2,341,273	Heavy rains. Severe storm, flooding.
15-Jan-98	Ice Storm	January 7-35, 1998	FEMA 1199-DR	PA/IA	$12,446,202	Major tree damage, electric power interrupted for a number of days. Schools were closed.
25-May-06	Severe Storm & Flooding	May 12-23, 2006	FEMA 1643-DR	PA/IA	$17,691,586	Severe storm causing massive flooding, road closures, dams breaching and evacuations
27-Apr-07	Severe Storm & Flooding	April 15-23, 2007	FEMA 1695-DR	PA/IA	$26,826,780	Severe storm causing flooding and Culvert and road washouts.
11-Aug-08	Severe Storms, Tornado, & Flooding	24-Jul-08	FEMA 1782-DR	PA	$3,673,097	No significant damage or major impacts.
2-Jan-09	Severe Winter Storm	December 11-23, 2008	FEMA 1812-DR	DFA/PA	$14,898,663	Winter storm, snow removal, power outages
29-Mar-10	Severe Winter Storm	February 23-March 3, 2010	FEMA 1892-DR	PA	$6,841,093	Loss of power. No major damage. Trees down.
3-Sep-11	Tropical Storm Irene	August 26 – Sept 6, 2011	FEMA 4026-DR	PA	$17,684,244	Rain, heavy at times. No major damage. No flooding. Few small trees down.

19-Mar-13	Severe Snow and Blizzard	February 9-11, 2013	FEMA 4105-DR	PA	$6,153,471	Known as blizzard "NEMO" brought heavy snow. No major damage. Loss of power in some locations in Town.
25-Mar-15	Severe Snow & Snowstorm	January 26-29, 2015	FEMA 4209-DR	PA	$4,939,214	Known as blizzard "JUNO" brought heavy snow. Emergency protective measures; snow removal assistance; and school closures.
7-Jun-18	*Severe Storms and Flooding*	*March 2-8, 2018*	*FEMA 4370-DR*	*ND*	*N/A*	*Disaster declared in Rockingham County only.*
7-Jun-18	Severe Snow & Snowstorm	March 13-14, 2018	FEMA 4371-DR	PA	$820,824.38	Emergency protective measures; snow removal assistance; and school closures.
13-Mar-20	COVID-19 Pandemic	Jan 20, 2020 - May 11, 2023	FEMA 4516-DR	PA	N/A	Global pandemic
Total major disaster declarations approximately =					$116,609,896	
Program Key: PA: Public Assistance, IA: Individual Assistance, DFA: Direct Federal Assistance, ND: No Designation						

List of Emergency Declarations in Strafford County

Figure 3-5: Emergency Declarations - Strafford County - 1990-2024

Date Declared	Event	Incident Period	Source	Program	Amount (Statewide)	Remarks
16-Mar-93	Heavy Snow	March 13-17, 1993	FEMA 3101-EM	PA	$832,396	Snow removal; high winds.
28-Mar-01	Snow Emergency	March 5-7, 2001	FEMA 3166-EM	PA	$3,433,252	Snow removal
11-Mar-03	Snow Emergency	February 17-18, 2003	FEMA 3177-EM	PA	$2,288,671	Snow removal
30-Mar-05	Snow Emergency	January 22-23, 2005	FEMA 3207-EM	PA	$3,611,491	Winter storm, snow removal
13-Dec-08	Severe Winter Storm	December 11-23, 2008	FEMA 3297-EM	DFA/PA	$900,000	Winter storm, snow removal

1-Nov-11	Severe Winter Storm	October 29-30, 2011	FEMA 3344-EM	PA	Data not available	Known as the "Halloween Snowstorm." Significant amount of large oak trees came down due to the leaves still on the trees; power outages ranging from 4 to 5 days
30-Oct-12	Hurricane (Sandy)	October 26-31, 2012	FEMA 3360-EM	PA	$643,660	Minor impacts, including periods of heavy rain and short-term power outages.
3-Apr-20	COVID-19 Pandemic	Jan 20, 2020 - May 11, 2023	FEMA 3445-EM	N/A	N/A	Global pandemic
Total emergency declarations approximately =					$11,709,470	
Program Key: PA: Public Assistance, DFA: Direct Federal Assistance						

Declaration Types

There are two types of disaster declarations provided for in the Stafford Act: Emergency Declarations and Major Disaster Declarations. Both declaration types authorize the President to provide supplemental federal disaster assistance. However, the event related to the disaster declaration and type and amount of assistance differ.

Emergency Declarations:

An Emergency Declaration can be declared for any occasion or instance when the President determines federal assistance is needed. *Emergency Declarations supplement State and local efforts* in providing emergency services, such as the protection of lives, property, public health, and safety, or to lessen or avert the threat of a catastrophe in any part of the United States. The total amount of assistance provided for a single emergency may not exceed $5 million. If this amount is exceeded, the President shall report to Congress.

Major Declaration:

The President can declare a Major Disaster Declaration for any natural event, including any hurricane, tornado, storm, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or drought, or, regardless of cause, fire, flood, or explosion, that the President believes has caused damage of such severity that it is *beyond the combined capabilities of state and local governments to respond*. A major disaster declaration provides a wide range of federal assistance programs for individuals and public infrastructure, including funds for both emergency and permanent work.

CHAPTER 4: RISK ASSESSMENT

The HMPT met to discuss the risk assessment and assign rating scores. Consideration was given to climate change, current capabilities, municipal assets, and critical infrastructure and their locations, population data, and previous/historical occurrences when determining the scale of impacts and overall risk (probability of occurrence).

Method for Rating Impacts, Probability of Occurrence, and Overall Risk

Impact Scoring

Impact scoring is an estimate generally based on a hazard's effects on humans, property, and businesses. The HMPT came together and 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 scores were broken into the following categories:

- 1-2 = Inconvenience to the population, reduced service/productivity of businesses, minor damages to property, and non-life-threatening injuries to people.
- 3-4 = Moderate to major damages to property, temporary closure and reduce service and/or productivity of businesses, and numerous injuries and deaths.
- 5-6 = Devastation to property, significant injuries and deaths, permanent closure and/or relocation of services and businesses, and long-term effects on the population.

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 guidance from the 2023 State Plan. The HMPT came together and determined the probability of occurrence rating for each of the previously identified hazards. The probability of occurrence ratings was broken into the following categories:

- 1 = 0%-33% Probability of the hazard occurring within 10 years (Low)
- 2 = 34%-66% Probability of the hazard occurring within 10 years (Medium)
- 3 = 67%-100% Probability of the hazard 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 the 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 threats. This will allow the HMPT 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:

- Low: The hazard poses a low risk in Madbury. Scores between 0.0-1.0
- Medium: The hazard poses a medium risk in Madbury. Scores between 1.1-2.4
- High: The hazard poses a high risk in Madbury. Scores between 2.5+.

Summary of Risk Scores for All Hazards

The HMPT, during a brainstorming session, used the method outlined above to determine the overall risk associated with hazards in Madbury. Results are distributed below. The Town's risk assessment tool provides a more comprehensive illustration of each hazard and their risk scores.

*6 hazards rated as having a **High** overall risk in* Madbury*:*

- *High Wind Events*
- *Severe Winter Weather*
- *Extreme Temperatures*
- *Inland Flooding*
- *Tropical Storms & Hurricanes*
- *Infectious Diseases*

*6 hazards rated as having a **Moderate** overall risk in* Madbury*:*

- *Drought*
- *Dam Failure*
- *Cyber Threats*
- *Wildfire*
- *Terrorism/Violence*
- *Mass Casualty Incident*

*9 hazards rated as having a **Low** overall risk in* Madbury*:*

- *Earthquakes*
- *Landslides*
- *Lightning*
- *Solar Storms & Space Weather*
- *Known and Emerging Contaminates*
- *Hazardous Materials*

Figure 4-1: Risk Assessment / Hazard Vulnerability Assessment Tool							
Hazard	Category	Human Impact	Property Impact	Economic/ Business Impact	Average Impact Score	Probability of Occurrence	Overall Risk
High Wind Events	Natural	3	3	2	2.67	2	5.33
Severe Winter Weather	Natural	3	3	2	2.67	2	5.33
Inland Flooding	Natural	2	2	2	2.00	2	4.00
Extreme Temperatures	Natural	1	2	2	1.67	2	3.33
Tropical Storms & Hurricane	Natural	3	3	3	3.00	1	3.00
Infectious Disease	Natural	4	1	3	2.67	1	2.67
Drought	Natural	1	1	1	1.00	2	2.00
Dam Failure	Tech	1	2	3	2.00	1	2.00
Cyber Threats	Human	1	1	2	1.33	1	1.33
Wildfire	Natural	1	3	1	1.67	1	1.67
Terrorism/Violence	Human	2	1	1	1.33	1	1.33
Mass Casualty Incident	Human	2	1	1	1.33	1	1.33
Earthquakes	Natural	1	1	1	1.00	1	1.00
Landslide	Natural	1	1	1	1.00	1	1.00
Lightning	Natural	1	1	1	1.00	1	1.00
Solar Storms & Space Weather	Natural	1	1	1	1.00	1	1.00
Known & Emerging Contaminants	Tech	1	1	1	1.00	1	1.00
Hazardous Material Spill	Tech	1	1	1	1.00	1	1.00
Long-term Utility Outage (1 week)	Tech	1	1	1	1.00	1	1.00
Radiological	Tech	1	1	1	1.00	1	1.00
Transport Accident	Human	1	1	1	1.00	1	1.00

Asset Inventory and Vulnerability

The following community assets include all public and private facilities that the HMPT considers essential for the delivery of vital services for the protection of the community, such as emergency operations centers, shelters, or utilities. All critical facilities and key resources are included in a series of maps in Appendix E.

Assets are organized into five categories:

1) Emergency Response Facilities are primary facilities and resources that may be needed during an emergency response
2) Non-Emergency Response Facilities are facilities considered essential, that although critical, not necessary for immediate emergency response effort.
3) Facilities and Populations to Protect can be defined broadly to include those who are not able to access and use the standard resources offered in disaster preparedness and planning, response, and recovery
4) Critical Infrastructure** are important structures that may be vulnerable during a hazardous event.
5) Water Resources are water sources that may be used during emergencies.

**Dams and bridges are part of the Critical Infrastructure.

Bridges are part of the transportation system that moves goods and services, many of which may be vulnerable to flooding and other disruptions. According to the 2023 State Plan, the average lifespan for a bridge is approximately fifty years, and the current average age of state-owned bridges in New Hampshire is 52-56 years. Dams may be vulnerable to flooding and other disruptions. The Town Public Works department visits dams prior to heavy storm events to be aware of potential problems during and after the event and requests that private owners do the same.

Figure 4-2: Emergency Response Facilities (ERF)

ERF's are primary facilities and resources that may be needed during an emergency response.

Facility	Type	Address
Town Hall (Municipal Office)	Administrative Office & Communication	13 Town Hall Road
Fire & Rescue Station	Emergency Operations Center	334 Knox Marsh Road
Police Station	Emergency Operations Center	334 Knox Marsh Road
*UNH Maintenance Shed	Emergency Fuel	Route 155A (Durham)
NHDOT Shed	Emergency Fuel	Old Hedding Road (Epping)
Oyster River High School	Primary Regional Shelter	55 Coe Drive (Durham)
Moharimet Elementary School	Backup Shelter	11 Lee Road
Helipad Location(s)	Emergency Medical Evacuation	33 Mill Hill Road
		Tibbett's Field
		Route 4 Weigh Station (Durham)

*There is no generator at this station.

Figure 4-3: Non-Emergency Response Facilities (NERF)		
NERF's are facilities considered essential, that although critical, not necessary for the immediate emergency response effort.		
Facility	**Type**	**Address**
Water Treatment Plant	Water Plant	60 Freshet Road
Pump House for Bellamy Reservoir	Pump House	Mill Hill Road
Pudding Hill Transfer Station	Transfer Station	Pudding Hill Road
Madbury Sand and Gravel (PIKE)	Potential Resource	174 Littleworth Road

Figure 4-4: Critical Infrastructure (CI)		
Facility	**Type**	**Address**
Amtrak Downeaster	Transportation	Transportation Center (Dover/Durham)
Cell Tower	Communication Function	Jenkins Road
		Beech Hill Road
Distribution Substation	Power Substation	Miles Lane
Transmission Lines	Power Utility	Route 125 to Route 108 (East/West)
Critical Infrastructure - important structures that may be vulnerable during a hazardous event.		
Gangwer Wildlife Pond Dam*	Low Hazard	Beards Brook
Bellamy Reservoir Dam**	High Hazard	Bellamy River
* Low Hazard Dam - low hazard potential due to its location and size, such that failure or misoperation would result in no possible loss of life and low economic loss to structures/property. **High Hazard Dam - high hazard potential due to its location and size such that failure or misoperation would result in probable loss of human life. Dams have been identified by the NHDES, Water Division		
Bridge #056/072	Transportation (Town Owned)	Nute Road over Bellamy River
Bridge #071/100	Transportation (State)	NH9 over Mallego Brook
Bridge #088/084	Transportation (State)	Mill Hill Road over Bellamy River
Bridge #115/085	Transportation (State)	NH155 over PAR
Bridge #120/096	Transportation (State)	NH155 over Bellamy River
Bridge #160/086	Transportation (Town Owned)	Freshet Road over Johnson Creek
Bridges have been identified by the NHDOT Bridge Design Bureau		

Figure 4-5: Vulnerable Populations to Protect (VPP)		
VPP's are not able to access the resources offered in disaster preparedness and planning, response, and recovery.		
Facility	**Type**	**Address**
Moharimet Elementary School	School	11 Lee Road
Little Tree Education	School (Children)	314 Durham Road
Growing Places/Our Time	After School Program	11 Lee Road
Manufactured Home Park	Manufactured Housing Park	Bunker Lane/Jenkins Road
Madbury Woods Apartments	Rental Housing	10 Lee Road
Old Stage Campground	Campground	46 Old Stage Road
Carriage Hill Assisted Living	Assisted Living	306 Knox Marsh Road

Figure 4-6: Water Resources (WR)		
WR's are potential sources to use during emergencies.		
Facility	**Type**	**Location**
Dry Hydrants	Auxiliary Fire Aid	Moharimet Drive
		Perkins Road
		Raynes Farm Road
Gravity Main Hydrants	Auxiliary Fire Aid	Kelley Road
		Evans Road
Pressured Hydrant	Auxiliary Fire Aid	Freshet Road
		Mast Road
Cisterns	Auxiliary Fire Aid	Moharimet Elementary School (30K)
		Long Hill Circle (30K)
		Hoyt Pond Road (15K)
		Champernowne (15K)
Drinking Water Wells	Wells	Freshet Road (Portsmouth)
		Pudding Hill Road (Dover – not online)
		Barbadoes Pond (Dover)

CHAPTER 5: HAZARD PROFILES AND HISTORY OF EVENTS

This section contains a compilation of information related to the hazards identified in this Plan, including the definition of the hazard, location, the extent of the hazard, impacts and past occurrences, summation of future risk, and the highest probable extent of the hazard. This assessment includes low, medium, and high risk natural hazards, however, it only includes the medium and high risk technological and human-caused hazards. The committee felt that the low technological and human-caused hazards were too small or non-existent to include in the rest of the plan.

The Hazard Mitigation Planning Team discussed past and potential hazards during a public meeting and also extracted data from the 2023 State Plan and other state and federal databases. Past and potential hazards were mapped where spatial data was available.

Natural Hazards

Inland Flooding

Risk Assessment: High
Average Impact: Medium
Future Probability: Medium

Definition:
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 throughout the State, 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 riverbank 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.

Location:
The risk from inland flooding is Town-wide, especially near rivers, streams, and brooks within special flood hazard areas and other localized areas identified by the Hazard Mitigation Planning Team.

Riverine flooding is the most common natural disaster to impact New Hampshire and are most likely to occur in the spring due to the increase in rainfall and the melting of snow; however, floods can occur at any time of the year because of heavy rains, hurricane, or a Nor'easter.

New Hampshire's climate ranges from moderate coastal to severe continental, with annual precipitation ranging from about 35 inches in the Connecticut and Merrimack River valleys, to about 90 inches on top of Mount Washington. Localized street flooding occasionally results from severe thundershowers, or over larger areas, from more general rain such as tropical cyclones and coastal "nor'easters." More general and disastrous

floods are rare, but some occur in the spring from large rainfall quantities combined with warm, humid winds that rapidly release water from the snowpack.

Causes of flooding that could potentially affect Madbury include:

- 100-year rainstorm
- hurricane or tropical storm that can bring torrential rainfall (>500-year storm)
- rapid snowpack melt given the northern, relatively cold location and climate
- river ice jams
- erosion and mudslide in steep slope areas or riverbanks resulting from heavy rainfall that can alter topology
- structural failure of a dam or water tank

Figure 5-1: 100-Year Flood

The "100-year flood" Term:

The "100-year flood" is a term often used to describe a flood that has a 1% chance of occurring in any year. But the phrase is misleading, and often causes people to believe these floods happen every 100 years on average. The truth is, these floods can happen quite close together, or not for long stretches of time, but the risk of such a flood remains constant from year to year. The 100-year-flood term was originated to delineate areas on a map to determine what properties are subject to the National Flood Insurance Program. Properties within the 100-year-floodplain, as defined by the Federal Emergency Management Agency, have special requirements and mortgage holders will require owners to carry flood insurance on these properties.

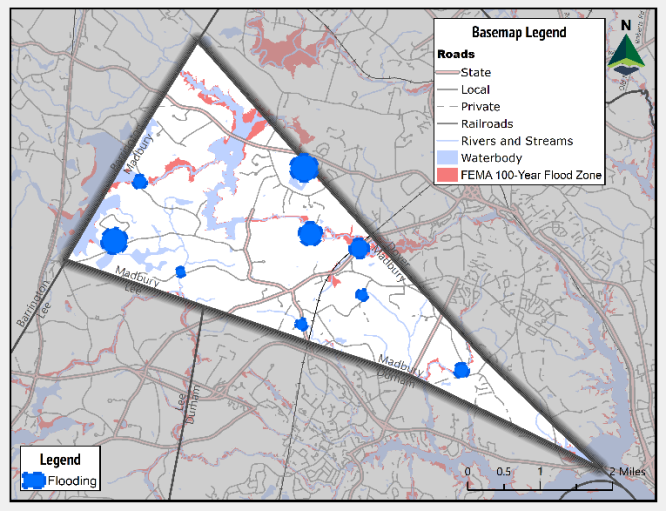
[Source: The Nurture Nature Center: Focus on Floods]

Extent:

Flooding can occur in any area of the Town but is more likely to occur within the 100-year floodplain (see Figure 5-2), downstream of dams, along river and stream banks, near wetlands and road crossings, and other low-lying areas. Madbury has approximately 4.5% (349 acres) of its land in 100-yr. floodplain (A and V Zones).

Limited extent. Madbury has few structures within the floodplain. However, structures that a 100-year storm could impact could also be affected by smaller, more frequent flooding. Although flooding of the full extent of this floodplain by definition would require a 100-year storm, smaller storms with a higher annual probability of occurrence could still flood significant portions of that floodplain. It is likely that the 100-year floodplain will expand in area when flood maps are updated due to better mapping technology and current precipitation data.

Figure 5-2: Recent Inland Flooding – Town of Madbury



Previous Hazard Events:
Although the storm could not be classified, a 1936 event was described at the time as causing "the greatest damage in New Hampshire's history" (Fahey 1936). Two other consequential flooding events took place in 2006 and 2007, both of which were considered 100-year events. To address prior flooding issues, the Town replaced a culvert at Cherry Lane in 2015.

