

Multi-Hazard Mitigation Plan Update

City of Dover, NH

2026



Submitted to the New Hampshire Homeland Security & Emergency Management
By the
City of Dover, NH
with Strafford Regional Planning Commission



This project was funded from a grant which was awarded to the Department of Safety, Division of Homeland Security and Emergency Management (HSEM) from the Federal Emergency Management Agency (FEMA).

Acknowledgements

This plan was created through a grant from New Hampshire Homeland Security Emergency Management (HSEM).

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

2026 Hazard Mitigation Committee

Perry Plummer, *Dover Emergency Management Director/Fire Chief*
Dave Balian, *Dover Director of Welfare*
Donna Benton, *Dover Director of Planning & Community Development*
Christine Boston, *Dover School Superintendent*
Brendan Driscoll, *Dover Emergency Management Director/Fire Chief*
Mike Gillis, *Dover Media Services Manager*
Kevin Hebert, *Dover Recreation Department Director*
Jim Maxfield, *Dover Building Official*
Ken Mavrogeorge, *Dover Deputy Director of Community Services*
Kathleen Meyers, *Dover Asset Management Admin/IT*
Jill Semprini, *Dover City Engineer*
John Storer, *Dover Community Services Director*
Dave Terlemezian, *Dover Police Chief*
Heather Worrall, *Dover Director of Human Resources*

New Hampshire Homeland Security Emergency Management (HSEM)

Austin Brown, *Chief of Mitigation | State Hazard Mitigation Officer*
Lauren Morgan, *Hazard Mitigation Coordinator*
Lynne Ryan, *State Hazard Mitigation Planner*
Virginia Clasby, *Assistant Chief of Mitigation | State Hazard Mitigation Officer*

Strafford Regional Planning Commission (SRPC)

Lisa Murphy, *Senior Regional Planner*
Owen Corcoran, *Regional Planner*
Rachel Dewey, *Senior Data Analyst*
Stephen Geis, *Regional Planner*

Date of Conditional Approval from FEMA:

Date of Adoption by City:

Date of Final Approval from FEMA:

TABLE OF CONTENTS

Executive Summary.....	6
Chapter 1: Planning Process	8
Basic Methodology	8
Jurisdiction.....	8
Participation.....	9
Public Involvement	9
Accomplishments Since Prior Plan Approval	9
Chapter 2: Existing and Potential Policies, Programs, and Resources	12
Existing Plans, Studies, and Reports	12
National Flood Insurance Program	12
National Flood Insurance Program Status and Compliance	12
Integration of Other Plans	13
Existing Programs and Policies.....	13
Pre- and Post-Disaster Mitigation Capability Assessment.....	14
Chapter 3: Hazard Identification.....	18
Introduction	18
2026 Plan Update Hazard Identification.....	18
Hazard Revisions Between 2018 and 2026.....	19
Disaster Declarations in Strafford County	20
List of Major Disaster Declarations.....	20
List of Emergency Declarations.....	20
Chapter 4: Risk Assessment	21
Method for Rating Impacts, Probability of Occurrence, and Overall Risk	21
Impact Scoring	21
Probability of Occurrence	21
Overall Risk	21
Summary of Risk Scores for All Hazards.....	22
Risk Assessment Tool.....	23
Critical Facilities: Asset Inventory and Vulnerability.....	24
Bridges	25
Dams	27
Critical Facilities/Key Resources.....	28

.....	32
Chapter 5: Hazard Profiles and History of Events.....	33
Natural Hazards	33
Coastal Flooding.....	33
Inland Flooding	34
Drought	36
Earthquake (>4 on Richter Scale).....	40
Extreme Temperatures	43
High Wind Events.....	45
.....	47
Infectious Diseases.....	47
Landslides.....	51
Lightning	52
Severe Winter Weather	54
Solar Storms and Space Weather	57
.....	58
Tropical Storms, Hurricanes, and Tropical Cyclones.....	58
Wildfire	63
Technological Hazards	64
Aging Infrastructure	64
Conflagration	65
Dam Failure.....	66
Known and Emerging Contaminates.....	68
Hazardous Materials	70
Long-Term Utility Outage	70
Radiological.....	71
Human-Caused Hazards	72
Cyber Threats.....	72
Mass Casualty Incident	75
Terrorism/Violence (Large Crowd Events).....	76
Transport Accident.....	76
Chapter 6: Climate Change	78
Introduction	78

Climate Change in New Hampshire	79
Greenhouse Gas Emissions	79
Air Pollution	79
Increased Temperature on Land	80
Increased Temperature in the Ocean	81
More Rainfall and Less Snow	82
Drought	82
Species Migration and Invasive Species.....	83
Chapter 7: Action Plan	84
Mitigation Goals.....	84
Overarching Goals.....	84
Natural Hazard Objectives	84
Technological Hazard Objectives	84
Human-Caused Hazard Objectives.....	85
Development of Action Items.....	85
Prioritization of Action Items.....	85
Implementation of Action Items.....	89
Chapter 8: Monitoring, Evaluation, and Updating the Plan.....	94
Introduction	94
Multi-Hazard Plan Monitoring, Evaluation, and Updates	94
Chapter 9: Plan Adoption.....	95
Signed Certificate of Adoption.....	95
Final Approval Letter from FEMA	96
Appendices	97
Appendix A: Bibliography.....	98
Appendix B: Planning Process Documentation.....	99
Appendix C: Summary of Possible All-Hazard Mitigation Strategies	105
Appendix D: Technical and Financial Assistance for All-Hazard Mitigation.....	115
Appendix E: Successful Outreach Campaigns	119
Appendix F: Maps	120

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.

Dover’s Multi-Hazard Mitigation Plan Update 2026 is an update to the City’s 2018 Multi-Hazard Mitigation Plan and follows the planning requirements as found in the [FEMA Local Mitigation Planning Policy Guide](#), released April 19, 2022, 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
- High Hazard Potential Dams (required for HHPD Grant Program)

The purpose of this Plan is 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 Dover’s Hazard Mitigation Committee with assistance from the Strafford Regional Planning Commission (SRPC), as well as input from the New Hampshire Department of Safety Division of Homeland Security and Emergency Management (NHHSEM) Planning Section, other federal and state agencies, and the public.

Since 1953, Strafford County received 25 major disaster declarations, including nine (9) severe storms; five (5) hurricane or tropical storms; five (5) severe snow events or blizzards; three (3) floods; two (2) biological events; and one (1) severe ice storm.



Severe Storms



Hurricanes



Snow



Flood



Biological



Severe Ice Storm

The City’s plan has five overarching goals, which are adapted from the State of New Hampshire Multi-Hazard Mitigation Plan (2023), 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 Dover 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 City
- 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 continuation of essential services

This Plan considers natural, technological, and human-caused hazards (Table 1). After a review of the hazards listed in the New Hampshire Multi-Hazard Mitigation Plan, several hazards were consolidated and renamed for consistency, and nine hazards were added to the plan for a total consideration of 23 hazards across the three hazard types: natural, technological, and human-caused hazards. The plan addresses the following hazards:

Table 1: 2026 Identified Hazards		
Natural Hazards	Technological Hazards	Human-caused Hazards
Inland Flooding	Aging Infrastructure	Cyber Attack
Drought	Conflagration	Mass Casualty Incident
Earthquake	Dam Failure	Large Crowd Event
Extreme Temperature	Known and Emerging Contaminates	Transport Accident
High Wind Event	Hazardous Materials	
Infectious Disease	Long-Term Utility Outage	
Landslide	Radiological	
Lightning		
Severe Winter Weather		
Solar Storm & Space Weather		
Tropical Storm & Hurricane		
Wildfire		

CHAPTER 1: PLANNING PROCESS

Basic Methodology

The Plan was developed and updated using [FEMA’s 2013 Local Mitigation Planning Handbook](#), which sets forth a nine-task planning process (as illustrated in Figure 1) to be undertaken to update a Local Hazard Mitigation Plan, and included substantial local, state, and federal coordination. The completion of this new multi-hazard plan required significant planning preparation and represents the collaborative efforts of the City of Dover, the Hazard Mitigation Committee, and SRPC.