Since the 2019 Plan, localized flooding has occurred at Evans Road due to beaver dams, and minor flooding has been observed at Hayes Road, near Moharimet Road and Nute Road, at the Bellamy River crossing. To mitigate future events, the Town replaced a stream crossing at Hayes Road over Dube Brook with an NH DES-approved structure and replaced the Nute Rd bridge over Bellamy River in 2021; the Town has the design, permits, and funding to replace the Freshet Road bridge/culvert in 2025 or 2026.

Probability of Future Events:
With the increase in storm intensity and frequency likely due to climate change, there are concerns that the areas mentioned already will be challenged even more, making Madbury more vulnerable to flooding. The Town will continue to monitor these areas and make stormwater management improvements when possible as funding becomes available.

Drought

Risk Assessment: Medium
Average Impact: Low
Future Probability: Medium

Definition:
A drought is defined as a long period of abnormally low precipitation, especially one that adversely affects growing or living conditions. The impacts of droughts are indicated through measurements of soil moisture, groundwater levels, and stream flow. The effect of drought on these indicators is variable during any event. For example, frequent minor rainstorms can replenish the soil moisture without raising groundwater levels or increasing streamflow. Low streamflow also correlates with low ground-water levels because ground water discharge to streams and rivers maintains streamflow during extended dry periods. Low streamflow and low ground-water levels commonly cause diminished water supply.

Location:
The risk from drought is Town-wide. The State has been divided up into five drought management areas to monitor for and respond to drought conditions effectively.

Extent:
Very limited extent, seasonal drought can occur throughout the region. During an extended period, in 2016 and 2020 for example, the Town experienced drought that dried up shallow wells. State and Town can request voluntary limits to water consumption, particularly for lawn irrigation systems.

The National Drought Monitor classifies the duration and severity of the drought using precipitation, stream flow, and soil moisture data coupled with information provided on a weekly basis from local officials. There are

five magnitudes of drought outlined in the New Hampshire State Drought Management Plan: Exceptional, Extreme, Severe, Moderate, and Abnormally Dry.

Drought is a regional hazard and can impact the entire jurisdiction. Agricultural land and residents who use dug shallower wells may be more vulnerable to the effects of drought.

Figure 5-3: National Drought Monitor

Category	Description	Possible Impacts
D0	Abnormally Dry	Going into drought: • short-term dryness slowing planting, growth of crops or pastures Coming out of drought: • some lingering water deficits • pastures or crops not fully recovered
D1	Moderate Drought	• Some damage to crops, pastures • Streams, reservoirs, or wells low, some water shortages developing or imminent • Voluntary water-use restrictions requested
D2	Severe Drought	• Crop or pasture losses likely • Water shortages common • Water restrictions imposed
D3	Extreme Drought	• Major crop/pasture losses • Widespread water shortages or restrictions
D4	Exceptional Drought	• Exceptional and widespread crop/pasture losses • Shortages of water in reservoirs, streams, and wells creating water emergencies

Previous Hazard Events:
Madbury experienced extended periods of drought in 2016 and, to a lesser extent, in 2020. Several homes with shallow wells had limited or no supply due to lack of recharge. As climate change worsens, the Town and State will likely experience increased drought conditions and more frequent drought conditions.

Normal precipitation for the state averages 40 inches per year. As a result, extended droughts are not as common as they are in other parts of the country; however, periods of drought have occurred historically in New Hampshire. Seven droughts of significant extent and duration were evident over the course of the last century as noted in the table below.

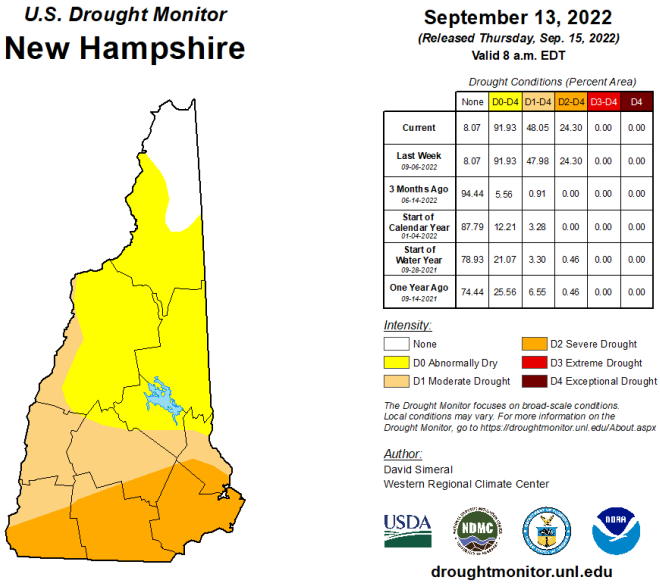
Figure 5-4: Period of Drought in NH				
Date	Description	Impacts	Location	Additional Information
1929-1936	Regional Drought	No specific impacts available	Statewide	10 to > 25yr recurrence interval
1939-1944	Regional Drought	No specific impacts available	Statewide	10 to >25yr recurrence interval, severe in southeast and moderate elsewhere.
1947-1950	Moderate Drought	No specific impacts available	Statewide	10-25yr recurrence interval
1960-1969	Severe Regional Drought	High Pollen Count, High Fire Danger, and high prices for produce, wells dried up, rivers, ponds and reservoirs became mud holes. Foggy mornings disappeared. Water Emergencies and Restrictions. Wild birds had trouble getting fish.	Statewide	>25yr recurrence interval. Regional longest recorded continuous spell of less than normal precipitation. President Johnson ordered a study to find out what could be done to help New England.
1999	Drought	Water systems and private wells were adversely impacted by the drought. Impacts to agricultural crops also occurred.	Statewide	Water systems in Salem and Hampton/North Hampton were in danger of running out of water.
2001-2002	Severe Drought	Numerous forest fires. Water systems and private wells were adversely impacted by the drought. Impacts to agricultural crops also occurred.	Statewide	Water systems in Salem and Seabrook were in danger of running out of water. Hundreds of private wells failed.
2016-2017	Extreme Drought	Water systems and private wells were adversely impacted by the drought. Impacts to agricultural crops also occurred. Hundreds of private wells failed.	Statewide	Areas of the state between D1-D3. 19 of the State's 120 dairy farms closed. The State had lost 10 farms over the previous four years combined. This was the first time that an Extreme drought had been declared for New Hampshire since the National Drought Monitor became operational in 2000. Conditions in 2016 were like that of droughts observed in 1995, 1978, and 1964.
2020	Extreme Drought	164 community water systems, eight municipalities, and some private well users in New Hampshire had restrictions in place. Since the start of dry conditions this spring, New Hampshire officials estimated at least 1,000 wells have gone dry.	Statewide	The severe drought lasted 2 months for the entirety of October and November of 2020. The hay crop had been reduced by up to 75 percent in New Hampshire

In more recent years, drought has again become a problem in New Hampshire with three significant droughts within the last 20 years. In 1999, a drought warning was issued by the Governor's Office. In March 2002, all counties in New Hampshire except for Coos County were declared in Drought Emergency. This was the first time that low-water conditions had progressed beyond the Level Two, Drought Warning Stage.

During the summer of 2015, most of central and southern New Hampshire experienced a severe drought. Drought conditions continued and intensified into 2016 in New Hampshire and in Southeast New Hampshire in particular. At its peak in October 2016, nearly 20% of the state was categorized as being in extreme drought. One hundred and sixty community water systems reported implementing a water restriction or ban, and 13 towns reported implementing voluntary or mandatory outdoor use bans in the state during the peak drought conditions. Conditions in New Hampshire largely returned to normal in the first half of 2017, with just over 2% of the state still experiencing abnormally dry conditions. This area covers the southern part of Strafford County,

including the Town of Madbury, illustrating the extent to which local drought conditions can vary both geographically and over time.

At the time of this update, there are no droughts in the Strafford County area or in the southern part of the State. However, in 2020, Strafford County experienced its most significant drought in over 20 years with nearly the entire county under an Extreme Drought for two consecutive months. (See adjacent **Figure 5-5: NH Drought Monitor**).



Probability of Future Events:
Advances in dynamic modeling and the use of hybrid methods have improved drought prediction, but challenges remain to improve the accuracy of drought forecasting.

Historically, droughts in New Hampshire have had limited effect because of the plentiful water resources and sparse population. Since 1960, the population has more than doubled, which has increased demand for the State's water resources. Further droughts may have considerable effect on the State's densely populated areas along the seacoast and in the south-central area.

Currently, drought possibility seems moderate; however, with extreme variation in environmental conditions due to climate change, drought probability may grow in the future, making Madbury more vulnerable to the impact of droughts. The large amount of water resources and relatively sparse population in New Hampshire have tended to minimize the impacts of drought events in the region, but this regional protection may be endangered in the future with increases in drought frequency or severity.

Earthquake

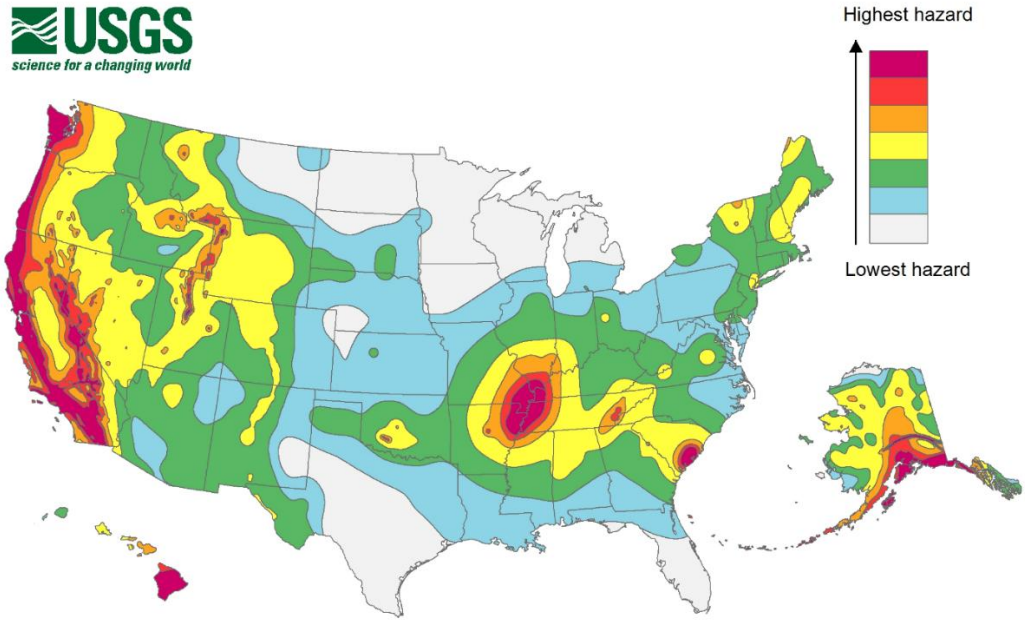
Risk Assessment: Low
Average Impact: Low
Future Probability: Low

Definition:
The USGS defines an earthquake as a term used to describe both sudden slip on a fault, and the resulting ground shaking and radiated seismic energy caused by the slip, or by volcanic or magmatic activity, or other sudden stress changes in the earth. Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric and phone lines, and often cause landslides, flash floods, fires, avalanches, and tsunamis. Larger earthquakes usually begin with slight tremors but rapidly take the form of one or more violent shocks and are followed by vibrations of gradually diminishing force called aftershocks. Earthquakes in the Northeast are not associated with specific known faults.

Due to the geology of the region, the area impacted by an earthquake in the Northeast can be up to 40 times greater than the same magnitude event occurring on the West coast. Earthquakes can occur at any time without warning.

Location:
The risk from earthquakes is Town-wide. There is no typical season for earthquakes, they can occur at any time. Due to the state's location in an area of moderate seismic activity, earthquakes below 4.0 occur but do not cause damage; often the epicenter occurs in the Atlantic Ocean. Significantly damaging earthquakes are rare.

Figure 5-6: Earthquake Risk Areas

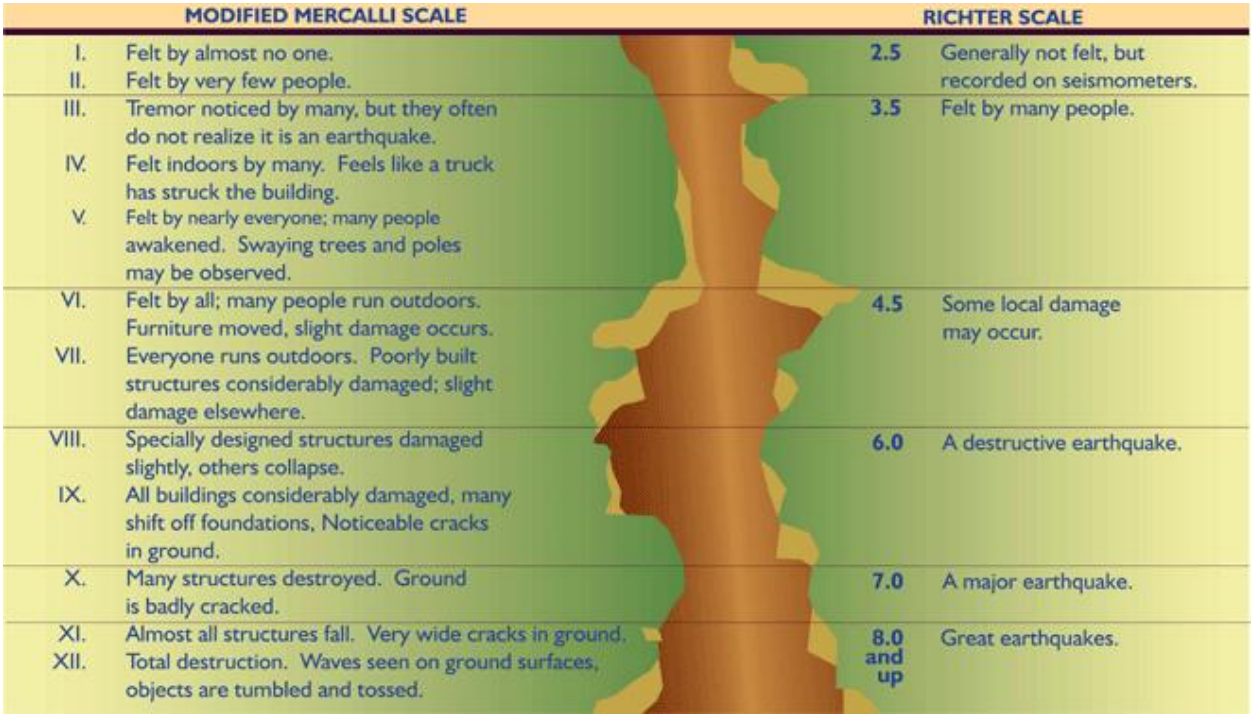


Extent:
Limited extent, but an earthquake can impact all areas of Town. People at greatest risk are those who live in unreinforced masonry buildings built on filled land or unstable soil, both of which are rare in New England. During the last five-year update period, there have been no impacts from earthquakes in Madbury, and only six (6) registered in New Hampshire as 4.0 or higher since 1925, the most recent being 1982.

The magnitude and intensity of an earthquake is measured by the Richter scale and the Modified Mercalli Intensity (MMI) scale, respectively. The Richter magnitude scale was developed in 1935 by Charles F. Richter of the California Institute of Technology as a mathematical device to compare the size of earthquakes. The magnitude of an earthquake is determined from the logarithm of the amplitude of waves recorded by seismographs. Adjustments are included for the variation in the distance between the various seismographs and the epicenter of the earthquakes.

The Modified Mercalli Intensity (MMI) scale was developed in 1931 by the American seismologists Harry Wood and Frank Neumann. This scale, composed of 12 increasing levels of intensity that range from imperceptible shaking to catastrophic destruction, is designated by Roman numerals. It does not have a mathematical basis; instead, it is an arbitrary ranking based on observed effects experienced at a given place and therefore has a more meaningful measure of severity.

Figure 5-7: Earthquake Scales- Modified Mercalli and Richter



Previous Hazard Events:

According to maps produced by the USGS, there have been 211 earthquakes (at the time of this update) felt in NH since 1925. Of those 211, only six (6) registered a 4.0 magnitude or above on the Richter Scale. During the last five-year update period, there have been no impacts from earthquakes in Madbury.

Figure 5-8: Notable Earthquakes in NH - 1925-2022 (Magnitude 4.0 or Greater)

Location	Date	Magnitude (Richter Scale)
5km North Northeast of Tamworth, NH	December 24, 1940	5.6
8km West of Tamworth, NH	December 20, 1940	5.3
29km South of Lac-Megantic, Canada	June 15, 1973	4.8
5km West of Hollis Center, Maine	October 16, 2012	4.7
1km of Sanbornton, NH	January 19, 1982	4.5
2km Northeast of Ossipee, NH	October 9, 1925	4.0

Probability of Future Events:

Earthquakes are on average an annual occurrence, but significant quakes have an annual probability of occurrence (based on the 1925-2022 period) of about 6.2%.

Extreme Temperatures

Risk Assessment: High
Average Impact: Medium
Future Probability: Medium

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

Extreme Heat events occur because of above normal temperatures, which often coincide with high relative humidity, that increase the likelihood of heat disorders with prolonged exposure or strenuous activity. This risk comes from the heat and humidity preventing the human body from adequately cooling itself using natural methods; this can result in heat disorders and, if untreated, unconsciousness and eventually death. Heat related disorders include heat cramps, heat exhaustion, and heat stroke. Populations at risk, such as the young and elderly, are more likely to experience a heat related disorder during a heat event. Humidity exacerbates how the human body experiences heat when hazy, damp air is trapped near the ground. Certain relative humidity percentages can render the body's natural ability to cool itself by sweating ineffective. These meteorological conditions can lead to heat stroke, which is an immediate medical emergency. Extreme heat can also damage or kill crops and animals (wild, farm, or domesticated), potentially presenting a risk to the economy.

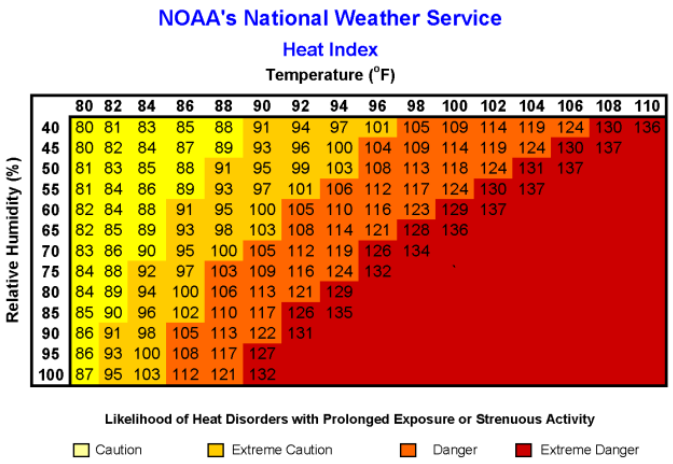
Extreme Cold events occur during meteorological cold waves, also known as cold snaps, that are caused by the southern transport of arctic airmasses into the Northeast. These events are most common in winter months and increase the likelihood of cold disorders in humans and animals that have prolonged exposure to low ambient temperatures. This effect is exacerbated when there are winds present that effectively lower the temperature that is perceived by the human body, known as the wind chill. The risk comes from when the body is losing heat faster than it can produce it. Wind acts to carry heat away from the body, therefore amplifying the perceived temperature by the human body and reducing the body's core temperature. Cold disorders can include frostbite and hypothermia. Frostbite occurs when uncovered skin/extremities are exposed to extreme cold and the body tissue is either injured or killed. Hypothermia is when the body is unable to heat itself at the rate it is being cooled and the body's core temperature begins to drop below normal values. A normal core body temperature is 98.6ºF: mild hypothermia occurs when core body temperature drops between 90-95ºF, and severe hypothermia occurs at core body temperatures of below 90°F. If left untreated, hypothermia can result in unconsciousness and eventually death. Extreme cold can also damage or kill crops and animals (wild, farm, or domesticated), potentially presenting a risk to the economy.