Figure 1: Local Mitigation Planning Handbook Tasks

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

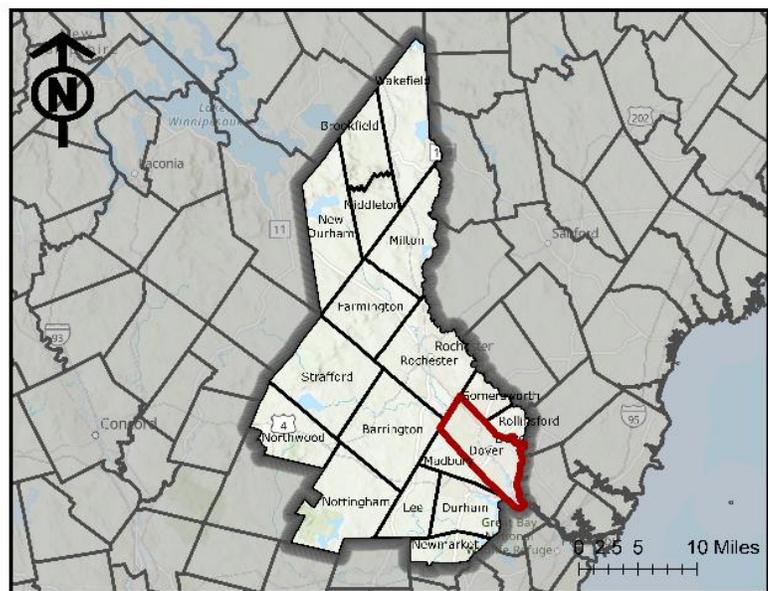
Several of the tasks were accomplished independently while other tasks were completed sequentially. While the 2026 update of the Plan was a complete overhaul to meet FEMA’s updated Local Mitigation Planning Policy Guide, much of the historical information came from the 2018 Plan and associated previous 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.

o

Jurisdiction

The Plan addresses only one jurisdiction – the City of Dover, NH. Once approved by the Hazard Mitigation Committee, the Plan was forwarded to HSEM for review and submittal to FEMA for approval pending adoption. Upon receiving approval pending adoption, the City held a public meeting to consider public comments and signed a Resolution to Adopt the Plan. Lastly, the Plan was sent to FEMA for final approval.

Map 1: Strafford Regional Area Locus Map



Participation

The Plan was updated with substantial local, state, and federal coordination. The completion of this new multi-hazard plan required significant planning preparation and represents the collaborative efforts of the City of Dover, FEMA, HSEM, Dover Hazard Mitigation Committee, and SRPC.

The Hazard Mitigation Committee met six times between October 28, 2025 and February 1, 2026 to discuss the range of hazards included in this plan as well as brainstorm mitigation needs and strategies to address these hazards and their impacts on people, business, and infrastructure in the City. All meetings were geared to accommodate brainstorming, open discussion, and an increased awareness of potential threats to the City. This process results in significant cross talk regarding all types of natural and man-made hazards. All feedback from participants of the committee were incorporated into the Plan. There was no participation from surrounding communities. There was no other public participation in the plan update process, although the meetings were posted and open to the public.

Supporting documentation on the planning process, including agendas and attendance sheets, can be found in Appendix A: Planning Process Documentation.

Public Involvement

Prior to the plan being submitted for conditional approval, Dover staff ensured that proper notice in accordance with RSA 91-A was met, including an announcement on the City's website explaining where residents could find the draft plan for review and comment. This public viewing period ran from (add dates). A copy of the Dover website posting can be found in Appendix B. Additionally, an announcement about the Plan update was included on the Strafford Regional Planning Commission's website and information about the Plan was included in SRPC's news updates to ensure that adjacent communities, academia and businesses were aware of any upcoming public meetings in Dover. An invitation to participate in the meetings was also sent to the abutting communities including Madbury, Rochester, Rollinsford, Somersworth, and Barrington.

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 also be a public meeting before each formal review and before any change/update is sent to HSEM. Once final approval by FEMA has been received, an electronic copy of the Plan will be distributed to the relevant city departments and personnel, HSEM, and FEMA. The Plan will remain on file at the Strafford Regional Planning Commission and will also be posted on the SRPC website.

Accomplishments Since Prior Plan Approval

Table 2 displays mitigation strategies, some of which were identified during the development of Dover's Multi-Hazard Mitigation Plan in 2002, 2010, and 2018. The Hazard Mitigation Committee provided a status update for each mitigation strategy during the preparation of the current Plan. Some of the accomplishments listed in Table 2 have decreased the vulnerability since the 2018 Dover Hazard Mitigation Plan.

Table 2. Accomplishments since Prior Plan Approval		
2026 Strategy	Status	Comments
Implement an action identified in the City's Strategic Plan to develop a community-wide risk reduction plan.	Completed	Action completed.
Ensure that all new and proposed CIP projects are required to consider the impacts from climate change, including sea-level rise and increases in extreme precipitation.	Completed	Started but can improve process.
*Review all existing CIP projects that are in design phase to ensure they are considering impacts from climate change, including sea-level rise and increases in extreme precipitation.	Completed and ongoing	Include this as a new action in the Action Plan.
*Develop and complete drainage improvements and shoreland stabilization along Cocheco River in coordination with waterfront development project.	Ongoing	Successful.
Develop a framework for an ongoing public education campaign on all-hazard preparation and self-resiliency for the 3 day - 72 hour event. The campaign will build off efforts currently underway with the elementary students, and may include a series of public service announcements for general and seasonal events.	Deleted	Revisit for new strategy.
*Update floodplain management brochure that was completed a few years ago (prior to the 2015 FEMA map adjustments and revisions to the City's floodplain ordinance). The updated brochure may include additional information on flood risk, revised freeboard and building permit requirements, and suggested flood-proofing techniques for homeowner.	Completed	Add as new action- Review for needed update.
*Review the updated floodplain model ordinance from Office of Strategic Initiatives and update the City's floodplain ordinance, as needed.	Deferred	Include this as a new action in the Action Plan.
*Determine the appropriate locations for additional warming/cooling stations throughout the city.	Completed	Keep as new action; review and update.
*Continue to implement the ongoing signalization project to install cameras at all 33 traffic lights locations to alleviate congestion areas and adjust timings as needed. This project will increase capacity to coordinate direction and traffic flow, as well as help during emergency widespread evacuation protocols.	Completed and ongoing	Add as new action.
Incorporate changes into the City's Site Plan and/or Subdivision Regulations based on the state's model water efficiency landscaping ordinance.	Completed	Revisit for new strategy.
*Street Reconstruction at Piscataqua and Rabbit Road – Design and reconstruction of Piscataqua and Rabbit Road.	Completed	Action completed.
*Street Reconstruction at Broadway – Design and proposed reconstruction including drainage curb, sidewalk, and road construction.	Completed and Ongoing	Include this as a new action in the Action Plan.
*Pump Station Equipment Replacement and Maintenance – Equipment upgrades and replacements for several sewer-pumping stations, including backup power to at least 3 or 4 of the stations.	Completed and ongoing	Include this as a new action in the Action Plan.
Purchase 3" & 4" Pump and Hoses – Community Services staff uses these pumps to pump from flooded areas to non-flooded areas during emergency events.	Completed	Action completed.

Table 2. Accomplishments since Prior Plan Approval		
2026 Strategy	Status	Comments
*Atlantic Avenue Reconstruction – This road is a main artery in and out of the city. Reconstruction is to replace the major drainage component of the road.	Deferred	Include this as a new action in the Action Plan.
*County Farm Road Bridge Replacement – Would provide additional access in and out of the North End area of the City.	Current & Ongoing	In design phase.
Message Boards – Used for evacuation plans, flooded areas, street closures and other emergency events.	Completed	Action completed.
New Bucket Truck – The current truck is 20 yrs. old and a replacement is needed for traffic lights and tree removal during emergency events.	Completed	Action completed.
*New Wood Chipper – To provide additional resources to assist in clean up after an emergency event.	Deferred	Include this as a new action in the Action Plan.
*Oak Street Railroad Bridge Replacement –Current bridge is only a 6-ton limit and is a major access thruway for both Dover and Rollinsford.	Current & Ongoing	In DOT 10-Year Plan.
*Old Colony Drainage – Two or three homes have major flooding during heavy rain events and winter melting. New drainage would resolve this problem.	Current & Ongoing	Currently doing areas of concern.
*Outer Sixth Street Replace Bridge & Culvert – Major overflows during heavy rain events. Replace bridge and raise the road. Provide additional access in and out of the North End area of the City.	Current & Ongoing	Replacing /upsizing culverts to reduce flooding.
*Raise County Farm Road – Maintain access to the Strafford County Complex, which includes the rest home, court, hospice care and jail.	Completed	Cost prohibitive for new bridge; exploring other options.
*River Gauges – Would be installed on the bridges crossing the major rivers to assist emergency personnel during flooding events.	Deferred	Include this as a new action in the Action Plan.
Sewer Jet – Equipment would replace the current 15-year-old unit.	Completed	Action completed.
*St. Thomas Street Drainage – Flooding occurs in this area due to the age of the infrastructure. Needs new design/reconstruction.	Current & Ongoing	Include this as a new action in the Action Plan.
*Tree Program – Using the City GPS and GIS program to identify all City trees. Also determine the health and potential hazards.	Current & Ongoing	In progress.
*Purchase generators –To power traffic lights at five critical intersections: Weeks Crossing, Central & Broadway, Central & Washington, NH9, and NH155. There is also consideration for: Glenwood & Central, Sixth and Whittier.	Current & Ongoing	4 generators purchased, more planned.
Central Falls Dam Project – investigate structural integrity of the retaining wall.	Completed	Action completed.
Status Update: Completed – This program continues to be an implemented mitigation action item since the last updated plan was developed Deferred – At the time of developing this plan, more time is required for completion Deleted – This existing program is no longer a priority to the City Current & Ongoing – The strategy is currently being addressed but was not completed at the time of writing this plan		

* These strategies will be included in the Action Plan.