Location:
The risk from extreme temperatures is Town-wide. The hazard is very season dependent: summer months present the greatest hazard for extreme heat events, while winter months present the greatest threat of extreme cold.

Extent:

Moderate extent, seasonal high temperatures becoming more frequent as the climate changes. To mitigate, more homes add cooling mechanisms, "mini-splits" for example. The Town continues to look at opportunities to upgrade the HVAC system in Town Hall as an additional cooling location. Extreme temperatures in Madbury likely to have more impacts on the unhoused or low income residents.

Since temperatures, humidity, and wind are all based upon existing scientific scales (Fahrenheit, Relative Humidity % [comparison of ambient temperature and dew point], and miles per hour [or knots], respectively), the data is already comparative to each other. Severity/magnitude of these events relates to how extreme the temperature is, how long it is expected to remain at an extreme, and any exacerbating factors (such as humidity or wind). (See adjacent **Figure 5-9: Heat Index**).

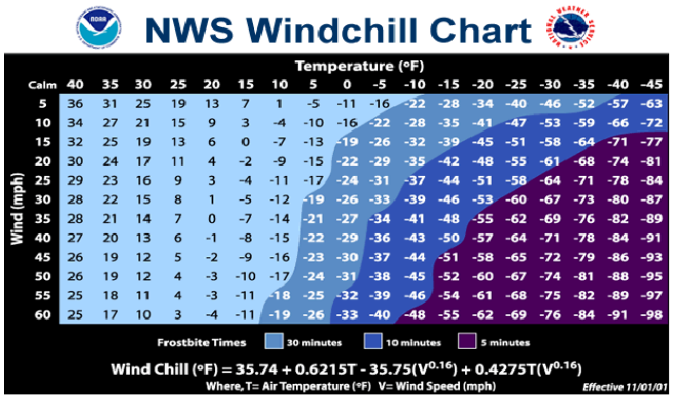


Extreme Heat

Extreme heat events can be described as periods with high temperatures of 90°F or above. The graph to the right displays the likelihood of heat disorders with prolonged exposure or strenuous activity.

Extreme Cold

What constitutes extreme cold varies by region. Characteristics of an extreme cold event in northern states include temperatures at or below zero for an extended period. According to the National Weather Service (NWS), extreme cold is a daily concern during the winter months for northern states. The NWS Windchill Temperature index calculates the dangers from winter winds and freezing temperatures. (See adjacent **Figure 5-10: Windchill Chart**).



Previous Hazard Events:

Extreme Heat

Since the last plan update, there have been several significant heat waves. The Hazard Mitigation Committee did not recall any heat-related losses. The elementary school is considered a location that can serve as a heating or cooling center for residents.

Extreme Cold

Since the last plan update, the Town has experienced challenges with roadways impacted from freeze thaw cycles. This is a result of warmer temperatures in the winter. During extreme cold events, older infrastructure is more apt to fail, such as water main breaks and necessary replacement schedules are needed. The Hazard Mitigation Committee did not recall any cold-related losses.

Probability of Future Events:
According to the New Hampshire Climate Assessment (June 2022), the warmest daily temperatures are expected to increase throughout this century along with an increase in the frequency of hot temperature extremes. By the end of the century, the increase in days above 90ºF projected for the higher concentration pathway (50-60 days) is twice as high as the projected increases for the lower concentration pathway (20-30 days). If this continues as predicted, it will increase Madbury's vulnerability to the impacts of extreme temperatures.

As winters warmed, the length of the cold season decreased with fewer days with snow on the ground and fewer cold temperature extremes, especially after 1970. Between 1907-1960, there were an average of 154 days per year under 32ºF. More recently, between 1991-2020, Madbury experienced a decrease of about ten days a year, with an average of 144 days per year under 32ºF. As such, the severity of cold extremes will likely decrease, along with snowfall and snow cover. Locally, there have been no records of extreme heat-related losses.

High Wind Events

Risk Assessment: High
Average Impact: High
Future Probability: Medium

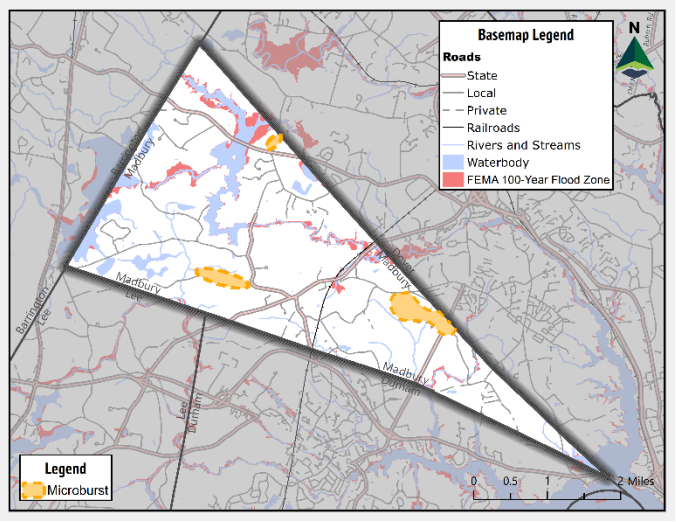
Definition:
For the purposes of this plan, there are two types of high wind events that may result from other severe storms and may occur at any time of the year:

- **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

Location:

The risk from high wind events is Town-wide.

Figure 5-11: Microburst Events in Madbury



Extent:

Moderate extent, power outages impact the Town more than other high wind event damages. The HMPT states that the utility company has stepped up tree maintenance near power lines and transformers over the last five years to mitigate the impacts. Most power outages last less than seven days and usually only impact a portion of the community. The HMPT ranked high wind events highest in the STAPLEE exercise due to anticipated future events and impact.

Tornadoes are measured based on the 3-second gust wind speed of the rotational winds. The Enhanced Fujita Scale is the standard scale for rating the severity of a tornado as measured by the damage it causes. The scale measures wind speeds of 65 to greater than 200 miles per hour. The damage path of a tornado can be more than one mile wide and 50 miles long, whereas a downburst is typically less than 2.5 miles. Downbursts can have wind speeds of 150 miles per hour.

Downbursts are primarily based on their size, but consideration is also given to duration and wind speed.

Figure 5-12: Downbursts

	Microbursts	Macrobursts
Size	Less than 2.5 miles	Greater than 2.5 miles
Duration	5-15 minutes	5-30 minutes
Wind speed (3 second gust – mph)	Up to 168 mph	Winds causing widespread damage, possibly as high as 135 mph

Previous Hazard Events:

The HMPT states a microburst event hit Madbury in June 2024. Power outages and downed trees created impacts and damages. Large tree debris totaled cars in the community. In June 2018, there was a severe storm event that hit part of southeastern New Hampshire. Tornado warnings were issued in Durham and Lee. A partial funnel cloud appeared in Durham, but never touched down. It was a localized event and Madbury experienced only rain and a few wind gusts.

Tornadoes are rare in New Hampshire. The NCDC Storm Events database (NCDC 2022) lists only 7 tornadoes that have impacted Strafford County since 1950. One was an EF-0 event (65-85 mph); one was an EF1 event (73-112 mph); and five were EF2 events (111-135 mph). Over the course of the past seven decades, there have not been any fatalities, 0 injuries, but approximately $2.9 million in property damages associated with tornados. Most property damage was sustained during an event that took place in 1981. The most recent

touchdown was in 2008, in which an F2 tornado and high winds created a path of destruction through five New Hampshire counties that destroyed homes, displaced families, downed trees, and forest lands and closed major state roadways. The impact to residents was extensive, with over 100 homes rendered uninhabitable. Phone and electric service was cut off to over 12,500 customers. One fatality (not in Strafford County) is attributed to a building collapse, and local hospitals reported numerous physical injuries associated with this severe storm. Since the last plan update, there have been no direct impacts from tornados in Madbury.

Downburst activity is very prevalent throughout the State, although most of the downburst activity is mostly unrecognized unless a large amount of damage has occurred. During the summer months, when several weather systems can merge creating 40-50 mph gusts, resulting storms can cause downed trees and electric wires. The increase and intensity of high wind events is likely caused by climate change and could increase the towns risk and vulnerability of this hazard in Madbury.

Probability of Future Events:
Between 1991 and 2010, the average annual number of tornadoes in New Hampshire was one. The average annual probability of recurrence of a tornado impacting Madbury is less than 10%. The probability may be slightly higher if local reports of tornadoes were considered; however, this 10% probability is for all of Strafford County – not just Madbury. The NCDC identified two tornadoes that touched down relatively close (Strafford and New Durham) to Madbury, which would suggest the average annual probably of recurrence to be less than 3%. While tornados are not common, one would likely cause significant impact. The probability of occurrence of a downburst is likely much higher. A tornado or downburst can impact the entire town but may cause greater damage to areas with higher densities.

Infectious Diseases

Risk Assessment: High
Average Impact: High
Future Probability: Low

Definition:
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 life-threatening infections may require hospitalization.

According to the United States Centers for Disease Control and Prevention (CDC), the number of people with a disease that is usually present in a community is referred to as the baseline or endemic level of the disease. This number of infections is not necessarily the desired level, which may in fact be zero, but rather is the typical or normal number of people infected. In the absence of intervention and if the number of infections is not high enough to deplete the pool of susceptible persons, the disease may continue to occur at this level indefinitely. Thus, the baseline level is often regarded as the expected level of the disease. While some diseases are so rare

in each population that a single case warrants an epidemiologic investigation (e.g., rabies, plague, polio), there are other diseases that occur more commonly so that only deviations from the norm (i.e. seeing more cases than expected) warrants investigation.

Epidemics occur when an agent (the organism) and susceptible hosts are present in adequate numbers, and the agent can be effectively conveyed from a source to the susceptible people. More specifically, an epidemic may result from:

- A recent increase in amount or virulence of the agent,
- The recent introduction of the agent into a setting where it has not been before,
- An enhanced mode of transmission so that more susceptible persons are exposed,
- A change in the susceptibility of people's response to the agent, and/or
- Factors that increase exposure or involve introduction through new portals of entry.

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)

An epidemic may also result from a bioterrorist event in which an infectious agent is released into a susceptible population, often through an enhanced mode of transmission, such as aerosolizing (inhalation of small infectious disease particles). Regarding foodborne and waterborne outbreaks, the epidemic hazard involves the safety of the food supply. This food safety may be jeopardized because of a fire, flood, hurricane, earthquake, or other natural, technological, or human-caused disaster.

Location:
The risk from infectious diseases is Town-wide. The prevalent diseases can change based on the time of year, such as the influenza virus in the winter and foodborne disease in the summer.

Extent:
High extent due to rate of spread and human impact if left uncontained. Exact vaccination rates in Madbury are unknown. Economic loss during the Covid-19 Pandemic primarily hit the personal finances of Madbury residents. Although Madbury does not have an extensive network of local businesses, mandatory shutdowns had an immediate impact on many local businesses, especially service based businesses. Several restaurants cut expenses by providing take-out options and were able to thrive during this time. The HMPT ranked

Infectious Disease highest for human impact but lowest for probability of future occurrence given the last pandemic hit in 1918.

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

Previous Hazard Events:
During March of 2020, the COVID-19 virus spread to the United States and effected Madbury in various ways, including economic impacts to businesses, a transition away from in-person meetings, and impacts to emergency responders.

To keep town officials, staff, and members of the public safe, municipal operations across town were altered. Staff met internally to develop strategies and policies that were based on the latest science and recommendations from the CDC. These included increased cleaning and sanitizing routines for municipal buildings; providing masks and hand sanitizer for all employees; enacting an ordinance that required masks to be worn outside and to maintain a safe distance; offering options for residents to pay bills online or by using a drop off box outside the Town Hall; communicating important updates on the virus and any changes in municipal policy through the town website; and transitioning to online meetings. The transition to a virtual, and eventually a hybrid (virtual and in-person) approach provided a more flexible and accessible option for public participation.

Probability of Future Events:
According to a study from the Global Health Institute from Duke University, the probability of a pandemic with similar impact to COVID-19 is about 2% in any year. Lastly, New Hampshire boasts a four-season climate and maintains a tourism-driven economy that welcomes visitors from all over the country every month of the year which exacerbates the transmission from other locations.

Landslides

Risk Assessment: Low
Average Impact: Low

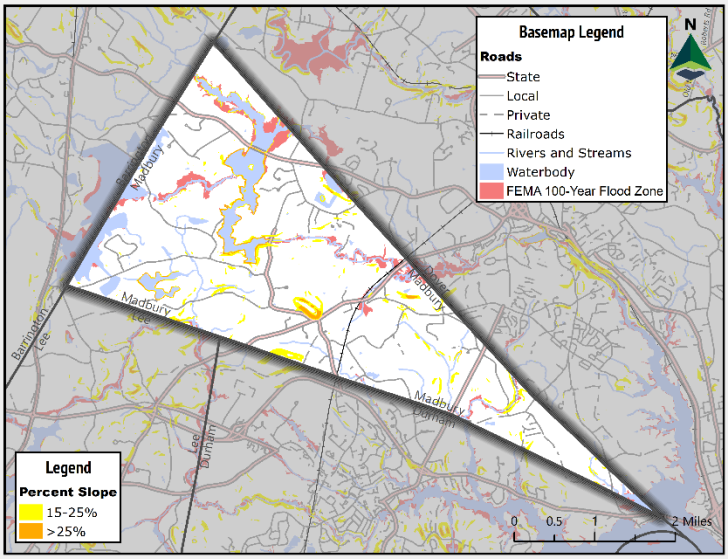
Future Probability: Low

Definition:
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 because of flash flooding
- Rock and soil slopes are weakened through saturation by snowmelt or heavy rains
- Large earthquakes have been known to weaken slopes and trigger landslides
- Wildfires (loss of vegetation)
- Excess weight from accumulation of rain or snow, stockpiling of rock, the formation of waste piles, or building of man-made structures may stress weak slopes to the point of failure

Location:
The risk from landslides can occur any place where steep slopes and unstable soils combine.
Slope steepness is a key factor causing the earth surface mass movements. However, there are other factors, including erosion of a slope and soil moisture, among others. A period of heavy rains can saturate slope soils, s that the pressure of the water in the spaces between soil particles pushes the soil apart. This enables gravity to overcome resistance to downward soil movement, and when this occurs, a slide begins. Gravity is constant but the degree of resistance can and does vary within slopes.

Figure 5-13: Steep Slopes in Madbury



Extent:
Very limited extent, very few steep slopes exist in Madbury. Potential impacts could include property damage, road closures, and increased erosion if forests were damaged.

Previous Hazard Events:
During the last five-year update period, there have been no impacts from landslides in Madbury. The USGS classifies landslide incidence regionally as very low (less than 1.5% of land area involved).

Probability of Future Events:
Landslides could occur in Madbury in areas with steep slopes, where soils and loose bedrock formations would tend to slough off and move en masse downhill under gravity. Earthquakes could readily cause landslides, as could ground saturation from extended heavy precipitation events. Given seismic or precipitation events that could initiate landslide, landslide hazard is likely in steep slope areas. However, these areas are extremely limited in scale. The local probability in Madbury will depend on specific soil/rock types and upon the probability of initiating events. Similar to other hazards identified in this plan, climate change can have a negative impact on the town and can increase the vulnerability to landslides.

Lightning

Risk Assessment: Low
Average Impact: Low
Future Probability: High

Definition:
Lightning is a visible electric discharge produced by a thunderstorm. The discharge may occur within or between clouds, between a cloud and the air, between a cloud and the ground, or between the ground and a cloud.

There are roughly 5-10 times as many cloud flashes as there are cloud to ground flashes. There are two types of ground flashes: negative polarity (those that occur because of electrification in the environment) and positive polarity (charge build up on tall structures, airplanes, rockets, and towers on mountains). Negative polarity lighting goes from cloud to ground while positive polarity lightning goes from ground to cloud.

Thunder always accompanies lightning but 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.

Location:
The risk from lightning is Town-wide; areas at enhanced risk include taller buildings, areas of higher elevation, open bodies of water, large fields, and campgrounds with sparse tree coverage. Negative polarity lightning (cloud to ground) usually occurs in the immediate area of the storm, whereas positive polarity lightning (ground to cloud) can strike long distances around the cell when no immediate signs of a thunderstorm are present.

Some lightning strikes occur far outside of the parent thunderstorm—these are called “bolts from the blue”, as they appear to come from a clear sky. These strikes are much more dangerous because they can strike up to 25 miles outside of the storm, catching people off guard in what appears to be clear conditions.

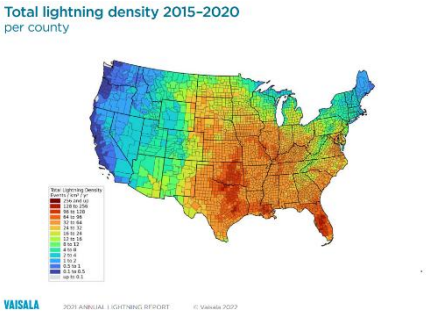
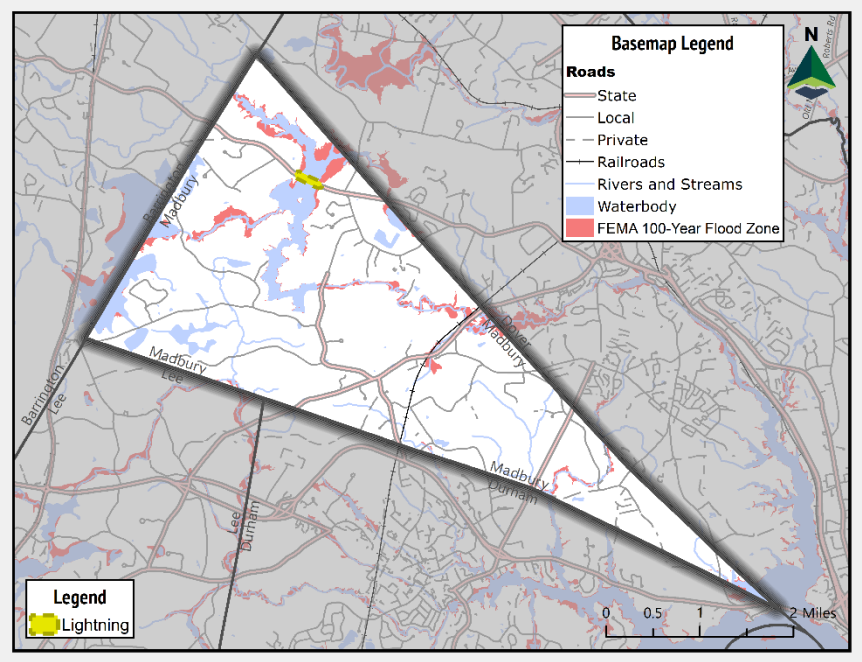


Figure 5-14: Lightning Strikes



Extent:

Very limited extent, power outages due to lighting strikes are primary concern. While weather forecasters can and do forecast the likelihood of intense lightening activity, it is impossible to forecast individual strikes as lightning is so widespread, frequent, and random during a storm. There is also still not a full scientific understanding of the cloud electrification processes.

Lightning strikes can be measured against each other through electrical calculations of the voltage and amperage that was discharged (the higher the voltage and amperage, the stronger and more severe the individual strike is). For the purposes of emergency management, all lightning strikes are viewed as equally dangerous regardless of their amps or volts, as any lightning strike is strong enough to cause infrastructure damage, injury, or death.

Research shows that the severity of a storm is roughly correlated to lightning frequency; however, there is significant regional variability, and no direct correlation has yet been found. That said, there appears to be a general increase in the frequency of lightning as a thunderstorm becomes more intense (i.e., larger in area and vertical growth, more organized, hail-producing, etc.). Currently, no widely adopted scale exists for measuring lightning storms in the northeastern United States. Based on information from the National Weather Service

that is used in fire weather forecasts, the severity of lightning storms can be measured using the Lightning Activity Level (LAL) which is based on cloud and storm
development as well as number of lightning strikes in a 5-minute period.

Figure 5-15: Lightning Activity Level

Lightning Activity Level (LAL)	Conditions
LAL1	No thunderstorms.
LAL2	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud to ground strikes in a five-minute period.
LAL3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a five-minute period.
LAL4	Scattered thunderstorms. Moderate rain is commonly produced. Lightning is frequent, 11 to 15 cloud to ground strikes in a five-minute period.
LAL5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 cloud to ground strikes in a five-minute period.
LAL6	Dry lightning (same as LAL3 but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag Warning.

Previous Hazard Events:
There were no reported lightning strike related deaths in New Hampshire. The NCDC database lists two reported lightning events in Strafford Country from January 1, 2008 to February 28, 2017.

Probability of Future Events:
It is highly likely that the Town will continue to experience impacts from lightning. The severity of those impacts is anticipated to be low to moderate depending on the location of lightning strikes, wind, or other factors such as flash flooding or downbursts that may accompany a thunderstorm. The committee did not recall any impact from lightning strikes since the previous plan.

Severe Winter Weather

Risk Assessment: High
Average Impact: High
Future Probability: Medium

Definition:
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

The severity of a heavy snowstorm is directly dependent on how much snow is falling and how fast it is falling. This is usually expressed by the National Weather Service in the number of inches that an affected area of the State will receive and the amount of time that they are expected to receive that snowfall in. Also, the amount of snow that falls in an hour is a unit of measurement of severity for a heavy snowstorm. Storms that produce 2 inches of snowfall in an hour or more begin to tax the ability of snowplows to keep the roadways clear, can

produce blizzard like conditions when combined with wind, and can quickly lead to treacherous road conditions. The Winter Storm Warning criteria for the State of New Hampshire are as follows:

- 6" or more of snow expected in a 12-hour period –or
- 9" or more of snow is expected in a 24-hour period –or
- a combination of snow, ice, and/or wind that produces life threatening impacts is expected

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 35 mph 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.

New Hampshire (New England) is especially susceptible to strong Nor'easters during the winter as the polar Jetstream transports cold, artic air southward across the northern central US. This airmass then moves eastward toward the Atlantic Ocean where it meets warm air from the Gulf of Mexico generating a strong low-pressure system. The warm waters of the Gulf Stream help keep the coastal waters off New England relatively mild during the winter, which in turn helps warm the cold winter air over the water. The presence of the relatively warmer, moist air over the Atlantic and cold, dry Arctic air over the land provide the temperature contrast necessary to generate the strong frontal boundaries that help a Nor'easter intensify.

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.

Location:

The risk from severe winter weather is Town-wide.

Extent:
Moderate extent, New Englanders are prepared for winter weather. Power outages during extreme winter weather can be a concern and cause elevated impacts. The Town continues to explore upgrades to town facilities for warming and cooling capabilities.

Winter weather events are common in New Hampshire. Heavy snow typically brings significant snow removal costs along with delays in transportation schedules. Wet snow can result in major infrastructure damage from heavy snow loads and has been the cause of human harm during long periods of shoveling, including back injuries and in some cases heart attacks. The most severe damage, though, often comes from ice storms and winter nor'easters.

NOAA has developed the Regional Snowfall Index (RSI) which is a snowfall impact scale that uses the area of snowfall, amount of snowfall, and population to attempt to quantify the societal impacts of a snowstorm.

Figure 5-16: Regional Snowfall Index

Category	RSI Value	Description	Approximate % of Storms
0	0-1	N/A	54%
1	1-3	Notable	25%
2	3-6	Significant	13%
3	6-10	Major	5%
4	10-18	Crippling	2%
5	18+	Extreme	1%
The RSI is an evolution of the previous Northeast Snowfall Impact Scale (NESIS).			

Blizzard
As a blizzard has specific scientific conditions that are either met or not met for a storm, the RSI scale referenced above could assist in the severity rating of a blizzard.

Nor'easter
The severity of a Nor'easter is directly dependent on the time of year and the type of weather that the Nor'easter brings. Nor'easters during the winter can cause heavy snowfall, blizzard conditions, ice, and strong winds. Occasionally these strong coastal low-pressure systems will occur during the summer and can produce significant rainfall, cause flooding, and generate tornadoes or straight-line wind events (micro/macrobursts).

Ice Storm
The Ice Storm Warning criteria for New Hampshire is an accumulation of ½" of ice or greater. Although there is currently not a widely adopted scale for measuring ice storms, based on information from the US Forest Service following the 1998 Ice Storm, the severity of ice storms can be viewed in terms of the amount of ice accumulation, the duration of that accumulation, and the resulting damage. The number of variables that need to be taken into consideration to accurately measure the intensity of an ice storm make the process difficult. Some resources, such as weather stations, are not able to measure ice accumulations; therefore, observers must report accumulations to the weather service to get an accurate depiction of the severity of an event.

Furthermore, ice accumulation can vary drastically over topography and over short distances, making interpolation of reported values less accurate.

In 2008, the Sperry-Piltz Ice Accumulation Index (SPIA Index) was developed to take into consideration ice thickness, wind speed and direction, and temperatures for the storm period to develop a severity index score across five levels.

Although not widely adopted, National Weather Service offices across the country that receive ice are testing this scale for its viability at being the next Saffir-Simpson style scale for measuring ice storms.

Figure 5-17: Sperry-Piltz Ice Accumulation Index

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

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 & widespread utility interruptions with extensive damage to main distribution feeder lines & 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.

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

Previous Hazard Events:
Three events of those listed in the National Climactic Data Center database are of note for their severity:

- **The Ice Storm of 2008** (December 11th–12th) was a major winter storm that brought a mixture of snow, sleet, and freezing rain. The greatest impact in the state was in southern and central New Hampshire where a significant ice storm occurred. Following the ice storm, recovery and restoration efforts were negatively impacted by additional winter weather events that passed through the state. The freezing rain and sleet ranged from 1 to 3 inches, ice accretion to trees and wires in these areas generally ranged from about a half inch to about an inch. The weight of the ice caused branches to snap, and trees to either snap or uproot, and brought down power lines and poles across the region. About 400,000 utility customers lost power during the event, with some customers without power for two weeks. Property damage across northern, central, and southeastern NH was estimated at over $5 million. Locally, Madbury experienced widespread power outages for upwards of a week.

- **The Blizzard of 2013 – NEMO** (February 8th-9th) was an area of low pressure developed rapidly off the Carolina coast late on the 7th and early on the 8th. The storm moved very slowly northeast during the 8th and 9th as it continued to intensify. By the morning of the 10th, the storm was located just to the east of Nova Scotia. The storm brought heavy snow, high winds, and blizzard conditions to the

southeastern part of the state. Snowfall amounts were generally 18 inches or more in the southeast where blizzard conditions caused considerable blowing and drifting snow. In western and northern sections, snowfall amounts were in the 4 to 18 inch range. Southeastern New Hampshire had blizzard conditions for about 3 to 10 hours.

According to the NOAA Northeast Snowfall Impact Scale (NESIS), which ranks storms that have large areas of 10 inch snowfall accumulations or greater based on a function of the area affected, the amount of snow, and the number of people living in the path of the storm, Nemo was ranked as a 'major' event (http://www.ncdc.noaa.gov/snow-and-ice/rsi/nesis).

The NCDC Regional Snowfall Index for the stations near Madbury reported between 18 and 24 inches of snow (Rochester and Nottingham) and 12 to 18 inches (between Epsom and Northwood) from February 8-February 10, 2013. According to the NH Union Leader, wind gusts of over 30 miles per hour were expected to occur with the storm; however, the NH Electric Co-op reported only minor power outages. Locally, this storm resulted in significant and expensive snow removal effort. There were some branches down, which led to sporadic power outages throughout town.

- **The Blizzard of 2015 – JUNO** (January 26th – 28th) was area of low pressure developed off the Delmarva peninsula on January 26th, and intensified rapidly as it moved slowly northward through the 27th. Snow spread northward across the region Monday night and became heavy on the 27th. Winds became strong during the day leading to blizzard conditions at times along and inland from the coast. The snow persisted into Tuesday night in many areas with blowing and drifting snow. Snowfall amounts ranged from 10 inches to more than 30 inches across much of the southeastern part of the state.

  Juno was ranked on the NESIS as a 'major' event based on the area affected, the amount of snow, and the number of people living in the path of the storm. The Regional Snowfall Index for the station near Madbury reported between 18 and 24 inches from January 25-January 28th, 2015. Locally, this storm resulted in significant and expensive snow removal effort. There were some branches down, which led to sporadic power outages throughout town.

During the last five-year update period, a major disaster was declared due to a winter storm and snowstorm during the period of March 13-14, 2018. The powerful Nor'easter brought high winds and more than two feet of snow in some areas in southeastern New Hampshire. As a result, Strafford County was one of three counties eligible for public assistance funding for emergency work and the repair or replacement of facilities damaged by the storm.

Probability of Future Events:

Madbury will continue to be impacted by severe, regional winter weather events that produce a variety of precipitation, including snow, rain, and sleet. Due to its heavily forested nature, the Town is most highly exposed in terms of damage to forest resources and the secondary impacts of those damages. As climate change seems to impact the amount of snow and more mild temperatures, storm events in recent years have produced more sleet, upwards of 2 inches in some events, causing water content to accumulate and bond to roadways more quickly. This mixture of precipitation is problematic as it exhausts more resources, materials,

and staff capacity to keep the roads safe and thereby, makes the town more vulnerable to this hazard. The Town's Public Works will need to continue exploring new and innovative methods, including pre-treatment and de-icing techniques and equipment purchases, to ensure they are prepared for unpredictable winter weather conditions.

Solar Storms and Space Weather

Risk Assessment: Low
Average Impact: Low
Future Probability: Low

Definition:
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.

Location:
The risk from solar storms and space weather is town-wide.

Extent:
Very limited extent, the Town considers the impacts to be wide during an event but that mitigation is limited at the municipal level.

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.

The next table 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.

Figure 5-18: Radio Blackout Chart

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)

Previous Hazard Events:

This is a hazard that is difficult to detect at the local level 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 Madbury.

Probability of Future Events:

The Work Group discussed the increased awareness of these events and ranked it as a high probability that these events will occur during the next ten years.

Hurricane and Tropical Storm

Risk Assessment: High
Average Impact: High
Future Probability: Low

Definition:

A tropical cyclone is the generic term for a non-frontal synoptic scale low-pressure system over tropical or sub-tropical waters with organized convection (i.e. thunderstorm activity) and defined cyclonic surface wind circulation. Once formed, a tropical cyclone is maintained by the extraction of heat energy from the ocean at high temperature and heat export at the low temperatures of the upper troposphere. There are several stages throughout the life cycle of a tropical cyclone:

- **Potential Tropical Cyclone**: Term used by the National Hurricane Center (NHC) in advisory products to describe a disturbance that is not yet a tropical cyclone, but which poses the threat of bringing tropical storm or hurricane conditions to land areas within 48 hours. This is a new term introduced by the NHC in the summer of 2017.

- **Tropical Disturbance**: A tropical disturbance is a cluster of showers and thunderstorms that flares up over the tropics. It is typically about 100 to 300 miles in diameter and generally moves westward. Tropical disturbances last for more than 24 hours, so there's a clear distinction between diurnal

convection and tropical disturbances. Lacking a closed circulation of winds, tropical disturbances do not qualify as tropical cyclones.

- **Tropical Storm**: Once the maximum sustained winds of a developing tropical cyclone reach 34 knots (39 MPH), the low-pressure system is typically called a tropical storm and is assigned a formal name. The tropical cyclone maintains a tropical-storm status if its maximum sustained winds are above 34 knots and less than 64 knots (74 MPH).

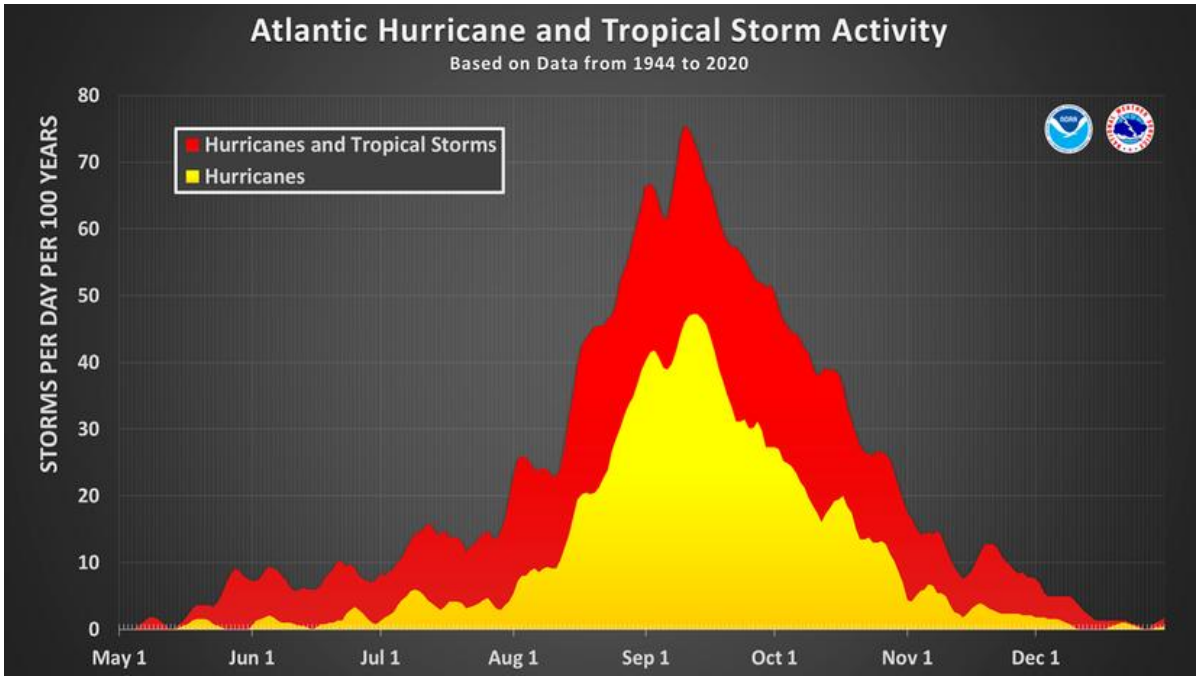
- **Hurricane**: Once a tropical cyclone's maximum sustained winds reach 64 knots (74 MPH), the storm becomes a hurricane (in the North Atlantic and Northeast Pacific Ocean basins).

- **Major Hurricane**: A tropical cyclone with maximum stained winds of 96 knots (111 MPH) or higher.

- **Post-tropical Cyclone**: A former tropical cyclone, this term is used to describe a cyclone that no longer possesses the sufficient tropical characteristics to be considered a tropical cyclone. These post-tropical cyclones often undergo an extratropical transition and form frontal boundaries. Post-tropical cyclones can continue carrying heavy rains and high winds and cause storm surge.

Location:
The risk from tropical and post-tropical cyclones is Town-wide. This hazard is very seasonally dependent: the Atlantic hurricane season officially runs from June 1st to November 30th each year. These dates were selected as they encompass over 97% of tropical activity; however, hurricanes have occurred outside of the official season dates. The peak of the Atlantic hurricane season falls in mid-September, followed by a lesser secondary peak in activity in mid-October.

Figure 5-19: Atlantic Hurricane and Tropical Storm Activity



Extent:
Moderate to high extent, hurricane-type storms have passed through Madbury and caused damage. The Town considers future events possible but not likely to cause major impacts due to previous experiences with storms. A storm that brings intense rain that causes flooding is the primary concern with power outages a secondary concern as a high level of threat.

The Saffir-Simpson Hurricane Wind Scale is a 1 to 5 rating system based on a hurricane's sustained wind speed. This scale estimates potential property damage. Hurricanes reaching Category 3 and higher are considered major hurricanes because of their potential for significant loss of life and damage. Category 1 and 2 storms are still dangerous, however, and require preventative measures.

Figure 5-20: Saffir-Simpson Hurricane Wind Scale

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

Previous Hazard Events:
Over the past decade, Madbury has experienced two significant storms, Tropical Storm Irene and Hurricane Sandy.

Tropical Storm Irene (August 28, 2011) - brought a prolonged period of strong and gusty winds and heavy rain to the state. The high winds snapped or uprooted numerous trees throughout the state causing more than 160,000 customers to lose electrical and/or communication services. The heavy rains caused rivers and streams throughout the state to flood causing damage to bridges, roads, and property. The strongest winds across the

state began Sunday morning in southern areas and spread northward during the day. Winds continued to be gusty overnight as the storm moved away from the area. Observed maximum wind gusts included 63 mph at Portsmouth, 52 mph at Concord, and 51 mph at Manchester. On the top of Mt. Washington, winds gusted to 104 mph as the storm approached and 120 mph as it moved away. The combination of wet soil and the prolonged period of strong and gusty winds brought down numerous trees throughout the state. One person was killed and three people were injured across the state due to falling trees or branches. Rainfall amounts across the state ranged from 1.5 to 3 inches across southeastern New Hampshire. Local impacts included wind, downed trees, and moderate flooding in low-lying areas. Downed tree limbs and flooding caused minor infrastructure damage.

Hurricane Sandy (October 26 to November 8, 2012) was the last hurricane to hit the region. Madbury experienced minimal impacts associated with rain and wind. Strafford County was not included in the public assistance or direct federal assistance declaration. Strafford County did receive Emergency Declaration funds for Emergency Protective Measures.

During the last five-year update period, there have been no significant impacts from tropical storms and hurricanes.

Probability of Future Events:
Madbury is vulnerable to hurricane hazards including wind, tornadoes, heavy rainfall, and inland flooding due to its location.

Based on a 30-year climate period from 1991 to 2020, an average Atlantic hurricane season has 14 named storms, 7 hurricanes, and 3 major hurricanes (Category 3, 4, or 5 on the Saffir-Simpson Hurricane Wind Scale). With variability in sea-level pressure and sea-surface temperatures in the Atlantic Ocean, it is difficult to predict with certainty the number of storms in any given year. It is even more difficult to determine which of those storms will make landfall.

Hurricanes and tropical storms will continue to affect Madbury and recurrence potential of hurricane and storm hazards is, therefore, moderate. It is likely that the town and region will be impacted by climate change as the intensity and frequency of storms seems to be increasing, thereby making the town more vulnerable.

Wildfire

Risk Assessment: Medium
Average Impact: Medium
Future Probability: Low

Definition:
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.