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

During the 2026 hazard mitigation update process, the Hazard Mitigation Committee discussed Dover’s existing policies, programs, and resources related to hazard mitigation and its ability to expand and improve on these. The purpose of this discussion was to determine the ability of the City to implement its hazard mitigation strategies and to identify potential opportunities to enhance specific policies, programs, or projects. The evaluation included existing plans, studies, and reports; participation in the National Flood Insurance Program; the integration of land use planning mechanisms; and pre- and post-disaster mitigation capabilities.

Existing Plans, Studies, and Reports

To improve resilience from natural hazards, the City has taken a proactive approach in gaining a better understanding of risk and risk tolerance. Through a series of planning efforts, Dover has demonstrated its commitment to guiding and managing growth in a responsible manner. The following is an abbreviated summary of the relevant plans, studies, and reports already in place. Each one should be considered as an available mechanism for incorporating the recommendations of the Dover Hazard Mitigation Plan Update 2026.

- Dover Master Plan
- 2018 Dover Hazard Mitigation Plan

The City referred to the 2018 Dover Hazard Mitigation Plan to assist in drafting this updated plan. The Committee was not aware of any integration of information into other plans.

National Flood Insurance Program

Communities that participate in the National Flood Insurance Program (NFIP) have adopted and enforce community floodplain regulations. One of the community’s requirements is to require and obtain certain elevation data for all new and substantially improved structures located in a special flood hazard area. Community permitting officials must review this elevation data to ensure floodplain development complies with the regulations.

National Flood Insurance Program Status and Compliance

According to FEMA’s Community Status Book Report, Dover has been a member of the National Flood Insurance Program (NFIP) since April 15, 1980. The City has significant portions of land and property in the 100-year floodplain specifically along the mainstem of the Cocheco River and its tributaries (Blackwater Brook, Clark Brook, Reyners Brook); Fresh Creek; the Salmon Falls River; the Bellamy River; and the Piscataqua River. There are also portions of land in the 100-year floodplain around the Bellamy Reservoir. According to a previous GIS analysis, the City has an estimated 214 parcels with structures that fall within the floodplain, with a value in excess of \$30,000,000; however, this analysis was completed prior to the delineation of the new FEMA flood maps and may no longer be accurate.

Article VII of the City’s Zoning Ordinance (as revised 7/22/2015) outlines the City’s floodplain development regulations. The City of Dover recognizes the need to minimize the potential loss of life and property during periods of flooding regulating the alteration and/or the development of those areas of special flood hazard

identified by FEMA. The regulations shall apply to all lands designated as areas of special flood hazard by FEMA in its "Flood Insurance Study for the County of Strafford, N.H." dated September 30, 2015.

According to information from the FEMA Community Data Summary, Dover has 66 total policies (45 single family homes, 16 other residential structures, and 5 non-residential properties) in the floodplain hazard area. There have been 32 paid loss claims totaling \$921,910 with six repetitive loss claims.

Table 3: Community, Policy, and Claims Information						
Policies in Force	Insurance in Force	Building Type			Number of Paid Losses	Net Payment of Paid Losses
43 (B, C, D, X Zones)	\$21,089,0006	Single Family	Multi-Family	Non-Residential	32	\$921,910
23 (A Zones)		45	16	5		
66		66				

Table 4: Repetitive Loss Information		
Total Number of Repetitive Losses NFIP +FMA	Number of Repetitive Loss Single Family	Number of Repetitive Loss Other Residential
6	2	4

In order to remain NFIP compliant, Dover has implemented a number of actions, including:

- In 2019 and 2020, there were two high hazard dams that were removed to improve safety by eliminating the high hazard risks and restoring fish passage. In addition to these benefits, more than 3000 cu. yds of contaminated sediment behind the dam were removed.
- Several stormwater management projects in the Action Plan of the 2018 Dover Hazard Mitigation Plan are currently being implemented including: street reconstruction at Broadway, County Farm Road Bridge Replacement (currently in design phase), and Old Colony drainage.
- Completed the Central Falls Dam Project - investigate structural integrity of the retaining wall.

Integration of Other Plans

This plan will only enhance mitigation if balanced with all other City plans. Dover will take the necessary steps to incorporate the mitigation strategies and other information contained in this plan with other plans, such as the Zoning Ordinances and Land Use Regulations, Emergency Operations Plan, Capital Improvements Program, as well as other planning mechanisms, when appropriate. In addition, the city will review and make note of instances when this has been done and include it as part of their annual review of the Plan.

Existing Programs and Policies

Program Descriptions

Building Codes – Establishes regulations for the design and installation of building systems.

Local Emergency Operations Plans (LEOP) - Defined notification procedures and actions that should be taken in different emergency situations.

Storm Drain Infrastructure Improvements - Responsible for catch basins, culverts cleaning, ditch maintenance, structure upkeep and maintenance for the entire City in compliance with MS4 stormwater regulations.

Tree Program – working with tree warden and Conservation Commission to identify forest timber opportunities. Also to determine the health and potential hazards.

Evacuation and Notification - Evacuation and notification procedures are defined in Dover’s LEOP.

Emergency Back-up Power and Emergency Shelters - Offers temporary shelter during extended periods without power.

Hazardous Materials Response Team - The City of Dover is a member of the START Hazardous Materials Emergency Response Team, a regional effort to combine resources to mitigate hazardous materials incidents. On-going training, education and acquisition of resources are important for the team.

Floodplain Management Ordinance - Local ordinance to regulate development in the floodplain.

Shoreline Water Quality Protection Act - Establishes minimum standards for the subdivision, use and development of the shorelands along the state’s larger waterbodies.

Master Plan - A guiding document used to manage Dover’s growth and development through local land use regulations.

Dover Host Plan - The Plan is part of the New Hampshire Radiological Emergency Preparedness (REP) Program and contains the planning information and procedures specific to the City of Dover.

Emergency Planning for Wastewater - A Plan is to assess the vulnerability of the municipal wastewater system in regard to extreme conditions or events.

Emergency Planning for Potable Water Supplies - The purpose of the Plan is to assess the vulnerability of the municipal water system in regard to extreme conditions or events. The Plan covers the entire city, and was last revised in 2008.

Capital Improvements Program (CIP) - A program that helps to address improvement projects over a period of time.

National Flood Insurance Program (NFIP) - A program created by the US Congress in 1968. The purpose of this program is to share the risk of flood losses through flood insurance and to reduce flood damages by restricting floodplain development.

Stormwater Management Regulations - A comprehensive, site-specific document that details strategies to manage, treat, and reduce pollution, erosion, and sediment from stormwater runoff.

Dam Inundation Plan - A plan that maps and defines the downstream areas expected to flood if the dam breaches or fails.

Site Plan Regulations - A Planning Board document that provides regulations to guide the development of commercial, industrial, and multi-family residential projects.

Subdivision Regulations - A Planning Board document that provides regulations to guide residential development projects.

Site Development Design Criteria - Stormwater Management, Erosion Control, Flood Hazards

Zoning Ordinance - A local law that outlines permitted uses and divides land into districts with information on permitted uses in each district. Last updated on October 13, 2025.

Pre- and Post-Disaster Mitigation Capability Assessment

As part of the update process, the Hazard Mitigation Committee 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 Table 5, each capability

was reviewed and identified as either Good, Average, or Poor. The Hazard Mitigation Committee discussed changes and improvements, as well as suggestions, since the 2018 Plan. Certain capabilities were removed/deleted as they no longer exist or were specifically preparedness/response oriented. During this process, gaps were identified and considered in creation of the 2026 mitigation actions.

Good = Meets or exceeds expectations

Average = generally meets expectations but may need improvements

Poor = Below expectations and need improvements

Table 5. Program/Policy	Area Covered	Responsible Party	Effectiveness	Improvements Needed/ Comments
Building Codes	City-wide	Inspection Services	Average	Building and Fire Dept monitor these; additional staffing is needed.
Local Emergency Operations Plan (LEOP)	City-wide	Emergency Management Director	Average	Currently updating.
Storm Drain Infrastructure Improvements	City-wide	Community Services	Average	Need additional staffing for proper maintenance and operation.
Tree Program	City-wide	Community Services	Good	Hire a City Arborist to improve program.
Evacuation and Notification	City-wide	Emergency Management Director	Good	Increase awareness of Code Red and identification of at-risk population.
Emergency Back-Up Power and Emergency Shelters	City-wide	Emergency Management Director	Average	Identify additional shelter locations.
Hazardous Materials Response Team	City-wide	FD	Average	Additional training.
Floodplain Management Ordinance	Flood hazard areas	Zoning Administrator	Average	Review ordinance and update as needed.
Shoreline Water Quality Protection Act	250' around shoreline areas	Zoning Administrator	Average	Review ordinance and update as needed.
Master Plan	City-wide	Planning Director	Good	Currently updating.
Dover Host Plan	City-wide	Emergency Management Director	Good	No changes are needed at this time.
Emergency Planning for Waste Water	City-wide	Community Services	Average	Infrastructure concern, lack of redundancy.
Emergency Planning for Potable Water Supplies	City-wide	Community Services	Good	Multiple well points, one interconnection tied to another; design is being considered for an additional one.
Capital Improvements Program (CIP)	City-wide	City Manager	Good	Implement software; review debt policy.
Member of NFIP	Flood Hazard Areas	Zoning Administrator	Good	No changes needed at this time.
Stormwater Management Regulations	City-wide	Planning Director	Average	Review and update.
Dam Inundation Plan	Dam inundation areas	Emergency Management Director	Good	No changes are needed at this time.