Location:

Madbury is a rural town with a predominantly forested landscape. The risk from wildfire is Town-wide with increased risk in heavily wooded areas. The Town is exposed to natural factors such as lightning that can cause wildfires. A more likely scenario is human-caused wildfire.

Extent:
Limited extent, the Town experienced a wildfire due to human error in 2007. Local contractors welding caused a wildfire due to sparks. Much of the Town is forested and vulnerable to wildfire, but the lands are mostly accessible to firefighting apparatus should a fire break out. The Town can likely contain a wildfire before the impacts reach high levels.

Currently, there is not a universally adopted scale for measuring wildfires within the State of New Hampshire. There are numerous factors that can be used to describe the severity and complexity of a wildfire:

- Acreage of the fire (size)
- Topography and landscape
- Amount of time required to extinguish the fire
- Environmental factors (drought or wind)
- Damages to urban infrastructure, damages to utility infrastructure, or other severe environmental damages
- Amount and types of resources required to extinguish the fire (expressed in number of alarms)

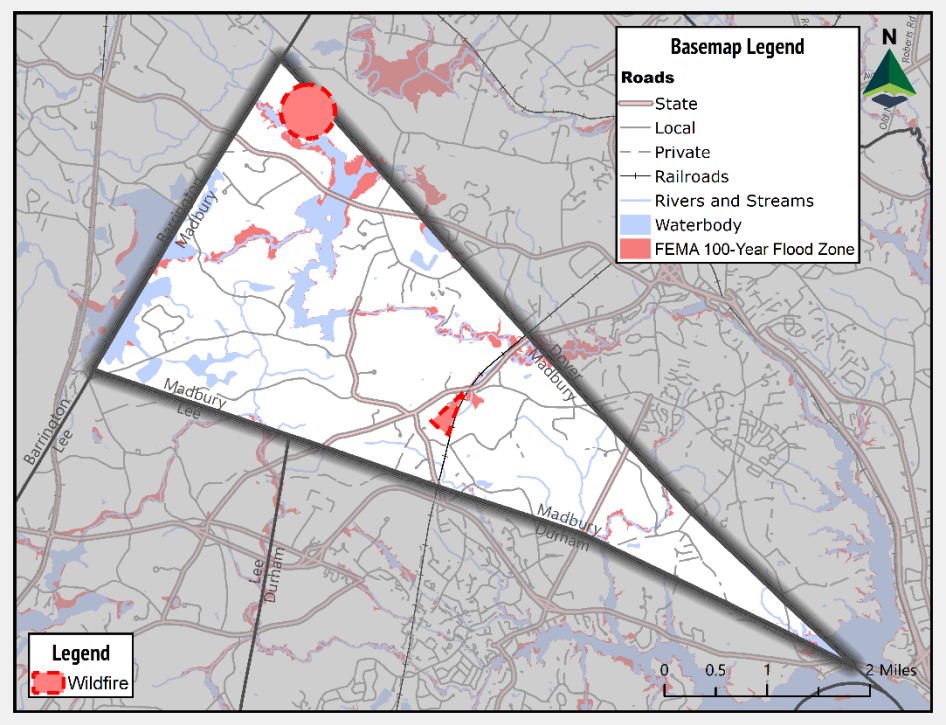
Generally, fire personnel most commonly use the acreage of the fire and the number of alarms to describe the magnitude of the wildfire, as these descriptions are relatable to the size of the fire and number of resources required to extinguish. While this is not an exact science, these two factors alone are easily understood and allow a straightforward comparison of the magnitude of wildfire events. Some wildfire events that may not easily be described using these factors, including:

- Significant acreage fires that are isolated to a large, flat field which require few resources to extinguish (greater area covered, less alarms needed)
- Small acreage fires that occur in a remote, difficult landscape burning deep into the ground, which often requires a more diversified and coordinated response

The National Wildfire Coordinating Group (NWCG) has developed a fire size classification chart to describe a wildfire by the areal extent in acres:

Figure 5-21: Fire Size Classification Chart	
Size Class of Fire	Size of Fire in Acres
Class A	One-fourth acre or less
Class B	More than one-fourth acres, 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

Figure 5-22: Wildfire Events in Madbury



Previous Hazard Events:

During the last five-year update period, the town experienced a wildfire (see Figure 5-21). The Town was able to contain the fire before extensive damage. Mutual aid and backup helped in these efforts.

Wildfires in New Hampshire historically have tended to run in 50-yr cycles, which can be observed starting from the 1800s. This 50-year cycle is partially based upon human activities and, therefore, may not prove to be accurate into the future. The peak in wildfires in the late 1940's and early 1950's is thought to be related to the increased fuel load from trees downed in the 1938 hurricane. Here, 70 years later, New Hampshire officials are again concerned about the high fuel load created by the 1998 and 2008 ice storms that hit New Hampshire.

Probability of Future Events:

The probability of occurrence of wildfires in the future is difficult to predict due to the dependence of wildfire on the occurrence of the causal hazards and the variability of numerous factors that affect the severity of a

wildland fire. As indicated above, loading of dead brush and other fuels in forested areas can be cyclical, indicating that the risk of wildfire can grow over time if potential sources of fuel are not regularly removed. Climate change can also increase Milton's vulnerability due to high wind events, drought, and long periods of extreme high temperatures. In general, if a wildfire occurred in one of the large, unfragmented woodland areas, the cost of the timber loss would likely be in the range of several million dollars.

Technological Hazards

Dam Failure

Risk Assessment: Medium
Average Impact: Medium
Future Probability: Low

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

Location:
One (1) High Hazard dam exists in Madbury, the Bellamy Reservoir Dam. The City of Portsmouth Water Department controls and maintains the dam (see Emergency Action Plan Bellamy Reservoir Dam).

Extent:
Limited extent, due to the probability of an event, however, an event likely would have a high impact.
Within the State of New Hampshire dams are categorized into one of four classifications, which are differentiated by the degree of potential damages that a dam failure is expected to cause. The classifications are designated as Non-Menace, Low Hazard, Significant Hazard, and High Hazard.

Non-Menace Structure
A non-menace structure is a dam that is not a menace because it is in a location and of a size that failure or misoperation of the dam would not result in probable loss of life or loss to property, provided the dam is:

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

Low Hazard Structure
A low hazard structure is a dam that has a low hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in any of the following:

- No possible loss of life.
- Low economic loss to structures or property.
- Structural damage to a town or city road or private road accessing property other than the dam owner's that could render the road impassable or otherwise interrupts public safety services.
- The release of liquid industrial, agricultural, or commercial wastes, septage, or contaminated sediment if the storage capacity is less than two-acre-feet and is located more than 250 feet from a water body or water course.

- Reversible environmental losses to environmentally sensitive sites.

Significant Hazard Structure

A significant hazard structure is a dam that has a significant hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in any of the following:

- No probable loss of lives.
- Major economic loss to structures or property.
- Structural damage to a Class I or Class II road that could render the road impassable or otherwise interrupt public safety services.
- Major environmental or public health losses, including one or more of the following:
    - Damage to a public water system, as defined by RSA 485:1-a, XV, which will take longer than 48 hours to repair.
    - The release of liquid industrial, agricultural, or commercial wastes, septage, sewage, or contaminated sediments if the storage capacity is 2 acre-feet or more.
    - Damage to an environmentally sensitive site that does not meet the definition of reversible environmental losses.

High Hazard Structure

A high hazard structure is a dam that has a high hazard potential because it is in a location and of a size that failure or misoperation of the dam would cause probable loss of human life as a result of:

- Water levels and velocities causing the structural failure of a foundation of a habitable residential structure or commercial or industrial structure, which is occupied under normal conditions.
- Water levels rising above the first floor elevation of a habitable residential structure or a commercial or industrial structure, which is occupied under normal conditions when the rise due to dam failure is greater than one foot.
- Structural damage to an interstate highway, which could render the roadway impassable or otherwise interrupt public safety services.
- The release of a quantity and concentration of material, which qualify as “hazardous waste” as defined by RSA 147-A:2 VII.
- Any other circumstance that would more likely than not cause one or more deaths.

Figure 5-23 shows all High Hazard, Significant Hazard, and Low Hazard dams in Madbury.

Figure 5-23: Dams

Hazard Class	Name	River or Stream	Inspection Interval
H	Bellamy Reservoir Dam	Bellamy River / Reservoir	2 years
L	Gangwer Wildlife Pond Dam	Beards Brook	6 years

Previous Hazard Events:

During the last five-year update period, there have been no impacts from dam failure.

Probability of Future Events:

The potential for catastrophic flooding from dam breach or failure exists in Madbury, but the HMPT considers the likelihood of dam failure to be extremely low. This could change, however, with the impacts of climate change and the increase of heavy storm events making Madbury more vulnerable to this hazard.

Hazardous Materials Spill

Risk Assessment: Low
Average Impact: Low
Future Probability: Low

Definition:
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 in various forms can cause death, serious injury, long-lasting health effects, and damage to buildings, homes, property, and the environment. Many products containing hazardous chemicals are used and stored in homes routinely and are also shipped daily on the nation's highways, railroads, waterways, and pipelines. Chemical manufacturers are one source of hazardous materials, but there are many others, including service stations, hospitals, and hazardous materials waste sites. Hazardous materials continue to evolve as new chemical formulas are created.

Location:
The risk from hazardous materials is Town-wide. Incidents involving hazardous materials could potentially occur at any residence or business or along any road; however, it is more likely that a spill would occur along State Routes 4, 9 (at the Bellamy Reservoir), 108, and 155 (at the railroad), as these are major transportation corridors that often have trucks carrying bio-diesel fuel and other harmful chemicals through Town.

Extent:
Very limited extent, minimal stored hazardous materials and minimal major transportation corridors through the Town. Incidents are more likely to occur in the form of a spill along Kings Highway, Ridge Road, or NH 153. The extent of such an incident can be difficult to predict and would depend upon the type and volume of materials involved. The Town has “country drainage” along roadways, not subsurface pipes and catchbasins. Spills will travel to the lowest points, usually a stream or other surface waterbody. Limiting the extent depends on response time.

Previous Hazard Events:
During the last five-year update period, there have been no significant impacts from hazardous materials or incidents that would activate the HazMat team.

Probability of Future Events:
As mentioned above, it is difficult to predict where and when a hazardous spill or incident will occur. The committee felt that with the increase in traffic volume on Kings Highway, Ridge Road, and NH 153, the probability is low that an incident will occur within the next 10 years.

Long-Term Utility Outage (1 week)

Risk Assessment: Low
Average Impact: Low
Future Probability: Low

Definition:
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. When discussing extended power failure in this plan, it is referring to power failure that can last for a period of up to one week. Many things can cause power failure: downed power lines (due to storm, wind, accident, etc.); failure of public utilities to operate or failure of the national grid.

Location:
The risk from long-term utility outage is Town-wide. Extended power failure can negatively impact lighting, heating, water supply, and emergency services. Extended power failure is particularly hazardous for remote areas. Elderly populations and other populations to protect could also be particularly vulnerable if the extended power outage occurred in conjunction with extreme heat or severe winter weather.

Extent:
Limited to moderate extent, depends on the frequency of maintenance work along powerline corridors and roadways with overhead powerlines. HMPT states that the utility company has been proactively clearing and maintaining corridors of dead or dangerous vegetation. The new Road Agent continues to identify high priority areas during routine activities throughout Town and communicating regularly with the utility company.

There is no universal method for measuring the extent of utility outages; however, proxy data can be used to determine the extent or area impacted during an outage. These factors include, but are not limited to:

- Number of customers without power, services, fuel, cable/internet, etc.
- Size of the area experiencing an outage
- How long customers have been without a utility and how long they can expect to be without that resource
- Whether resources were completely expended, requiring state or federal assistance
- Extent of cascading impacts

An event is typically referred to after the fact as the greatest extent experienced. For example, the greatest number of customers without power throughout the incident.

Previous Hazard Events:
Power outages occurred during the years since the last HMP update. Most outages were isolated to small areas of the Town and did not last more than a week. Historically, power outages have coincided with storm and wind events due to impacts upon power lines, but no significant impacts beyond repair of damaged lines have been reported during the last five-year update period.

Probability of Future Events:
The likelihood of future power outage events can be difficult to predict, though the historic record indicates that they will be highly correlated with high wind events such as thunderstorms and severe winter weather.

Known and Emerging Contaminates

Risk Assessment: Low
Average Impact: Low
Future Probability: Low

Definition:
Contaminants in drinking water include naturally occurring contaminants associated with the geology in each region and known man-made contaminants associated with nearby land use activities. Some contaminants are considered 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 are particularly concerning to the public because the potential health impacts of these are sometimes uncertain.

Location:
The risk from known and emerging contaminants is Town-wide.

Extent:
Very limited extent, HMPT states that impact is unknown and difficult to predict given limited past experience. Experts provide no universal standard for all types of emerging contaminants; however, environmental service agencies typically measure the presence of chemicals in water sources in parts per billion or trillion. Safe drinking water thresholds for many chemicals are set by either the EPA or NHDES to protect human health; however, new emerging contaminants will require scientific study to determine what level, if any, is safe for human consumption. These thresholds for contaminants can change as the health impacts of exposure at different levels are observed over time.

Drinking Water Contaminants
Drinking water contaminants that may be present in drinking water include: microbial contaminants, inorganic contaminants, pesticides and herbicides, organic chemical contaminants, radioactive contaminants, and lead. Trace elements, such as arsenic, lead, manganese and uranium can be particularly worrisome when found in drinking water obtained from private wells.

Exposure to contaminants through drinking water can have a variety of adverse health effects. Immunocompromised persons such as those with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune disorders, some elderly, and infants can be particularly at risk from infections.

Some contaminants, such as certain strains of E.coli bacteria or high levels of nitrates, can result in immediate illness, such as gastroenteritis. Other contaminants, when consumed over a long period of time at low doses, increase the risks for developing certain forms of cancer, cardiovascular diseases, and neurological disorders. Among potential private well water contaminants, arsenic is of particular concern in New Hampshire. Arsenic has been linked to cancer in humans. Based on the potential adverse effects of arsenic on the health of humans and the frequency and level of arsenic occurrence in public drinking water systems, the EPA has set the arsenic maximum contaminant level for public drinking water systems at 10 parts per billion. Arsenic is naturally occurring and quite common in New Hampshire's groundwater, and health studies of New Hampshire residents have demonstrated the connection between arsenic and the increased prevalence of conditions such as bladder and other cancers and developmental effects on children.

Emerging Contaminates

Emerging contaminants have been detected in surface and groundwater that are sources of drinking water in the State of New Hampshire, and citizen awareness of this issue has grown exponentially in recent years. 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, at unusually high levels in groundwater derived from one public water supply well at the Pease Tradeport in Newington, NH.

In 2016, the U.S. EPA issued new health advisories for PFAS compounds of 70 parts per trillion (ppt), which is significantly lower than the 2009 health advisory. The 2016 health advisory states that short-term exposure in drinking water above 70 ppt poses a health risk to susceptible populations and requires rapid response actions to ensure that consumption of the contaminated water ceases and that an alternative supply of drinking water be provided. During the last five-year update period, there have been no impacts from this hazard reported.

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. This chemical was used as an additive in gasoline until 2007, but was still detected in approximately 10% of randomly tested wells in southeastern New Hampshire.

Not all emerging contaminants are directly associated with man-made chemicals. Increased land development and more intense precipitation trends are increasing nutrient loading in several surface water bodies that are sources of drinking water for public water systems. Increased nutrient loading coupled with warming temperatures have caused harmful algal blooms to form in surface water bodies. If the blooms release harmful algal toxins and impact the water at the intake of the public water system, there is a concern that existing drinking water treatment systems may not be adequate to remove the toxins.

Previous Hazard Events:

The HMPT did not recall any previous incidents of this hazard.

Probability of Future Events:

The HMPT agreed that this hazard has a low probability of occurring within the Town due to an acute isolated incident.

Human-Caused Hazards

Cyber Threats

Risk Assessment: Medium
Average Impact: Medium
Future Probability: Low

Definition:
The field of cyber security is primarily concerned with protecting against damage and disruption to or theft of hardware, software, or information. Due to the variety of services they provide, local government organizations collect, store, and work with large amounts of personal data and other sensitive information. While the security of this information has always been important, increasing use of digital networks to store and transmit that information makes the security of those networks a priority. Furthermore, local governments provide critical services such as police, fire, utilities, and other services, and disruption to these services could be devastating for residents. Types of cyber threat include:

- **Malware**: Malicious software that can damage computer systems, including monitoring system activity, transferring information, or even taking control of computers or accounts. This includes a wide variety of viruses, Trojans, ransomware, and other programs that are usually installed by clicking on infected links, files, or email attachments.
- **Phishing**: These attacks come in the form of emails, often disguised as a trusted or legitimate source, that attempt to extract personal data.
- **Denial of Service**: This is a large-scale attack designed to disrupt network service by overloading the system with connection requests. These attacks are more likely to impact large, high-profile organizations, but such attacks can occasionally have residual impacts on other organizations in the same network.
- **Man in the Middle**: By imitating an end user (e.g. an online bank), an attacker can extract information from a user. The attacker can then input that information to the end user to access additional information, including sensitive data such as personal or account information.
- **Drive-by Downloads**: Malware installed on a legitimate website causes a system to download a program simply by visiting that website. This program then downloads malware or other files directly to the user's system.
- **Malvertising**: This attack type downloads malware or other files to your computer when you click on an infected advertisement.
- **Rogue Software**: Attackers use pop-up windows to mimic legitimate anti-virus or other security software to trick users into clicking on links to download malware or other files.
- **Sponsored Attacks**: These threats, which could be perpetrated by state or non-state actors, include specific attacks to damage or disrupt infrastructure such as utilities or wastewater facilities.

Location:
The risk from cyber-threats is Town-wide. The severity of any impact depends upon the type of incident – targeted phishing attacks may be focused upon a single employee or account, while malware attacks could impact an entire department or gain access to an entire database of personal information.

Extent:
Limited to moderate extent, as noted below with a recent event and the Town's response. Madbury's best defense is constant training of municipal staff to recognize threats or suspicious activity to mitigate future incidents. The type of attack determines the extent; loss of access to Town computer systems or breaching Town data / resident personal identification data, remains the broadest extent of impacts.

The National Cybersecurity and Communications Integration Center (NCCIC) uses the Cyber Incident Scoring System to measure the magnitude of a cyber incident. The NCCIC Cyber Incident Scoring System (NCISS) uses the following weighted arithmetic mean to arrive at a score between zero and 100:

Each category has a weight, and the response to each category has an associated score. The categories are:

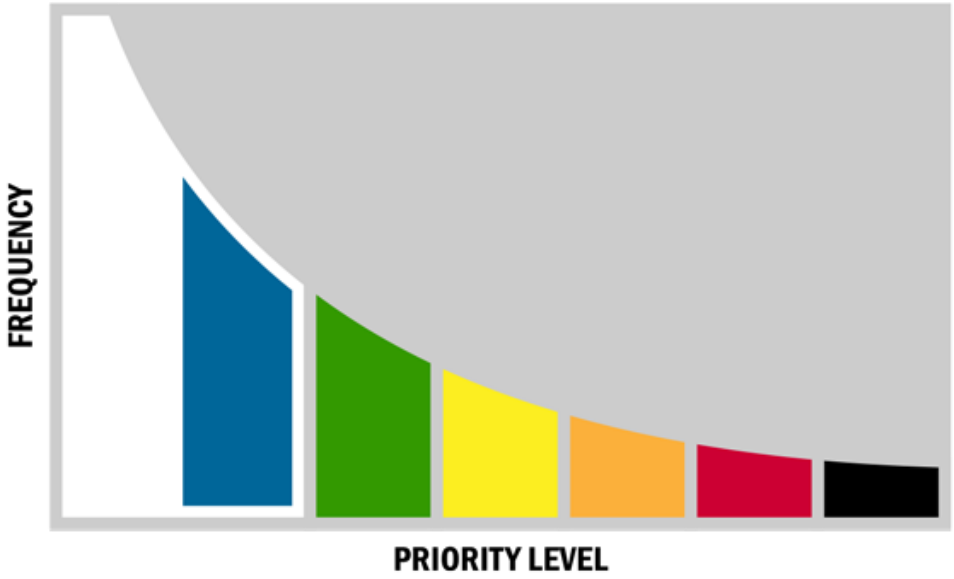
- Functional Impact
- Observed Activity
- Location of Observed Activity
- Actor Characterization
- Information Impact
- Recoverability
- Cross-Sector Dependency
- Potential Impact

Each response score is multiplied by the category weight, and the weighted scores are summed.

Calculate the minimum possible weighted score sum and subtract this number from the previously calculated sum of the weighted scores. Divide the result by the range: the difference between the maximum possible weighted score sums and the minimum possible weighted score sum. Finally, multiply the resulting fraction by 100 to produce the result.

Weights and values are specific to an individual organization's risk assessment process. Accompanying this document is a representative tool that demonstrates a reference implementation of the concepts outlined in this system. Once scored, the incident is assigned a priority level.

Figure 5-24: Cyber Threat Risk Level



■ Emergency (Black)

An Emergency priority incident poses an imminent threat to the provision of wide-scale critical infrastructure services, national government stability, or the lives of U.S. persons.

■ Severe (Red)

A Severe priority incident is likely to result in a significant impact to public health or safety, national security, economic security, foreign relations, or civil liberties.

■ High (Orange)

A High priority incident is likely to result in a demonstrable impact to public health or safety, national security, economic security, foreign relations, civil liberties, or public confidence.

■ Medium (Yellow)

A Medium priority incident may affect public health or safety, national security, economic security, foreign relations, civil liberties, or public confidence.

■ Low (Green)

A Medium priority incident may affect public health or safety, national security, economic security, foreign relations, civil liberties, or public confidence.

Baseline

A baseline priority incident is highly unlikely to affect public health or safety, national security, economic security, foreign relations, civil liberties, or public confidence. The bulk of incidents will likely fall into the baseline priority level with many of them being routine data losses or incidents that may be immediately resolved. However, some incidents may require closer scrutiny as they may have the potential to escalate after additional research is completed. To differentiate between these two types of baseline incidents, and

seamlessly integrate with the CISS, the NCISS separates baseline incidents into Baseline–Minor (Blue) and Baseline–Negligible (White).

■ Minor (Blue)
A Baseline–Minor priority incident is an incident that is highly unlikely to affect public health or safety, national security, economic security, foreign relations, civil liberties, or public confidence. The potential for impact, however, exists and warrants additional scrutiny.

■ Negligible (White)
A Baseline–Negligible priority incident is an incident that is highly unlikely to affect public health or safety, national security, economic security, foreign relations, civil liberties, or public confidence.

Previous Hazard Events:
Madbury Police Department experienced a ransomware attack in 2019. The HMPT did not provide details due to security implications, but the PD better understands its vulnerabilities and took immediate corrective actions. Madbury has taken additional steps town-wide to reduce risk, including filtering potential threats and spam, adding anti-virus for programs on all machines, and providing education to municipal employees.

Probability of Future Events:
Cyber threats constantly evolve to find new weaknesses in anti-virus software and other network defenses. As noted above, ransomware has become an increasingly prevalent form of malware in recent years and is likely to continue to be a threat in years to come.

Mass Casualty

Risk Assessment: Medium
Average Impact: Medium
Future Probability: Low

Definition:
The definition of a mass casualty event is any incident that results in a large number of casualties from a single incident such as a multi-car automobile accident, aircraft accident, hurricane, flood, or armed assault that exceeds the capacity of local emergency and support services.

Location:
The risk from mass casualty events is town-wide.

Extent:
Very limited extent, low density of development and limited infrastructure protect the Town from extensive mass casualties.

Previous Hazard Events:
During the last five-year update period, there have not been any major accidents; however, the Town recognizes this to be a threat since there is very limited full-time emergency staff in Madbury.

Probability of Future Events:
The Hazard Mitigation Planning Team ranked this as a low probability to occur within the next five years, but ranked as medium impact/assessment due to the need for mutual aid should an incident occur. The extent of this type of hazard exceeds the capacity of the local emergency services and would require assistance from nearby towns and State services.

Terrorism & Violence

Risk Assessment: Medium
Average Impact: Medium
Future Probability: Low

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

Location:
The risk from terrorism and violence is Town-wide.

Extent:
Very limited extent, Madbury has limited exposure to violence and terrorism.
Within the immediate area of a terrorist event, police, fire and other public officials are relied on for direction and on-scene emergency management. However, preparations for a terrorist event are made in much the same way as other crisis events wherein foundational emergency management best practices are followed. Current threats and reports from international attacks also warrant continued training in an effort to identify secondary attack potentials and ensure first responders remain cognizant of the potential for continued attacks after the first occurrence of such.

Homegrown violent extremists (HVEs) is a person or group of people who are inspired by a global terrorist organization that prepares, plans, and executes their attacks without direct support or guidance from the terrorist organization. Lone wolf offenders are not directed or controlled by any specific terror group, but are often inspired by domestic terror group beliefs, grievances, and rhetoric through propaganda videos and articles.

The threat of a terror attack by HVEs or lone wolf offenders is of significant concern based on their lack of connection to a larger conspiracy, autonomy and low profile, all of which limit the ability of law enforcement to detect and disrupt such plots. Furthermore, attacks of this nature present equal risk to every state, city, town, and municipality in the U.S., as the symbolic targeting of key infrastructure and population locations is often focused on the nearest available target rather than the national visibility of that target.

Previous Hazard Events:
The HMPT identified no instances of terrorism in the Town since the 2019 plan.

Probability of Future Events:
Due to there being no historical information about terrorism in Madbury, the probability is low.

Transportation Accidents

Risk Assessment: Low
Average Impact: Low
Future Probability: Low

Definition:
A transport accident is any accident that occurs during transportation. This plan refers explicitly to accidents via rail, shipping, plane, tractor-trailer, or vehicle accident.

Location:
The risk from transportation accidents is Town-wide.

Extent:
Limited extent, state numbered roads 9, 108, and 155 pass through Town over short stretches along with a short stretch of rail.

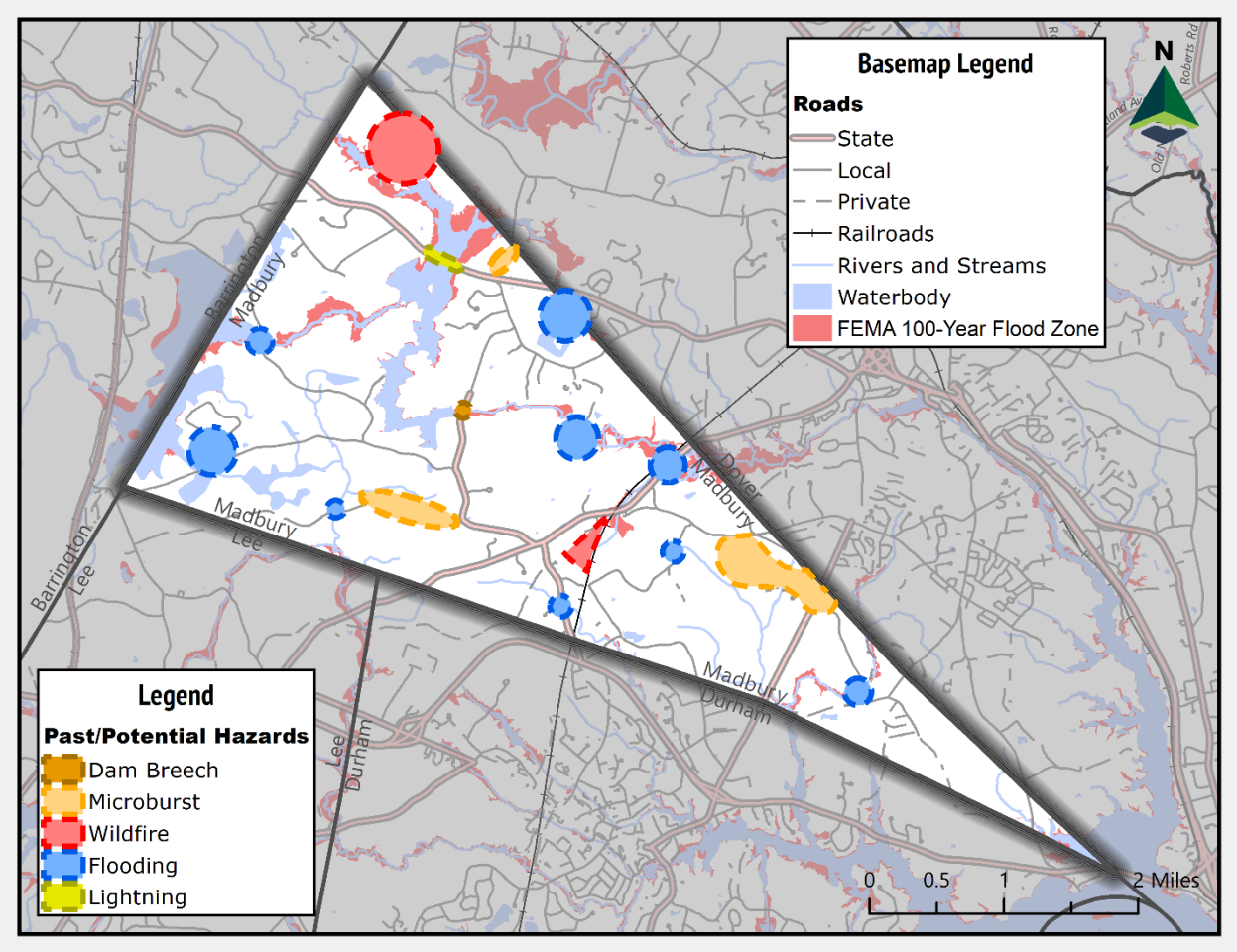
Figure 5-25: Miles of Road by Legislative Class

	State			Municipal			
NH DOT	I	II	II	IV	V	VI	Total
2019	3.04	4.64			21.02	3.16	31.85

Previous Hazard Events:
The HMPT did not recall any significant transportation accidents within the last five years.
According to the New Hampshire Information and Analysis Center, over the past 20 years New Hampshire has experienced an annual average of 117 fatal crashes (127 victims) due to vehicular transportation accidents. According to the National Highway Traffic Safety Administration, New Hampshire had a 47 percent increase in traffic fatalities between 2019 and 2022, from 101 to 148.

Probability of Future Events:
Transportation accidents will certainly continue to be a hazard for the Town, but transportation accidents with significant impacts remain very limited. While crashes will be primarily limited to the State Routes, other accidents will persist due to the main form of transportation being via car, despite safety improvements along town-maintained and state-maintained roadways.

Figure 5-26: All Hazards in Madbury



CHAPTER 6: CLIMATE CHANGE

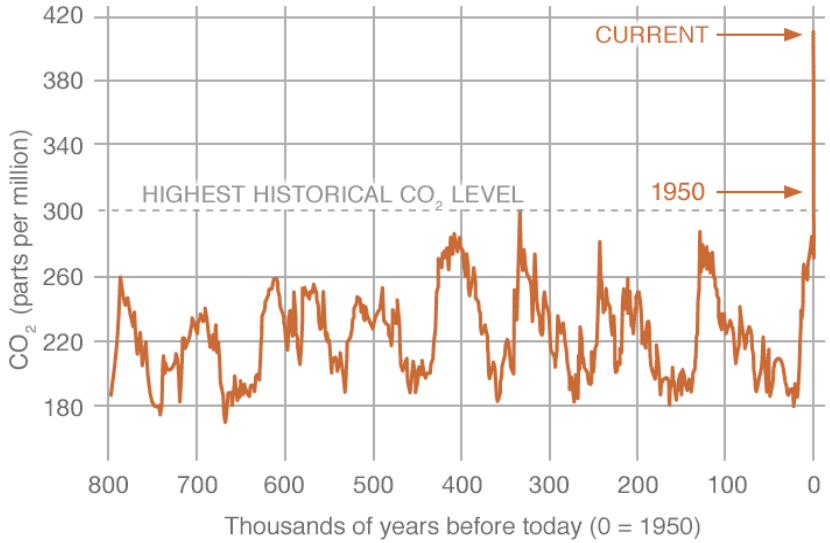
Increase in Intensity and Frequency of Severe Weather Events

Introduction

According to the National Aeronautics and Space Administration's (NASA) Global Climate Change, there have been seven cycles of glacial advance and retreat over the last 650,000 years, with most of these changes driven by fluctuations in the Earth's orbit that alter the amount of solar energy the planet receives, especially in the northern hemisphere, combined with the powerful ice-albedo feedback loop (ice is more reflective than land or water surfaces). Other influences on Earth's climate on shorter timeframes (annual to century scales) include variations in solar output and volcanic eruptions that generate particles that reflect sunlight, which can brighten the planet and cool the climate. These processes are natural and will continue to affect the planet's climate; however, an extensive and ever-growing body of scientific evidence—the IPCC's Fifth Assessment and the Fourth National Climate Assessment for example— point to human activities, and especially the burning of fossil fuels, as being responsible for the warming of the planet over the past 50 years.

As of November 2020, concentrations of carbon dioxide (CO_2) in the Earth's atmosphere have reached 415 parts per million (ppm). For context, according to ice core samples, CO_2 concentrations never exceeded roughly 300 ppm over the last 400,000 years and studies have shown that human activities have raised atmospheric concentrations of CO_2 by 47% since pre-industrial levels in 1850.

Figure 6-1: Proxy Measurements of CO_2 taken from Reconstruction of Ice Cores



Atmospheric levels of other greenhouse gases, including methane, nitrous oxide, and CFC have also risen over the past several decades as well. This increase in atmospheric greenhouse gases is primarily responsible for the rise in the planet's average surface temperature of about 1.6°F since the late 1800s, with most of the warming occurring in the last 50 years. Nineteen of the twenty warmest years on record have happened since 2001. This warming trend is considered extremely likely to continue. These increases in temperature have affected the Earth's climate in many ways. Ocean temperatures have warmed, the Greenland and Antarctic ice sheets are rapidly losing mass, glaciers are retreating all over the world, global sea-level is rising, snow cover has decreased, and the number of record high temperatures and intense rainfall events has been increasing since the 1950s.

Climate Change in Madbury

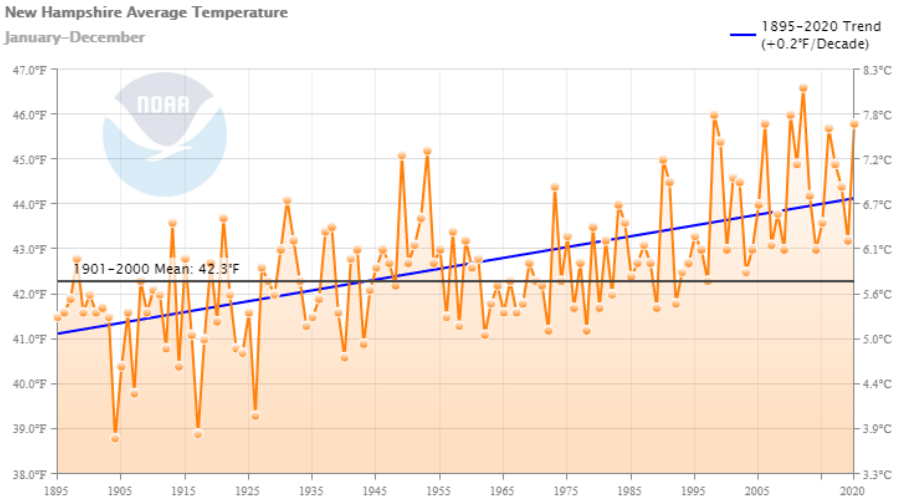
Madbury will experience increased intensity, duration, and frequency of disaster events in line with State changes. The HMPT identified the likely hazards to impact the Town (see: Chapter 3 Hazard Identification), and did not anticipate changes to this list, additions or subtractions, in the next five years.

Climate Change in New Hampshire

Increased Temperature on Land

Temperature, of course, is one of the most used indicators for climate change. Historically, New Hampshire has been characterized by cold, snowy winters and mild summers but there has been significant evidence this seasonal definition is changing. According to data from the NOAA National Centers for Environmental Information, since the early 20th century, the average annual temperature in the state has increased by approximately 3°F, and state's maximum temperatures have increased between 0.5°F and 2.6°F. The State's temperature change has been continuously recorded at three meteorological stations in southern New Hampshire (Keene, Durham, and Hanover) for the last century and all three weather stations show consistent long-term minimum and maximum temperature increases. Overall, more than half of the state's warmest years on records have occurred since 1990.

Figure 6-2: NH Average Temperature Change (1895-2020)

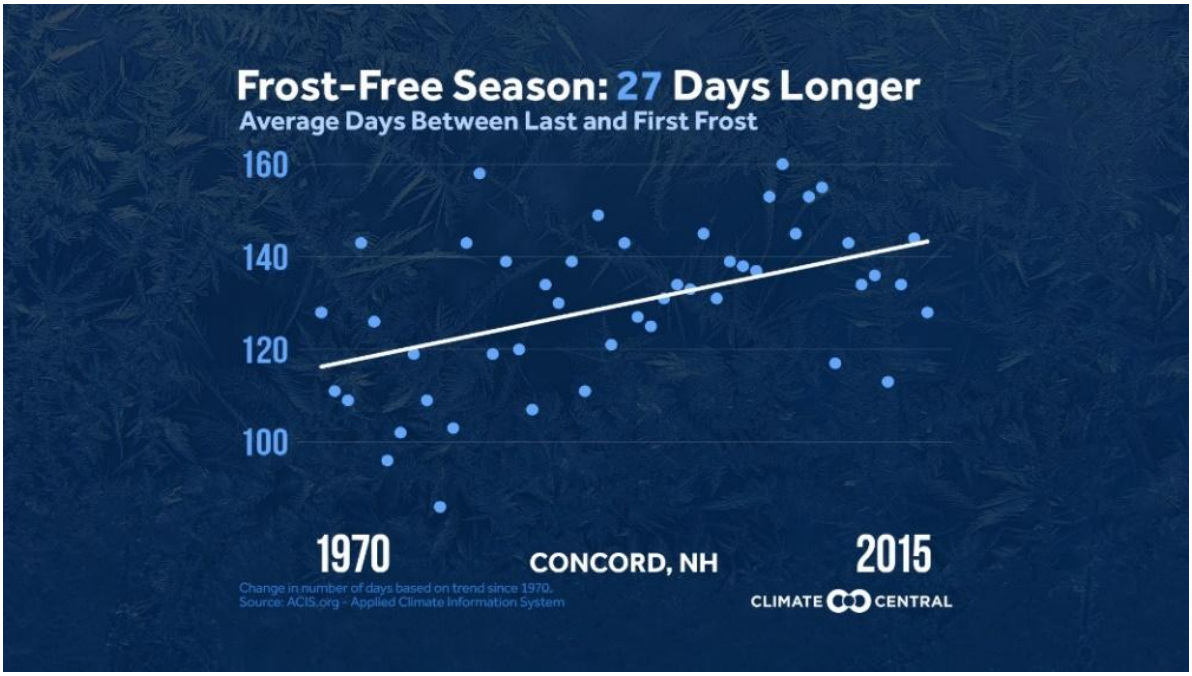


According to Wake et al. 2014, while the number of hot days has increased slightly across southern New Hampshire, there has been a dramatic increase in the rate of winter warming over the last four decades at all three stations, which may be linked to decreases in snow cover through changes in surface albedo, or reflectivity. In Southern New Hampshire, the number of hot days has increased slightly over the last five decades (+0.8 days per decade) and the number of cold days has reduced significantly. (-5.0 days per decade).