Table 5. Program/Policy	Area Covered	Responsible Party	Effectiveness	Improvements Needed/ Comments
Site Plan Regulations	City-wide	Planning Director	Good	Update as needed.
Subdivision Regulations	City-wide	Planning Director	Good	Update as needed.
Site Development Design Criteria-Stormwater Management, Erosion Control, Flood Hazards	City-wide	Planning Director	Good	Update as needed.
Zoning Ordinance	City-wide	Planning Director	Good	Update as needed. Last update was October 13, 2025.

CHAPTER 3: HAZARD IDENTIFICATION

Introduction

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 City of Dover. The following threats are included, assessed, and reviewed from the 2018 Plan.

Table 6: 2018 Identified Hazards	
Flooding (Riverine/Extreme Rain Event)	Coastal Flooding (Storm surge and sea-level rise)
Hurricane & Tropical Storms	Cyber Attacks
Severe Winter Storms	Extreme Temperatures
Severe Thunderstorms	Drought
Public Health Threats	Flooding (Dam Failure)
Hazardous Materials	Earthquake & Landslide
Tornado & Downburst	Wildfire

2026 Plan Update Hazard Identification

As a result of input from Hazard Mitigation Committee, 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 new hazards. The following threats are included, assessed, and reviewed in the 2026 Plan.

Table 7: 2026 Identified Hazards		
Natural Hazards	Technological Hazards	Human-caused Hazards
Inland Flooding	Aging Infrastructure	Cyber Attack
Drought	Conflagration	Mass Casualty Incident
Earthquake	Dam Failure	Large Crowd Event
Extreme Temperature	Known and Emerging Contaminates	Transport Accident
High Wind Event	Hazardous Materials	
Infectious Disease	Long-Term Utility Outage	
Landslide	Radiological	
Lightning		
Severe Winter Weather		
Solar Storm & Space Weather		
Tropical Storm & Hurricane		
Wildfire		

Hazard Revisions Between 2018 and 2026

The following is a summary of revisions made between the 2018 and 2026 Plans. The notable changes include the addition of 9 new hazards, splitting the Earthquake and Landslide hazards into 2 hazards, and renaming 4 hazards to match the NH Hazard Mitigation Plan Update 2023.

Table 8: Summary of Hazard Revisions between 2018 and 2026		
2018	2026	Description
Flooding (<i>Riverine/Extreme Rain Event</i>)	Inland Flooding	Renamed to match State Plan
Hurricane & Tropical Storms	Tropical Storm & Hurricane	No significant change
Severe Winter Storms	Severe Winter Weather	No significant change
Severe Thunderstorms	Lightning	Renamed to match State Plan
Public Health Threats	Infectious Disease	Renamed to match State Plan
Hazardous Materials	Hazardous Materials	No change
Tornado & Downburst	High Wind Event	Renamed to match State Plan
Coastal Flooding (<i>Storm surge and sea-level rise</i>)	Coastal Flooding	No change
Cyber Attacks	Cyber Attacks	No change
Extreme Temperatures	Extreme Temperatures	No change
Drought	Drought	No change
Flooding (<i>Dam Failure</i>)	Dam Failure	No significant change
Earthquake & Landslide	Earthquake	Split to match State Plan
	Landslide	
Wildfire	Wildfire	No change
	Solar Storm & Space Weather	New identified hazard
	Aging Infrastructure	New identified hazard
	Conflagration	New identified hazard
	Known and Emerging Contaminates	New identified hazard
	Long-Term Utility Outage	New identified hazard
	Radiological	New identified hazard
	Mass Casualty Incident	New identified hazard
	Large Crowd Event	New identified hazard
	Transport Accident	New identified hazard

Disaster Declarations in Strafford County

Strafford County, the county in which Dover is located, has experienced 25 disaster declarations, including Presidential Declarations (DR) and Emergency Declarations (EM), since 1953 that amount to over \$266 million in federal assistance. These were the result of multiple hazard types, with the most common being severe weather events. Since the 2018 Plan, there have been 3 major disaster declarations, outlined in red in the next two tables.

List of Major Disaster Declarations

Table 9: List of Major Disaster Declarations

Disaster Number	Year	Declaration Title	Amount	Local Remarks and/or Damage Assessments
399	1973	Severe Storms & Flooding	-	-
789	1987	Severe Storms & Flooding	\$4,888,889	-
917	1991	Hurricane Bob & Severe Storms	\$2,293,449	Extended power outages
1144	1996	Fall Nor'easter Rainstorm	\$2,341,273	Heavy rains
1199	1998	Severe Ice Storm, Rains and High Winds	\$12,446,202	Power outages, school closures
1643	2006	Severe Storms and Flooding	\$23,406,012	Major flooding damage
1695	2007	Severe Storms and Flooding	\$26,715,781	Major flooding damage
1782	2008	Severe Storms, Tornado, and Flooding	\$1,269,314	FEMA Damage Assessment
1812	2009	Severe Winter Storm	\$14,898,663	FEMA Damage Assessment
1892	2010	Severe Winter Storm	\$6,841,093	FEMA Damage Assessment
4026	2011	Tropical Storm Irene	\$1,262,645	FEMA Damage Assessment
4105	2013	Severe Winter Storm and Snowstorm	\$6,153,471	Snow removal and minor repairs
4209	2015	Severe Winter Storm and Snowstorm	\$4,917,407	Snow removal and minor repairs
4371	2018	Severe Winter Storm and Snowstorm	\$2,797,497	FEMA Damage Assessment
4457	2019	Severe Storms & Flooding	\$3,202,283	
4516	2020	COVID-19 Pandemic	\$203,266,929	FEMA Damage Assessment
18 declarations totaling approximately \$254,104,712				

List of Emergency Declarations

Table 10: List of Emergency Declarations

Disaster Number	Year	Declaration Title	Amount	Damage Assessments
3101	1993	Blizzards, High Winds & Record Snowfall	\$644,698	Snow removal
3166	2001	Snow	\$3,433,252	Snow removal
3177	2003	Snow	\$2,288,671	Snow removal
3258	2005	Hurricane Katrina Evacuation	\$9,887	Limited impacts
3207	2005	Record and/or Near Record Snow	\$3,611,491	Snow removal, school closures
3297	2008	Severe Winter Storm	\$900,000	Snow removal, school closures
3333	2011	Hurricane Irene	\$550,618	Limited local impacts
3344	2011	Severe Storm	-	Widespread power outages
3360	2012	Hurricane Sandy	\$644,301	Limited local impacts
3445	2020	COVID-19	-	Widespread shutdowns
10 emergency declarations totaling greater than \$12,082,918				

CHAPTER 4: RISK ASSESSMENT

The Dover Hazard Mitigation Committee 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 Hazard Mitigation Committee 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 2018 State Plan. The Hazard Mitigation Committee 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 City in determining which hazards pose the largest potential threats. This allowed the Hazard Mitigation Committee 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:

- Red - High: The hazard poses a high risk in Dover. Scores 10 +
- Yellow - Medium: The hazard poses a medium risk in Dover. Scores between 5-9
- Green - Low: The hazard poses a low risk in Dover. Scores between 1-4

Summary of Risk Scores for All Hazards

The Hazard Mitigation Committee, during a brainstorming session, used the method outlined above to determine the overall risk associated with hazards in Dover. Results are distributed below. Table 11 on the next page is the City's risk assessment tool and provides a more comprehensive illustration of each hazard and their risk scores.

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

- Tropical Storms/Hurricanes
- Coastal Flooding
- Mass Casualty
- Inland Flooding
- Aging Infrastructure
- Terrorism/Violence

13 hazards rated as having a **Moderate** overall risk in Dover

- High Wind Events
- Infectious Diseases
- Drought
- Severe Winter Weather
- Transport Accident
- Conflagration
- Hazardous Materials
- Extreme Temperatures
- Dam Failure
- Cyber Threats
- Lightning
- Wildfire
- Long-Term Utility Outage
-

5 hazards rated as having a **Low** overall risk in Dover:

- Earthquakes > 4.0 on Richter Scale
- Known/Emerging Contaminants
- Solar Storms & Space Weather
- Radiological
- Landslides

Risk Assessment Tool

Table 11: Risk Assessment Tool							
Hazard	Classification	Human Impact	Property Impact	Business Impact	Average Impact Score	Probability of Occurrence	Overall Risk
Tropical Storms/Hurricanes	Natural	5	5	4	4.67	3	14
Coastal Flooding	Natural	4	5	4	4.33	3	13
Mass Casualty	Human-Caused	6	3	4	4.33	3	13
Inland Flooding	Natural	3	4	4	3.67	3	11
Aging Infrastructure	Technological	2	4	5	3.67	3	11
Terrorism/Violence	Human-Caused	5	2	4	3.67	2	11
High Wind Events	Natural	3	3	3	3	3	9
Infectious Disease	Natural	4	2	3	3	3	9
Drought	Natural	3	3	3	3	3	9
Severe Winter Weather	Natural	3	3	3	3	3	9
Transport Accident	Human-Caused	3	3	3	3	3	9
Conflagration	Technological	3	3	3	3	3	9
Hazardous Materials	Technological	3	3	3	3	3	9
Extreme Temperatures	Natural	3	2	2	2.33	3	7
Dam Failure/Breach	Technological	2	3	2	2.33	1	7
Cyber Threats/Attacks	Human-Caused	2	2	3	2.33	3	7
Lightning	Natural	2	2	2	2	3	6
Wildfire	Natural	2	2	2	2	3	6
Long-Term Utility Outage	Technological	3	3	3	3	2	6
Earthquakes > 4 on Richter Scale	Natural	4	4	4	4	1	4
Known/Emerging Contaminants	Technological	1	1	1	1	3	3
Solar Storms and Space Weather	Natural	1	1	1	1	3	3
Radiological	Technological	2	1	2	1.67	1	2
Landslide	Natural	1	1	1	1	1	1

<p>Impact Scoring</p> <p>(1-2): Inconvenience to the population, reduced service/productivity of businesses, minor damages to property, and non-life-threatening injuries to people</p> <p>(3-4): Moderate to major damages to property, temporary closure and reduce service and/or productivity of businesses, and numerous injuries and deaths</p> <p>(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</p>	<p>Probability Scoring</p> <p>(1): 0%-33% Probability of the hazard occurring within 10 years (Low)</p> <p>(2): 34%-66% Probability of the hazard occurring within 10 years (Medium)</p> <p>(3): 67%-100% Probability of the hazard occurring within 10 years (High)</p>
--	---

Critical Facilities: Asset Inventory and Vulnerability

The following community assets include all public and private facilities that the Hazard Mitigation Committee considers essential for the delivery of vital services for the protection of the community, such as emergency operations centers, shelters, or utilities. Most of this list was generated from the previous (2018) Plan with updates on critical facilities that have been edited, added or removed from Table 12. All critical facilities and key resources are included in a series of maps in Appendix F. Assets are organized into four categories:

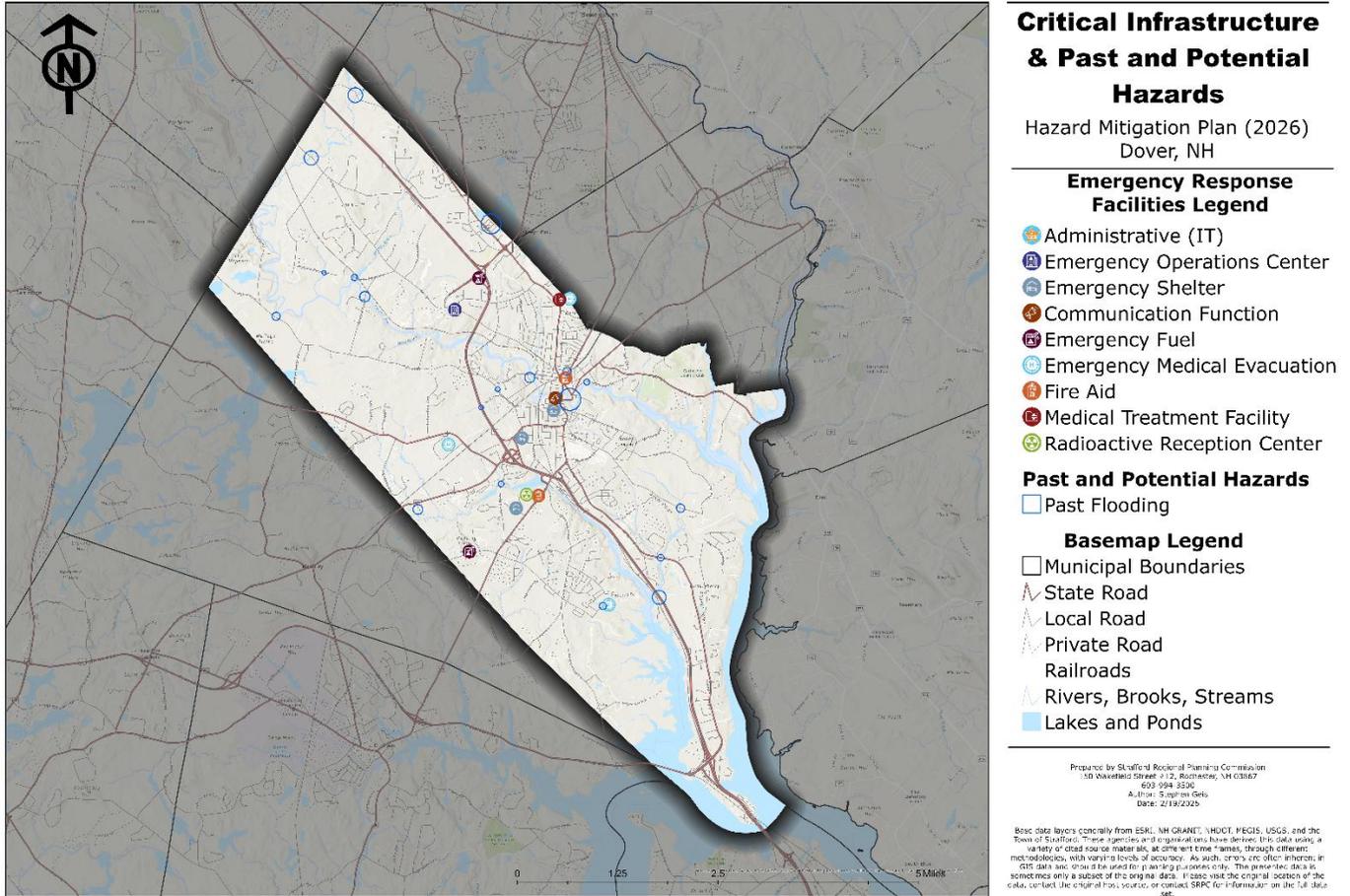
- 1) Emergency Response Facilities are primary facilities and resources that may be needed during an emergency response
- 2) Non-Emergency Response Facilities are facilities considered essential, that although critical, not necessary for immediate emergency response effort.
- 3) Facilities and Populations 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) Water Resources are water sources that may be used during emergencies.

Table 12: Emergency Response Facilities (ERF)

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

Facility	Type	Address
City Hall	Administrative (Information Technology)	288 Central Ave
Police Station	Primary Emergency Operations Center	46 Chestnut Street
Liberty North End Fire Station	Back-up Emergency Operations Center	262 Sixth Street
Central Fire Station	Fire	9-11 Broadway
South End Fire Station	Fire	25 Durham Road
McConnell Center	Primary Emergency Shelter	61 Locust Street
Dover High School	Primary Back-Up Emergency Shelter	25 Alumni Drive
Woodman Park	Back-Up Emergency Shelter	11 Towle Ave
Communication Tower	Primary Communication Tower	46 Chestnut Street
Dover Middle School	Radioactive Reception Center	16 Daley Drive
State Shed	Emergency Fuel	Indian Brook Drive
Public Works Garage	Emergency Fuel (diesel only)	271 Mast Road
Wentworth Douglass Hospital	Medical Facility	789 Central Ave
Helipad Locations	Emergency Medical Evacuation	Wentworth Douglass Hospital Industrial Park Drive Bellamy Fields
Evacuation Routes	Evacuation Planning	State Routes 4, 9, 16, 108, 155 Spaulding Turnpike Interstate 95 (Exit 5)

Map 2: Emergency Response Facilities



Bridges

The following is a list of state and local bridges, which are part of the critical transportation system that moves goods and services, many of which may be vulnerable to flooding and other disruptions. According to the 2018 State Plan, the average lifespan for a bridge is around fifty years, and the current average age of state-owned bridges in New Hampshire is 52-56 years.

Condition Rating:

Red Listed Bridges - Bridges designated for highway traffic having at least one major structural element (deck, superstructure, substructure, or culvert) with a condition rating of “4 = Poor” or less are categorized as “structurally deficient”. Bridges in “poor” condition are still considered safe for use, in accordance with posted weight restrictions.