Changes in the distribution of hot and cold extreme temperatures can lead to the increased frequency, duration, and intensity of heat waves, increased nighttime warming, longer growing seasons, drought length and intensity, crop failure, and the expansion of suitable habitat for both Lyme disease-bearing ticks and invasive species such as the emerald ash borer. This change has been observed in New Hampshire as well as the Town of Madbury, which increases the town's vulnerability to extreme temperatures.

According to the EPA, accompanying the rising temperatures is a steady lengthening of the United States' growing season. The average growing season has lengthened by two to five weeks across the U.S since the beginning of the 20th century, with a particularly large increase over the last 30 years. Since 1970, data collected in Concord, NH shows an increase of 27 days between the first and last frost of the year. In Southern New Hampshire, the growing season has increased by 10 days per decade since 1960.

Figure 6-3: Length of Frost-Free Season in Concord, NH, 1970-2015



As the Northeast is known for its long, cold winters, and warm to hot summers, this seasonality is an important cultural and economic driver of regional economies such as agriculture, commercial fishing, forest products, and tourism. Cold, snowy winters help support regional tourism such as fishing, hunting, and winter sports. Timber harvesting on wet sites often occurs in the winter when soils are frozen, or snow covered, and maple sugaring depends on sufficient cold winters for adequate sap quantities. Milder winters and early springs are adversely impacting the region's tourism, farming, and forestry activities.

The growing season determines what crops can be grown in a region and changes can have both positive and negative effects. While a longer season can allow farmers to diversify their crops or have multiple harvests from the same plot, it can also limit the types of crops grown, increase the heat stress on crops, encourage invasive species or weed growth, and increase pests and irrigation demands. Farmers will need to combat the northward expansion of the European corn borer and the Western corn root worm on their crops, and the warmer temperatures will likely allow the codling moth—an apple tree pest—to complete a third generation requiring additional insecticide applications.

More Rainfall and Less Snow

As winter warms in New Hampshire, snowfall and snow cover will continue to decrease (See Increased Temperature on Land). Although snowfall amounts in recent winters have varied, overall snowfall has been decreasing at most monitoring stations and the number of snow-covered days is decreasing throughout the state. This is because as cold seasons warm, more precipitation falls as rain instead of snow. Precipitation across the region has increased in the last century, with the highest number of extreme precipitation events happening in the last decade. Between 1958 and 2010, the northeastern United States experienced a 70% increase in precipitation during heavy rain events. The statewide average for annual precipitation is 44.2 inches, with higher amounts in the southern and eastern parts of the state due to proximity to the Atlantic Ocean. This average in southeastern New Hampshire is projected to increase by 5-10% by mid-century and 7-15% by 2100—with a subsequent increase in flooding. The increase is expected to be greatest in the winter and spring, intermediate in the summer, and lowest in the fall.

These observations in total and seasonal precipitation are due to an increase in the intensity and frequency of individual precipitation events, with the Great Bay watershed showing a 15-38% magnitude increase of extreme daily precipitation since the 1950s. These large precipitation events have contributed to significant springtime flood events in coastal New Hampshire and are projected to increase the risk of future flooding. Extreme precipitation events also cause non-coastal flooding of rivers, streams, roadways, and active agricultural fields which can result in contamination of farmland soils by floodwaters as well as crop failure. It is anticipated that this will increase Madbury's vulnerability to climate change.

Drought

Drought is yet another prominent extreme weather event that is increasing due to climate change. In the 21st century, droughts have been characterized by hotter temperatures, longer durations, and greater spatial extent with recent years being punctuated by periods of moderate to extreme drought development. Droughts are also exacerbated by growing human demands on water resources. Drought conditions have historically been driven by sea surface temperatures, internal atmospheric variability, and land-atmosphere feedback, but human-caused climate change is increasingly affecting the frequency, intensity, and extent of droughts. While it is projected there will be increased precipitation in New Hampshire, the intensity of naturally occurring droughts is projected to increase as well. This is because higher summer temperatures will increase the rate of depletion of soil moisture during dry spells and the projected increases in average annual precipitation will take place primarily during the winter and spring. Practically, this could look like rainier winters and springs with more extreme precipitation events and longer periods without precipitation more prone to drought in the summer and fall.

For example, over the past two decades, the state has experienced several significant periods of drought including in 2001-2002; 2015-2016, 2020; and most recently 2021. The most recent drought period only ended due to extreme precipitation in the month of July 2021. The NH Drought Management Program determined that the drought that impacted the state in the early 2000s was the third worst on record, and that recent droughts were due to a combination of a below average snowpack in the spring, little precipitation to recharge the groundwater, and the inability of watersheds to store large volumes of water due to their geology. With extreme variation in environmental conditions due to climate change, drought probability may grow in the future.

The large amount of water resources and relatively sparse population in New Hampshire, including Madbury, have tended to minimize the impacts of drought events in the region, but this protection may be endangered in the future with increases in drought frequency or severity combined with population growth and increased development. Increased development means more impervious surfaces, and more impervious surfaces will contribute to additional precipitation runoff and less groundwater recharge during rain and flooding events. Impacts from climate change may cause a 10% increase in annual groundwater recharge rates in the New Hampshire coastal region over the next century; however, increases in impervious surfaces may reduce this recharge 5 to 10%. Land development associated with increases in demand due to population growth will also increase groundwater withdrawals for drinking water and will contribute to intensified groundwater depletion during droughts.

Increased Temperature in the Ocean

Worldwide, ocean temperatures are also increasing. The Gulf of Maine is warming at an accelerating rate, three times as fast as the average global rate in the last three decades and seven times as fast in the last 15 years. In 2012, during the most intense ocean heat wave in the last three decades, sea surface temperatures in the Gulf of Maine were a record-breaking 69.98°F. These warming temperatures are having cascading effects on environmental and ecological patterns such as marine species migrating northward in search of colder waters, and are already impacting NH fishing grounds with the closure of the Gulf of Maine Shrimp Fishery based on depleted shrimp populations. These changes also lead to higher levels of evaporation and greater moisture in the air, which contributes to more precipitation and extreme weather events.

Greenhouse Gas Emissions

The New Hampshire Department of Environmental Services (NHDES) conducts an annual greenhouse gas (GHG) emissions inventory that tracks the six main GHG's, including carbon dioxide, methane, nitrous oxide, and three industrial process gases (hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride). According to 2017 data, carbon dioxide makes up the majority of NH's GHG emissions (92%), primarily due to burning fossil fuels for heat, electricity, and to power motor vehicles. GHG sources are usually categorized into the following sectors: transportation, electricity generation, residential, commercial, industry, waste and wastewater, and agriculture. Transportation is the predominant sector, producing an estimated 47% of the state's GHGs.

Fortunately, a large majority of NH is forested, with these areas acting as a carbon sink. This process, called carbon sequestration, could be responsible for absorbing and storing nearly 25% of CO_2 emissions from the burning of fossil fuels in the state. Intact forested ecosystems are also a major factor in **climate resiliency** for

New Hampshire. It is estimated that a 40-acre forest in northern New Hampshire holds the same amount of carbon as 53,000 automobile tanks of gasoline. Large undeveloped and unfragmented forested blocks are also very important for wildlife and biodiversity conservation and as of 2019, 47% of large forest blocks in the state are permanently conserved. Climate corridors, identified by the Nature Conservancy as part of their Resilient and Connected Landscapes project, facilitate tree and wildlife species range shifts as temperatures and habitat continue to change. Intentionally keeping areas forested and protected is a natural safeguard for fresh drinking water and clean air for local communities and offers numerous benefits for the state overall, both now and in the future.

Air Pollution

New Hampshire has a network of 13 air quality monitoring stations that continuously monitor air pollutants. NHDES staff track progress in reducing air pollution and inform the public about air quality in their communities and any necessary health precautions. New Hampshire's regulated air pollutant levels have generally dropped since the 1970s, but air quality in many parts of the country still fails to meet health-based air quality standards. While the impact of climate change on the production of fine particulate matter pollution has been inconclusive, warmer temperatures associated with climate change will increase ozone production and ozone concentrations in urban areas. This is likely to lead to more pollution-related cardiorespiratory illness and death in the state.

Species Migration and Invasive Species

The timing of biological events (bird migration, wildlife breeding, plant flowering and fruiting) is determined by variables such as seasonal temperature, food availability, and pollination. In the Northeast, flowering dates are occurring one week earlier than the mid-1800s and migratory birds are arriving and breeding earlier, revealing a shift in migratory patterns. Forests are a defining feature of New Hampshire and climate change has the potential to alter the forest species composition, distribution, abundance, and productivity (as well as their associated species) in several ways. While not uniform and depending on the suitable habitat characteristics for species (such as soils, elevation, latitude, and other factors), some tree species will experience decreases in suitable habitat, while others will see expansion of suitable habitat as the climate changes. Decreases in suitable habitat are projected to be greatest in Southern and Coastal New England.

While already a major threat to native New Hampshire ecosystems, nonnative plant and animal species are becoming more of a concern because of their increased potential to outcompete native species. Some nonnative species can establish themselves faster than native species because they lack competitors and are better able to respond to climate change-induced changes such as warmer temperatures, earlier springs, and reduced snowpack. Additionally, the warmer temperatures are likely to expand the ranges of certain invasive species that were previously limited by colder northern temperatures. Fewer days below freezing is leading to increases in rates of pest outbreaks and vector-borne diseases (disease that results from an infection transmitted to humans and other animals by blood-feeding arthropods, such as mosquitos, ticks, and fleas) such as Dengue fever, West Nile Virus, Lyme disease, and malaria. All these factors can lead to a decline of natural species, increases in nonnative or invasive species, and a reduction in biodiversity.

CHAPTER 7: ACTION PLAN

Mitigation Goals

The Madbury Hazard Mitigation Planning Team developed overarching goals and objectives, which are adapted from the 2023 NH State Hazard Mitigation Plan.

Overarching Goals

The following are the five overarching goals of this Plan:

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

Natural Hazard Objectives

The following are the natural hazard objectives of this Plan:

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

Technological Hazard Objectives

The following are the technological hazard objectives of this Plan:

- Ensure technological hazards are responded to appropriately and to mitigate the effect on citizens.
- Identify and respond to emerging contaminates.
- Enhance public education of technological hazards to assist in the prevention and mitigation of hazard impacts on the population.
- Ensure emergency responders are properly equipped and trained to respond, contain, and mitigate incidents involving technological hazards.
- Reduce the possibility of long-term utility outages by implementing mitigation reduction measures such as line clearing and removal of nuisance trees, as well as ensuring back-up power is in place and tested.
- Lessen the effects of technological hazards on communications infrastructure.

Human-Caused Hazard Objectives

The following are the human-caused hazard objectives of this Plan:

- Identify Critical Infrastructure and Key Resources (CIKR) risks or vulnerabilities and protect or strengthen infrastructure against hazards.
- Improve the ability to respond and mitigate Cyber Events through increased training, exercising, improved equipment, and utilizing accepted technologies.
- Foster collaboration between Federal, State, and Local agencies on training, exercising, and preparing for mass casualty incidents and terrorism. Ensure local assets (e.g., non-profits, schools, senior housing facilities, and other facilities and populations to protect) are prepared for all phases of emergency management including training and exercising on reunification.

Development of Action Items

The HMPT determined that any strategy designed to reduce personal injury or damage to property that could be done prior to an actual disaster would be listed as a potential mitigation strategy. The committee determined that this Plan was in large part a management document designed to assist town officials in all aspects of managing and tracking potential emergency planning strategies. For instance, the HMPT was aware that some of these strategies are more properly identified as readiness issues; however, did not want to "lose" any of the ideas discussed during these planning sessions and thought this method was the best way to achieve that objective.

The committee identified twenty-seven (13) new strategies to implement during the life of this Plan. These strategies are intended to supplement existing programs and the ongoing and not yet completed mitigation strategies identified in previous plan updates. When identifying new strategies, the committee balanced several factors including capacity to implement strategies, priority projects, existing strategies, policies, and programs, the hazard ranking, and whether a strategy will reduce risk associated with multiple hazards.

Prioritization of Action Items

A technique known as a STAPLEE evaluation, which was developed by FEMA, was used to evaluate new mitigation strategies based on a set of criteria (see below).

Figure 7-1: Prioritization "STAPLEE" Method

S	Social	Is the proposed strategy socially acceptable to the community? Is there an equity issue involved that would result in one segment of the community being treated unfairly?
T	Technical	Will the proposed strategy work? Will it create more problems than it solves?
A	Administrative	Can the community implement the strategy? Is there someone to coordinate and lead the effort?
P	Political	Is the strategy politically acceptable? Is there public support both to implement and to maintain the project?
L	Legal	Is the community authorized to implement the proposed strategy? Is there a clear legal basis or precedent for this activity?
E	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?
E	Environmental	How will the strategy impact the environment? Will it need environmental regulatory approvals?

The HMPT evaluated each mitigation strategy using the STAPLEE and ranked each of the criteria as poor, average, or good. These rankings were assigned the following scores: Poor=1; Average=2; Good=3.

The following questions were used to guide further prioritization and action:

- Does the action reduce damage?
- Does the action contribute to community objectives?
- Does the action meet existing regulations?
- Does the action protect historic structures?
- Can the action be implemented quickly?

The prioritization exercise helped the HMPT evaluate the new hazard mitigation strategies that they had brainstormed throughout the multi-hazard mitigation planning process. While all actions would help improve the Town's multi-hazard and responsiveness capability, funding availability will be a driving factor in determining what and when new mitigation strategies are implemented.

Figure 7-2: Mitigation Actions - 2025-2030								
New Mitigation Project 2025	**S**	**T**	**A**	**P**	**L**	**E**	**E**	**TOTAL**
Identify ways to send out information that doesn't rely solely on having power and an internet connection (NH Alerts & Code Red), for example, developing a list of addresses (using assessing data) for door-to-door notification and/or welfare checks during a hazardous storm event (prioritize vulnerable populations, eg. elderly and disabled).	2	3	1	2	3	3	3	17
Prepare and make available emergency preparedness information to Town residents, such as link to Ready.Gov and FEMA resources, or an Emergency Preparedness event.	3	3	3	3	3	3	3	21
Improve the communication tools for the Town to all residents, such as providing information in the community calendar, on the Town website, or advocate for more residents to sign up for emergency alerts.	2	3	3	3	3	2	3	19
Work with Portsmouth as they prepare dam inundation zone map if the Bellamy Dam were to fail. Prepare list of tax parcels and owners that would be impacted and notify those residents.	2	2	1	2	2	2	2	11
**Research options to create a Community Emergency Response Team (CERT) for the town to have a list of volunteers that meet certain requirements, including training to handle emergency situations.	2	3	2	3	2	3	3	18
Use the culvert analysis referenced in the C-RiSe vulnerability assessment report and stream crossing data to prioritize future culvert replacements and repairs.	3	3	3	3	3	1	2	18
Public works revisions, looking at succession plan for town staff; identify potential location(s) for new facility.	2	3	3	3	3	1	3	18
Review potential changes to Town Fire Dept/Emergency Response, eg share or contract with a neighboring community.	2	3	3	3	2	1	3	17
Research and review Town preparedness for virtual meetings in event of future pandemic or shelter-in-place event for town staff and town public hearings/meetings.	3	1	2	3	3	2	3	17
Replace generator at Public Safety complex to maintain operations.	3	3	1	3	3	2	3	18
Develop a warming/cooling option in Town Hall with improved HVAC system.	3	3	1	3	3	2	3	18
Amend stormwater regulations for SUB and SPR to strengthen performance standards.	3	3	2	3	3	2	3	19
Update the Local Emergency Operations Plan (LEOP) and coordinate it with annual update to HMP.	3	3	2	3	3	3	3	20

Implementation of Action Items

After reviewing the finalized STAPLEE numerical ratings, the Hazard Mitigation Planning Team prepared to develop the Implementation Plan (Figure 7-3). To do this, the HMPT developed an implementation plan that outlined the following:

- ∴ Type of hazard
- ∴ Affected location
- ∴ Type of Activity
- ∴ Responsibility
- ∴ Funding
- ∴ Cost Effectiveness; and
- ∴ Timeframe

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?

In addition to the prioritized mitigation projects, Figure 7-3, Implementation Plan, includes the responsible party (WHO), how the project will be supported (HOW), and what the timeframe is for implementation of the project (WHEN).

Following agency abbreviations used in Figure 7-3; bold letters identify the lead agency.

- EMD=Emergency Management Director
- PB=Planning Board
- RA=Road Agent
- FD=Fire Department
- PD=Police Department
- TS=Town Staff
- TA=Town Administrator
- SB=Select Board

Figure 7-3: Implementation Plan - 2025-2030					
New Mitigation Projects 2025	**Type of Hazard**	**Lead & Support Agencies (Bold=Lead)**	**Potential Funding Sources**	**Cost Effectiveness** *Low = < $5,000* *Med = $5,000 - $10,000* *High = > $10,000*	**Timeframe** *6 months - 1 year* *1 - 2 years* *2 - 5 years*
Prepare and make available emergency preparedness information to Town residents, such as link to Ready.Gov and FEMA resources, or an Emergency Preparedness event.	All	**SB**, TS, EMD	Budget	Low	1-2 Years
Update the Local Emergency Operations Plan (LEOP).	All	**FD**, EMD, SB	FEMA	Med	1-2 Years
Improve the communication tools for the Town to all residents, such as providing information in the community calendar, on the Town website, or advocate for more residents to sign up for emergency alerts.	All	**SB**, TS	CIP, budget	Med	6mos-1 Year
Amend stormwater regulations for SUB and SPR to strengthen performance standards.	Flooding, hurricane	**PB**	State (DES), PREPA	Med	2-5 Years
Research options to create a Community Emergency Response Team (CERT) for the town to have a list of volunteers that meet certain requirements, including training to handle emergency situations.	All	**SB**, TS	Budget	Low	1-2 Years
Use the culvert analysis referenced in the C-RiSe vulnerability assessment report and streamcrossing data to prioritize culvert replacements and repairs.	Flooding	**RA**, SB	CIP, FEMA, budget	High	2-5 Years

Public works revisions, looking at succession plan for town staff; identify potential location(s) for new facility.	All	**SB**, PWPC, RA	CIP	High	2-5 Years
Replace generator at Public Safety complex to maintain operations.	Power outages	**FD**, TS, SB	Grant, CIP	High	2-5 Years
Develop a warming/cooling option in Town Hall with improved HVAC system.	Power outages	**SB**, TS	Grant, CIP	High	2-5 Years
Identify ways to send out information that do not rely solely on having power and an internet connection (NH Alerts & Code Red), for example, developing a list of addresses (using assessing data) for door-to-door notification and/or welfare checks during a hazardous storm event (prioritize vulnerable populations, eg. elderly and disabled).	All	**TS**, SB, FD, EMD, PD	Budget	Low	1-2 Years
Review potential changes to Town Fire Dept/Emergency Response, eg share or contract with a neighboring community.	All	**SB**, FD, EMD, TS, consultant	Budget, CIP	High	1-2 Years
Research and review Town preparedness for virtual meetings in event of future pandemic or shelter-in-place event for town staff and town public hearings/meetings.		**TS**, EMD, SB	Budget, CIP	Low	1-2 Years
Work with Portsmouth as they prepare dam inundation zone map if the Bellamy Dam were to fail. Prepare list of tax parcels and owners that would be impacted and notify those residents.	Dam, flooding	**TS**, SB	Budget	Low	6mos-1 Year

CHAPTER 8: MONITORING, EVALUATION, AND UPDATING THE PLAN

Introduction

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

Multi-Hazard Plan Monitoring, Evaluation, and Updates

To track programs and update the mitigation strategies identified through this process, the Plan shall be reviewed and evaluated following each declared/non-declared event or at a minimum, on an annual basis. The Plan will be updated formally every five years. The review will detail any adjustments that need to be made to the Plan to illustrate changes from across the State, such as updated maps or changes in priorities from within the State's mitigation strategy.