Table 13: Bridges				
Bridge ID	Location	Condition	Owner	Year Built/Rebuilt
057/173	Sixth Street over Blackwater Brook	Structurally Deficient	City	1937
079/140	Watson Road over Cocheco River	Not Deficient	City	1986
084/165	NH16 over Long Hill Road	Not Deficient	State	1956, 1990
101/150	Indian Brook Drive over NH16	Not Deficient	State	1957, 1997
104/143	Glenwood Ave over NH16	Not Deficient	State	1957, 2002
105/133	NH16 over Cocheco River	Structurally Deficient	State	1957, 1991
105/138	Sixth Street over NH16	Structurally Deficient	State	1957, 2001
106/125	Tolend Road over NH16	Not Deficient	State	1957, 2003
106/133	NH 16/Spalding Turnpike over Cocheco R.	Structurally Deficient	State	1957/1991
109/106	NH9 over BMRR	Not Deficient	State	2011
111/132	Whittier Street over Cocheco River	Not Deficient	City	2018
113/111	NH16 (SB) over BMRR	Not Deficient	State	1957, 1992
113/112	NH16 (NB) over BMRR	Not Deficient	State	1957, 1992
120/098	Bellamy Road over Bellamy River	Not Deficient	City	1967
120/118	Washington Street over CSX	Not Deficient	City	1907
121/106	Silver Street over NH16	Not Deficient	State	1957, 2000
123/126	Fourth Street over Cocheco River	Not Deficient	City	1978
127/104	Cataract Ave over NH16	Not Deficient	State	1957, 2003
128/122	Chestnut Street over Cocheco River	Not Deficient	City	1975
130/099	NH108 over Bellamy River	Not Deficient	City	1986
131/123	NH108 (SB) over Cocheco River	Not Deficient	City	1976
132/101	NH16 (SB) over NH108/CSX	Structurally Deficient	State	1957/1999
132/102	NH16 (NB) over NH108/CSX	Structurally Deficient	State	1957/1999
134/122	NH108 (NB) over Cocheco River	Not Deficient	City	1977
136/123	Washington St. over Cocheco River	Not Deficient	City	2010
160/083	Gerrish Road over NH16	Not Deficient	State	1956/2001
169/130	Gulf Road over Fresh Creek	Not Deficient	State	1948
174/034	US4 over Bellamy River	Not Deficient	State	1998
182/036	US4 (WB) over NH16	Not Deficient	State	2020
182/123	Gulf Road over Salmon Falls River	Structurally Deficient	State	1950/1982
200/023	General Sullivan over Little Bay (Closed)	Structurally Deficient	State	1934/1950
201/024	NH16 (NB) over Little Bay	Not Deficient	State	2018

Dams

The following is a summary list of dams in Dover, which may be vulnerable to flooding and other disruptions. According to the NHDES Dam Bureau, Dover has 54 dams, however, only 25 have received a rating in the hazard classification. This includes all Non-Menace (NM), Low (L), Significant (S) and High (H) hazard dams. Dover has 1 High, 1 Significant, 1 Low, and 22 Non-Menace dams.

Table 14: Dam Classification Definition

Dam Classification	Classification Definition
High	Dam that has a high hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in probable loss of human life.
Significant	Dam that has a significant hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in no probable loss of lives but major economic loss to structures or property.
Low	Dam that has a low hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in no possible loss of life and low economic loss to structures/property.
Non-Menace	Dam that is not a menace because it is in a location and of a size that failure of misoperation of the dam would not result in probable loss of life or loss to property.

Table 15: Dover Dams

HAZCL	NAME	RIVER	HEIGHT ft	IMPND acres	DAM OWNER
NM	FARM POND DAM	UNNAMED STREAM	6	0.21	PRIVATE
NM	FIRE POND DAM	TR MALLEGO BROOK	6	0.5	PRIVATE
NM	BRADBURY DAM	TR BLACKWATER BROOK	6	0.75	PRIVATE
NM	ELLIOT ROSE POND DAM	UNNAMED STREAM	12	0.2	PRIVATE
NM	GATEWAY DET POND DAM	RUNOFF	6	1	PRIVATE
NM	BELLAMY R WILDLIFE POND DAM	BELLAMY RIVER	10	1.2	NH FISH & GAME
NM	SIXTH ST DET POND 1 DAM	RUNOFF	6	0.41	PRIVATE
NM	HEALTHCARE DET POND DAM	RUNOFF	14	0.21	PRIVATE
L	WATSON WALDRON DAM	COCHECO RIVER	18	54	NH DES WATER DIV
H	COCHECO FALLS DAM	COCHECO RIVER	15	20	CITY OF DOVER
NM	HUGGINS FARM POND DAM	UNNAMED STREAM	10	0.49	PRIVATE
NM	FARM POND DAM	TRIB TO LITTLE BAY BELLAMY R	10	0.56	PRIVATE
NM	FARM POND DAM	TR GANNEY BROOK	9	0.39	UNKNOWN
NM	TUTTLE MARKET FARM POND DAM	UNNAMED STREAM	12	0.77	PRIVATE
NM	TUTTLE FARM POND DAM	UNNAMED STREAM	12	0.36	UNKNOWN
NM	RECREATION POND DAM	UNNAMED STREAM	10	0.16	PRIVATE
S	THORNWOOD COMMONS POND DAM	VARNEY BROOK	16	2	PRIVATE
NM	FARM POND DAM	UNNAMED STREAM	10	0.5	PRIVATE
NM	WATER SUPPLY POND DAM	UNNAMED STREAM	7	0.26	UNKNOWN

HAZCL	NAME	RIVER	HEIGHT ft	IMPND acres	DAM OWNER
NM	WHITE FARM POND DAM	UNNAMED STREAM	12	1.9	PRIVATE
NM	WILDLIFE POND DAM	CANNERY BROOK	6	1.5	PRIVATE
NM	CRICKET BROOK DAM	CRICKET BROOK	---	---	PRIVATE
NM	FARM POND DAM	UNNAMED STREAM	7	0.71	PRIVATE
NM	BACK RIVER DET POND DAM	RUNOFF	12	0.2	PRIVATE
NM	HANNAFORD DET POND DAM	RUNOFF	10	0.148	PRIVATE

Table 16: 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	Lowell Avenue
Water Treatment Plant	Water Plant	Griffin Well
Water Treatment Plant	Water Plant	French Cross Road
Water Treatment Plant	Water Plant	56 Stonewall Drive
Wastewater Treatment Plant	Wastewater Plant	484 Middle Road
Solid Waste/Recycling Center	Residential Waste	265 Mast Road
Dover Transportation Center	Transportation Center	33 Chestnut Street
NH Park and Ride	Potential Logistics and Staging Area	23 Indian Brook Drive (Exit 9)

Critical Facilities/Key Resources

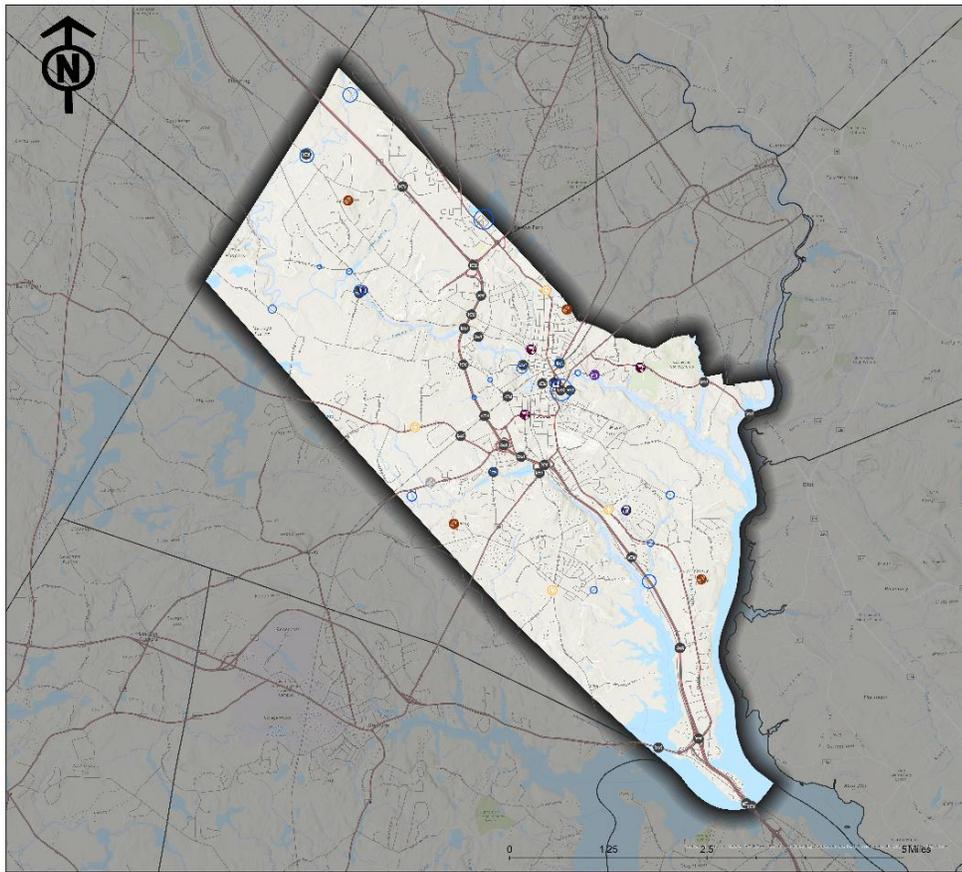
It is important to identify the critical facilities and other structures that are most likely to be damaged by hazards. Table 17 lists all critical facilities and key resources, including bridges and dams that are located within past and potential hazard areas.



Photo: Captain Matthew Adams

Table 17: Critical Facilities (CF)		
CF are important structures that may be vulnerable during a hazardous event		
Facility	Type	Address
Pump Station(s)	Pump Station	3 Seaport Way (River Street) 25 Charles Street 60 Mill Street 182 Crosby Road 18 Daley Drive 87A Gerrish Road 10 Wentworth Terrace 12 Boston Harbor Road 12A Leighton Way 22A Isaac Lucas Circle 135 Mast Road 5A Spruce Drive 20 Cocheco Street 181 County Farm Road 56A New Rochester Road 16B Cranbrook Lane 47 Hampshire Circle 18 Back Road 5 Sandpiper Drive 31 Sullivan Drive 62 Stonewall Drive Tolend Rd. and Glen Hill Rd. intersection 6 Washington Street
Distribution Substation(s)	Power Substation	75 Cocheco Street
Water Tower	Water Reservoir	Garrison Hill Long Hill Road
Smaller Substation(s)	Smaller Voltage Substation	36 Dover Point Rd (Stark Avenue) 7 Drew Road 71 Littleworth Rd 799 Central Ave (Wentworth Douglass)
Natural Gas Stations	Gas Regulator Stations	Rutland Street at Silver Street Sixth Street at Maple and Horne Street Gulf Road toward Eliot Bridge
Switching Stations	Switching Stations	193 Knox Marsh Road
Communication Tower(s)	Communication Function	Mast Road Garrison Hill Long Hill Road Middle Road
Cocheco Falls Dam	High Hazard Dam	Cocheco River
Watson Waldron Dam	Low Hazard Dam	Cocheco River
Central Ave Dam and Fish Ladder (Cocheco Falls)	Low Hazard Dam	Cocheco River
Redden Pond Dam	Low Hazard Dam	Redden Pond
Thornwood Commons Pond	Significant Hazard Dam	Varney Brook

Map 3: Critical Infrastructure



Critical Infrastructure & Past and Potential Hazards

Hazard Mitigation Plan (2026)
Dover, NH

Critical Infrastructure Legend

- Bridge
- Communication Function
- Dam
- Gas Regulator Station
- Power Station/Substation
- Smaller Voltage Substation
- Switching Station

Past and Potential Hazards

- Past Flooding

Basemap Legend

- Municipal Boundaries
- State Road
- Local Road
- Private Road
- Railroads
- Rivers, Brooks, Streams
- Lakes and Ponds

Prepared by Seacoast Regional Planning Commission
150 Waterford Street #12, Dover, NH 03827
603-894-3300
ARTHUR@SEACOST.RP.COM
Date: 2/15/2026

Base data layers generally from ESRI, NH GRANITE INFORMATION SYSTEMS, USGS, and the Town of Dover. These agencies and organizations have done the data using a variety of methods and instruments, in different time frames, through different methodologies, in different levels of accuracy. As such, errors are often present in GIS data and should be used for general purposes only. The provided data is provided only in support of the original data. Please visit the original source of the data, contact the original data source, or contact ESRC for information on the full data sets.

Table 18: Populations to Protect

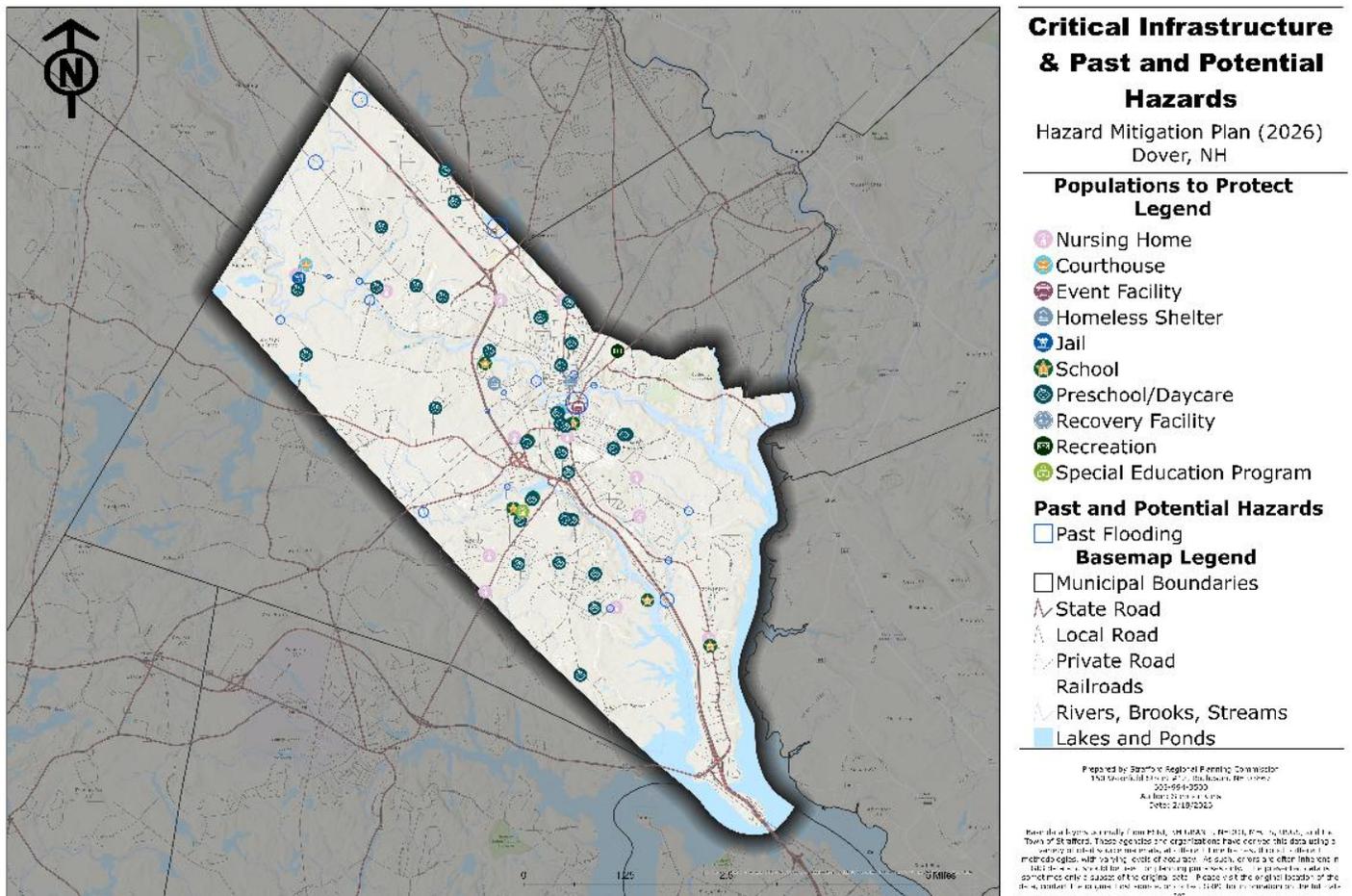
Vulnerable populations can be defined broadly to include those who are not able to access and use the standard resources offered in disaster preparedness and planning, response, and recovery

Facility	Type	Address
Woodman Park	Elementary School	11 Towle Avenue
Garrison	Elementary School	50 Garrison Road
Horne Street	Middle School	78 Horne Street
Middle School	Senior High School	16 Daley Drive
High School and Regional Career Center	Special Education Program	25 Alumni Drive
Dover Alternative School	College-Preparatory School	50 Alumni Drive
Cochecho Academy of the Arts	Catholic High School (Private)	40 Hampshire Circle
St. Thomas Aquinas	College-Preparatory School (Private)	199 Dover Point Road
Portsmouth Christian Academy	Catholic School (Private)	20 Seaborne Drive
Saint Mary Academy	Preschool/Daycare	222 Central Avenue
Children in Motion	Preschool/Daycare	274 County Farm Road
My School	Preschool/Daycare	118 Locust Street
Dover Children’s Home	Preschool/Daycare	207 Locust Street
Happy Helpers Preschool	Preschool/Daycare	6 Heather Lane