The Emergency Management Director is responsible for initiating the review and will consult with members of the hazard mitigation planning team identified in this plan. The public will be encouraged to participate in any updates and will be given the opportunity to be engaged and provide feedback through such means as periodic presentations on the plan at town functions, surveys, and posting on websites. Public announcements will be made through postings on the Town website, in Town Hall, and social media page. A formal public meeting will be held before reviews and updates are official.

Changes will be made to the Plan to accommodate projects that have failed or are not considered feasible after a review for their consistency with STAPLEE, the timeframe, the community's priorities, or funding resources. Priorities that were not ranked high, but identified as potential mitigation strategies, will also be reviewed during the monitoring and update of the plan to determine the feasibility of future implementation. In keeping with the process of adopting this hazard mitigation plan, a public meeting to receive public comment on plan maintenance and updating will be held during the annual review period and before the final product is adopted by the Select Board.

CHAPTER 9: PLAN ADOPTION

Signed Certificate of Adoption

Town of Madbury, New Hampshire
Select Board

A Resolution Adopting the 2025 Multi-Hazard Mitigation Plan Update, Town of Madbury, NH

WHEREAS, the Town of Madbury authorizes responsible departments and/or agencies to execute their responsibilities demonstrated in the plan, and received funding from the NH Office of Homeland Security and Emergency Management under a Flood Mitigation Assistance Project Grant and assistance from Strafford Regional Planning Commission in the preparation of the 2025 Multi-Hazard Mitigation Plan Update, Town of Madbury, NH; and

WHEREAS, several public planning meetings were held between October 31, 2024 and March 13, 2025 regarding the development and review of the 2025 Multi-Hazard Mitigation Plan Update, Town of Madbury, NH; and

WHEREAS, the 2025 Multi-Hazard Mitigation Plan Update, Town of Madbury, NH contains several potential future projects to mitigate hazard damage in the Town of Madbury; and

WHEREAS, a duly-noticed public meeting was held by the Madbury **Select** Board on June 6th, 2025 to formally approve and adopt the 2025 Multi-Hazard Mitigation Plan Update, Town of Madbury, NH.

NOW, THEREFORE BE IT RESOLVED that the Madbury **Select** Board adopts the 2025 Multi-Hazard Mitigation Plan Update, Town of Madbury, NH

ADOPTED AND SIGNED this day of June 6, 2025

Tim Burt, Madbury **Select** Board, Chair

Eric Fiegenbaum
~~Town Seal~~ or Notary

ERIC N FIEGENBAUM NOTARY PUBLIC MY COMMISSION EXPIRES 3/27/2029 STATE OF NEW HAMPSHIRE

Date 6-6-2025

U.S. Department of Homeland Security
FEMA Region 1
220 Binney Street
Cambridge, MA 02142

FEMA

June 11, 2025

Robert M. Buxton, Director
New Hampshire Homeland Security and Emergency Management
33 Hazen Dr.
Concord, NH 03305

Director Buxton:

The U.S. Department of Homeland Security, Federal Emergency Management Agency (FEMA) Region 1 Mitigation Division has approved the *2025 Multi-Hazard Mitigation Plan Update, Town of Madbury, NH* effective **June 11, 2025** through **June 10, 2030** in accordance with the planning requirements of the Robert T. Stafford Relief and Emergency Assistance Act (Stafford Act), as amended; the National Flood Insurance Act of 1968, as amended; the National Dam Safety Program Act, as amended; and Title 44 Code of Federal Regulations (CFR) Part 201.

Mitigation plans may include additional content to meet Element H: Additional State Requirements or content the local government included beyond applicable FEMA mitigation planning requirements. FEMA approval does not include the review or approval of content that exceeds these applicable FEMA mitigation planning requirements.

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

The plan must be updated and resubmitted to the FEMA Region 1 Mitigation Division for approval every five years to remain eligible for FEMA mitigation grant funding.

www.fema.gov

Thank you for your continued commitment and dedication to risk reduction demonstrated by preparing and adopting a strategy for reducing disaster losses. Should you have any questions, please contact Jay Neiderbach at (202) 285-7769 or josiah.neiderbach@fema.dhs.gov.

Sincerely,

CHRISTOPHER J MARKESICH Digitally signed by CHRISTOPHER J MARKESICH
Date: 2025.06.11 12:45:26 -04'00'

Christopher Markesich
Floodplain Management and Insurance Branch Chief
Mitigation Division | DHS, FEMA Region 1

cc: Austin Brown, Mitigation & Recovery Section Chief, NH HSEM
Lynne Doyle, State Planner, NH HSEM
Richard Verville, Mitigation Division Director, DHS, FEMA Region 1
Josiah (Jay) Neiderbach, Hazard Mitigation Community Planner, DHS, FEMA Region 1

APPENDICES

Appendix A: Bibliography

Appendix B: Planning Process Documentation

Appendix C: Engagement Survey – Results

Appendix D: Technical and Financial Assistance for All-Hazard Mitigation
- Hazard Mitigation Grant Program (HMGP)
- Pre-Disaster Mitigation (PDM)
- Flood Mitigation Assistance (FMA)
- Repetitive Flood Claims (RFC)
- Severe Repetitive Loss (SRL)

Appendix E: Maps
- Emergency Response Facilities
- Non-Emergency Response Facilities
- Facilities and Populations to Protect
- Potential Resources
- Water Resources

Appendix A: Bibliography

1. Master Plan
2. Capital Improvements Program
3. Zoning Ordinance
4. Land Use Subdivision and Site Plan Regulations
5. C-Rise Vulnerability Assessment
6. Emergency Action Plan Bellamy Reservoir Dam

Appendix B: Planning Process Documentation

- List of Meeting Dates and Primary Agenda Items
- Meeting Sign-in Sheets

Figure B: List of Meetings with Hazard Mitigation Planning Team

Meeting	Date	Agenda Items
Meeting #1	10/31/2024	Status of past mitigation strategies, review of capabilities (existing programs and policies
Meeting #2	12/5/2024	Hazard identification, update to asset inventory, discuss past and potential hazards, and risk assessment
Meeting #3	12/19/2024	Begin discussion of potential action items, discuss survey and outreach to residents and stakeholders
Meeting #4	1/16/2025	Finalize mitigation action items, conduct STAPLEE prioritization exercise of action items
Meeting #5	3/13/25	Review of draft plan, particular attention to key chapters (Action Items and Priority Plan)

Town of Madbury, New Hampshire

Hazard Mitigation Planning Team
October 31, 2024
11:00 AM

Town Hall
13 Town Hall Rd
Madbury, NH

ATTENDANCE SHEET

Name	Position Title/ Department Affiliation	E-mail	Time spent preparing for meeting (reviewing material, compiling information, etc.)
MARK AVERY	Chair, Select Board		40 min
Justin Carrow	building inspector		20 min.
Marcia Goodnow	Chair, Planning Board		20 minutes
ERIC FIEGENBAUM	ADMINISTRATOR		1 HOUR
LIZ DURFEE	PLANNING CONSULTANT		30 MIN
TOM PERLEY	FIRE CHIEF / EMD		

Town of Madbury, New Hampshire

Hazard Mitigation Planning Team
December 5, 2024
11:00 AM

Town Hall
13 Town Hall Rd
Madbury, NH

ATTENDANCE SHEET – Meeting 2

Name	Position Title/ Department Affiliation	E-mail	Time spent preparing for meeting (reviewing material, compiling information, etc.)
MARK AVERY	SELECT BOARD	MARKAVERYMADBURY@GMAIL.COM	2 HRS
Marcia Goodnow	Planning Board Chair	marciagoodnow@gmail.com	1 hour
Justin Corrow	Building Inspector	bimadbury@Comcast.net	1hr.
LIZ DURFEE	contract Planner	liz@sfdesignplanning.com	0.5hr
ERIC FIEGENBAUM	ADMINISTRATOR	adminmadbury@comcast.net	0.5 hr
Mathew Paugh	Town Road Agent		
TOM PERLEY	EMD FC	TPERLEY@MADBURYFIRE.ORG	1L

Town of Madbury, New Hampshire

Hazard Mitigation Planning Team
December 19, 2024
11:00 AM

Town Hall
13 Town Hall Rd
Madbury, NH

ATTENDANCE SHEET – Meeting #3

Name	Position Title/ Department Affiliation	E-mail	Time spent preparing for meeting (reviewing material, compiling information, etc.)
ERIC FIEGENBAUM	ADMINISTRATION	adminmadbury @ comcast.net	1.0 HRS
LIZ DURFEE	contract planner	liz@efdesignplanning.com	0.25 hr
Justin Corrow	building inspector	bi madbury@comcast.net	½ hr
MARK AVERY	Select Board	MARKAVERYMADBURY@gmail.com	1 hr
Marcia Goodnow	Chair, Planning Board	marciagoodnow@gmail.com	.25

Town of Madbury, New Hampshire

Hazard Mitigation Planning Team
January 16, 2025
11:00 AM

Town Hall
13 Town Hall Rd
Madbury, NH

ATTENDANCE SHEET – Meeting #4

Name	Position Title/ Department Affiliation	E-mail	Time spent preparing for meeting (reviewing material, compiling information, etc.)
ERIC FIEGENBAUM	ADMINISTRATOR	adminmadbury@comcast.net	1.5 HRS
Justin Corrow	building inspector	bimadbury@comcast.net	.5 hr.
LIZ DURFEE	CONTRACT PLANNER	liz@efdesignplanning.com	0.5 hr
MARK AVERY	SELECT BOARD	MARKAVERYMADBURY@GMAIL.COM	1 HR
Marcia Goodnow	Planning Board	marciagoodnow@gmail.com	.5 hr

Town of Madbury, New Hampshire

Hazard Mitigation Planning Team
March 13, 2025
11:00 AM

Town Hall
13 Town Hall Rd
Madbury, NH

ATTENDANCE SHEET – Meeting #5

Name	Position Title/ Department Affiliation	E-mail	Time spent preparing for meeting (reviewing material, compiling information, etc.)
LIZ DURFEE	CONTRACT PLANNER	liz@elcdesignplanning.com	30 min
Justin Corron	Building Inspector	bimadbury@comcast.net	1 hr.
MARK AVERY	SELECT BOARD	MARKAVERYMADBURY@gmail.com	2 Hrs
Marcia Goodnow	Planning Board Chair	marciagoodnow@gmail.com	
ERIC FIEGENBAUM	ADMIN	adminmadbury@comcast.net	30 MINUTES

Appendix C: Engagement Survey – Results

(see Figure next page)

Survey Results - Town of Madbury - Hazard Mitigation Assessment - Survey of Residents & Stakeholders

Q1. How concerned are you with the following hazards impacting Madbury?

	Not concerned		Somewhat concerned		Very concerned		Total	Weighted Average
Flooding	57.14%	8	35.71%	5	7.14%	1	14	2
Drought	6.67%	1	66.67%	10	26.67%	4	15	3.4
Earthquake	78.57%	11	21.43%	3	0.00%	0	14	1.43
Extreme Temperatures (temperatures above 90 or below 0 degrees)	26.67%	4	53.33%	8	20.00%	3	15	2.87
High Wind: Tornadoes, Downbursts, Severe Wind	6.67%	1	66.67%	10	26.67%	4	15	3.4
Infectious Disease	46.67%	7	46.67%	7	6.67%	1	15	2.2
Landslide	85.71%	12	14.29%	2	0.00%	0	14	1.29
Lightning	21.43%	3	71.43%	10	7.14%	1	14	2.71
Severe Winter Weather: Heavy snow amounts, ice storms, blizzard, nor'easter	20.00%	3	53.33%	8	26.67%	4	15	3.13
Solar Storm and Space Weather: Radio blackouts/interference, solar radiation, solar flare	57.14%	8	42.86%	6	0.00%	0	14	1.86
Tropical Storm or Hurricane	14.29%	2	71.43%	10	14.29%	2	14	3
Wildfire	21.43%	3	50.00%	7	28.57%	4	14	3.14
Hazardous Materials	35.71%	5	57.14%	8	7.14%	1	14	2.43
Known and Emerging Contaminants: Drinking water contaminants, PFAs, saltwater intrusion	13.33%	2	46.67%	7	40.00%	6	15	3.53
Long-term Power Outage: 3 days or more	14.29%	2	28.57%	4	57.14%	8	14	3.86
Cyber Threats	35.71%	5	42.86%	6	21.43%	3	14	2.71
Transport Accidents	28.57%	4	64.29%	9	7.14%	1	14	2.57
							Answered	**15**
							Skipped	**0**

Q2. Please add any comments, descriptions, or locations that you have about safety in town due to disasters or events listed in Question 1.

Answered	**4**
Skipped	**11**

Q2. Responses

Being a rural town with lots of old growth trees, high wind and lightning storms pose a risk for downed trees and/or branches disrupting travel, power, internet, and possibly damage to homes in town. Power disruptions already can be seen in town during/after inclement weather (Pendexter/Perkins Roads).
More common droughts have pushed us into "high" wildfire risk situations multiple times over the past 5 years. And with a majority of town having private wells, there is always a risk of a groundwater contamination event taking place.
The Bellamy Dam, Madbury Metals -Snitzer, Hartford salt on Hayes Road, Transfer Station, Pike Industries
1.railroad passing through town 2.Problem at the Moharimet School (shooting) 3.Storm damage at Carrage Hill home
I feel like more proactive work needs to be done regarding limbs/brush along the roadways. I worry about long power outages relating to this as well.

Q3. How prepared do you feel you are for a natural disaster or severe weather event?

Answer Choices	Responses	
Not prepared	6.67%	1
Somewhat prepared	80.00%	12
Very prepared	13.33%	2
Why or why not?		7
	Answered	**15**
	Skipped	**0**

Q3. Why or why not?

Old Yankee prepper
I have my own well, a generator for extended power outages, heat, food, hot water to be self sufficient for a week or two if need be…
I have alternate sources for some things: water, heat, food, but not for others

Home generator, wood stove, small freezer, gas cook top
Very prepared, because we may be on our own for several days
We've had more severe storms which have knocked down trees in my yard. I worry about my property and the roads in Madbury.
Hard to know what you really need until you know what you will be up against

Q4. Do you want to get more involved in supporting preparedness and response within your neighborhood and/or the town (eg. sharing your resources, talent, or time)?

Answer Choices	Responses	
Yes	6.67%	1
No	46.67%	7
Maybe, I'll need more information	46.67%	7
	Answered	**15**
	Skipped	**0**

Q5. If you entered yes or maybe to the previous question, please provide your name and email.

Answer Choices	Responses	
Name	100.00%	6
Email	100.00%	6
	Answered	**6**
	Skipped	**9**

Q5. Responses suppressed to protect privacy

Q6. Which best describes you?

Answer Choices	Responses	
Resident of Madbury	100.00%	15
Business owner in Madbury	0.00%	0
Visitor to Madbury	0.00%	0
Other (please specify)	0.00%	0

	Answered	**15**
	Skipped	**0**

Q7. What is your age range?

Answer Choices	Responses	
Under 18	0.00%	0
18-29	0.00%	0
30-49	40.00%	6
50-64	33.33%	5
65+	26.67%	4
	Answered	**15**
	Skipped	**0**

Appendix D: Grant and Technical Assistance for Hazard Mitigation

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

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

FEMA's HMA grants are provided to eligible Applicants (States/Tribes/Territories) that, in turn, provide sub-grants to local governments and communities. The Applicant selects and prioritizes sub-applications developed and submitted to them by sub-applicants. These sub applications are submitted to FEMA for consideration of funding. Prospective sub-applicants should consult the office designated as their Applicant for further information regarding specific program and application requirements. Contact information for the FEMA Regional Offices and State Hazard Mitigation Officers is available on the FEMA website, www.fema.gov.

HMA Grant Programs
The HMA grant programs provide funding opportunities for pre- and post-disaster mitigation. While the statutory origins of the programs differ, all share the common goal of reducing the risk of loss of life and property due to Natural Hazards. Brief descriptions of the HMA grant programs can be found below. For more information on the individual programs, or to see information related to a specific Fiscal Year, please click on one of the program links.

A. Hazard Mitigation Grant Program (HMGP)
HMGP assists in implementing long-term hazard mitigation measures following Presidential disaster declarations. Funding is available to implement projects in accordance with State, Tribal, and local priorities.

What is the Hazard Mitigation Grant Program?
The Hazard Mitigation Grant Program (HMGP) provides grants to States and local governments to implement long-term hazard mitigation measures after a major disaster declaration. Authorized under Section 404 of the Stafford Act and administered by FEMA, HMGP was created to reduce the loss of life and property due to natural disasters. The program enables mitigation measures to be implemented during the immediate recovery from a disaster.
Who is eligible to apply?
Hazard Mitigation Grant Program funding is only available to applicants that reside within a presidentially declared disaster area. Eligible applicants are:

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

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

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

The State prioritizes and selects project applications developed and submitted by local jurisdictions. The State forwards applications consistent with State mitigation planning objectives to FEMA for eligibility review. Funding for this grant program is limited and States and local communities must make difficult decisions for the most effective use of grant funds. For more information on the **Hazard Mitigation Grant Program (HMGP),** go to:
http://www.fema.gov/government/grant/hmgp/index.shtm

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

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

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

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

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

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

Types of FMA Grants
Three types of FMA grants are available to States and communities:

- Planning Grants to prepare Flood Mitigation Plans. Only NFIP-participating communities with approved Flood Mitigation Plans can apply for FMA Project grants
- Project Grants to implement measures to reduce flood losses, such as elevation, acquisition, or relocation of NFIP-insured structures. States are encouraged to prioritize FMA funds for applications that include repetitive loss properties; these include structures with 2 or more losses each with a claim of at least $1,000 within any ten-year period since 1978.
- Technical Assistance Grants for the State to help administer the FMA program and activities. Up to ten percent (10%) of Project grants may be awarded to States for Technical Assistance Grants

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

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

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

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

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

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

Definition

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

a) That has at least four NFIP claim payments (including building and contents) over $5,000 each, and the cumulative amount of such claims payments exceeds $20,000; or
b) For which at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building.

Purpose:

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

Federal / Non-Federal cost share:

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

Appendix E: Maps of Key Public Facilities and Infrastructure

- Emergency Response Facilities
- Non-Emergency Response Facilities
- Critical Infrastructure
- Vulnerable Populations to Protect
- Water Resources