JB's Learning House	Preschool/Daycare	25 Mathes Hill Drive
Strafford County Head Start	Preschool/Daycare	62A Whittier Street
Strafford County YMCA	Preschool/Daycare	21 Daley Drive
Strafford County YMCA	Preschool/Daycare	50 Garrison Road
Strafford County YMCA	Preschool/Daycare	78 Horne Street
Strafford County YMCA	Preschool/Daycare	11 Towle Avenue
WDH Early Learning	Preschool/Daycare	789 Central Avenue
Michelle Michaud's Daycare	Preschool/Daycare	6 Wallace Drive
Our House for Girls	Preschool/Daycare	576 Central Avenue
Shannonigans Childcare	Preschool/Daycare	168 Mast Road
Stay & Play Early Learning	Preschool/Daycare	9 Nelson Street
Dover Daycare Learning	Preschool/Daycare	32 Saint Thomas Street
Honey Tree Learning	Preschool/Daycare	36 Olive Meadows Lane
Cross Road Children's Center	Preschool/Daycare	18 French Cross Road
Peter Cotton Tail Preschool Daycare	Preschool/Daycare	42 Long Hill Road
Shenanigans Early Learning	Preschool/Daycare	2 Apache Street
Honey Hill Child Care	Preschool/Daycare	57 Central Avenue
Seacoast Charter School	Preschool/Daycare	171 Watson Road
Little Tree Education	Preschool/Daycare	383 Sixth Street
Bright Beginnings Daycare	Preschool/Daycare	50 Back River Road
Garrison City Early Childhood Center	Preschool/Daycare	103/105 Durham Road
Our Little Ones	Preschool/Daycare	7 Birch Drive
Lu Daycare	Preschool/Daycare	7 Tennyson Avenue
Susie's Daycare	Preschool/Daycare	28 Tennyson Avenue
Little Lamb Nursery	Preschool/Daycare	31 Tennyson Avenue
Miss Patty's Children Center	Preschool/Daycare	49 Piscataqua Road
Melissa's After School Care	Preschool/Daycare	42 Pearl Street
Kids Culture-South	Preschool/Daycare	43 Back River Road
Kids Culture-North	Preschool/Daycare	32 St. Thomas Street
Riverside Rest Home	Nursing Home	276 County Farm Road
Saint Ann House	Nursing Home	195 Dover Point Road
Langdon Place	Nursing Home	60 Middle Road
Wentworth Home	Assisted Living	795 Central Avenue
Bellamy Fields	Assisted Living	150 Garrison Road
Watson Fields	Assisted Living	201 Watson Road
Wadleigh House	Assisted Living	10 Summer Street
Residence at Silver Square	Assisted Living	100 Sterling Way
Mast Landing Senior Care Housing	Assisted Living	250 Mast Road
Johnson Creek Village	Assisted Living	301 Durham Road
Pointe Place Memory Care	Assisted Living	Pointe Place
Cocheco River Manor	Assisted Living	262 County Farm Road
Dover Rehabilitation	Assisted Living	307 Plaza Drive

My Friends Place	Homeless Shelter	368 Washington Street
Dover Circuit Court	Courthouse	25 St. Thomas Street
River Mill at Dover Landing	Event Facility	2 Washington Street
Strafford County Jail	Prison	266 County Farm Road
Strafford County Superior Court	Courthouse	259 County Farm Road
Dover Ice Arena	Recreation	110 Portland Avenue
SOS Recovery Community Organization	Recovery Facility	4 Broadway Street

Map 4: Populations to Protect



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.

The Hazard Mitigation Committee investigated past and potential hazards using a variety of sources and techniques including, but not necessarily limited to, local knowledge, consulting various hazard experts and extracting 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

Coastal Flooding

Risk Assessment: High

Average Impact: Medium

Future Probability: High



Definition: Global climate change is expected to continue to have a broad range of impacts ranging from anticipated sea level rise to changing weather patterns and increasing numbers of extreme weather events. Coastal municipalities need to prepare for these changes that would have serious implications for their communities, including storm surge, coastal erosion, and coastal flooding due to sea level rise. These changes pose a threat to coastal populations due to potential negative impacts upon existing buildings, infrastructure, and natural resources.

Location: The risk from coastal flooding is limited to tidal areas. The Oyster River, a tidally influenced coastal river, flows south into the Piscataqua River and acts as the boundary between New Hampshire and Maine before draining into the Gulf of Maine through Portsmouth Harbor. Influenced by historic development patterns and significant changes in land use, as well as extreme precipitation and coastal surge, these complex freshwater river systems have experienced more frequent and significant flooding during storm events in the past 15 years. These contributing factors translate into the Great Bay communities being vulnerable to both saltwater and freshwater flooding.

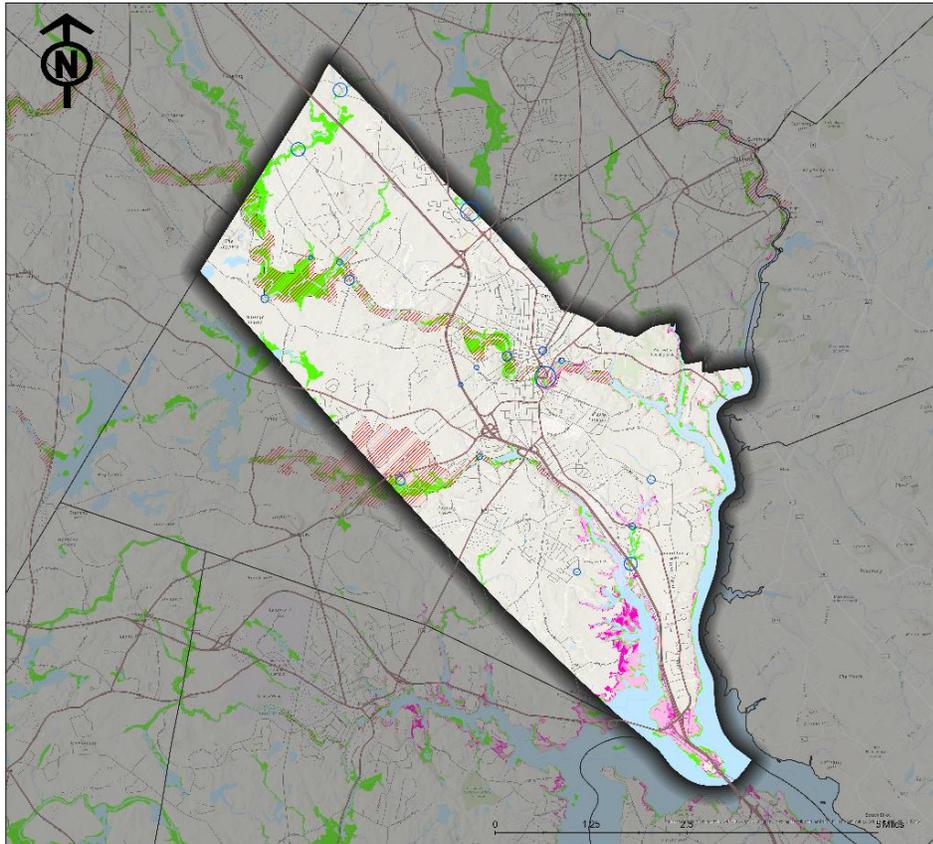
Other flooding, such as riverine flooding, will be covered in the inland flooding hazard section.

Extent: Areas within the coastal floodplain make them particularly vulnerable to flooding from seasonal high tides, coastal storms, and sea-level rise. Many high-value private residences have been built in this shoreline area and could be susceptible to coastal flooding. This area is also susceptible to storm surge from hurricanes, which have roughly the same probability of occurrence as the 100-year storm.

Previous Hazard Events: The committee did not identify any coastal flooding in the past five years.

Probability of Future Events: With the impacts of climate change, flooding is likely to increase in the coastal floodplain areas. The Dover Hazard Mitigation Committee ranked coastal flooding as a high probability to occur within the next ten years.

Map 5: Sea Level Rise and Flooding



Critical Infrastructure & Past and Potential Hazards

Hazard Mitigation Plan (2026)
Dover, NH

Sea Level Rise and Flooding Legend

-  Dam Inundation Areas
-  FEMA 100-year Floodplain
-  Extent of Sea Level Rise of 1.7' with Storm Surge
-  Extent of Sea Level Rise of 4.0' with Storm Surge
-  Extent of Sea Level Rise of 6.3' with Storm Surge

Past and Potential Hazards

-  Past Flooding

Basemap Legend

-  Municipal Boundaries
-  State Road
-  Local Road
-  Private Road
-  Railroads
-  Rivers, Brooks, Streams
-  Lakes and Ponds

Prepared by Stafford Regional Planning Commission
100 Riverfield Street, #10, Dover, NH 03820
603.994.3300
Public: 508.948.6666
Date: 1/1/2024

Note: Data layers provided by NHDES, NHDES, NHDES, and the Town of Dover. These agencies and organizations have collected this data using a variety of data sources, methods, and dates. The accuracy and scale of the data may vary. This map is for informational purposes only. The user will take a search for only a subset of the original data. Please visit the original location of the data, contact the original data provider, or contact SRPC for information on the full data set.

Inland Flooding

Risk Assessment: High

Average Impact: Medium

Future Probability: High



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.

Causes of flooding that could potentially affect Dover include:

- 100-year rainstorm,
- Severe tropical storm (hurricane or tropical storm) that can bring torrential rainfall in excess of that from a 500-year storm,
- Rapid snow pack melt in spring can be a significant potential flooding source, given the northern, relatively cold location and climate of Dover and has occurred multiple times in the past.
- River ice jams

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]

Location: Flooding can occur in any area of the city but is more likely to occur within the 100-year floodplain, downstream of dams, along river and stream banks, near wetlands and road crossings, and other low-lying areas.

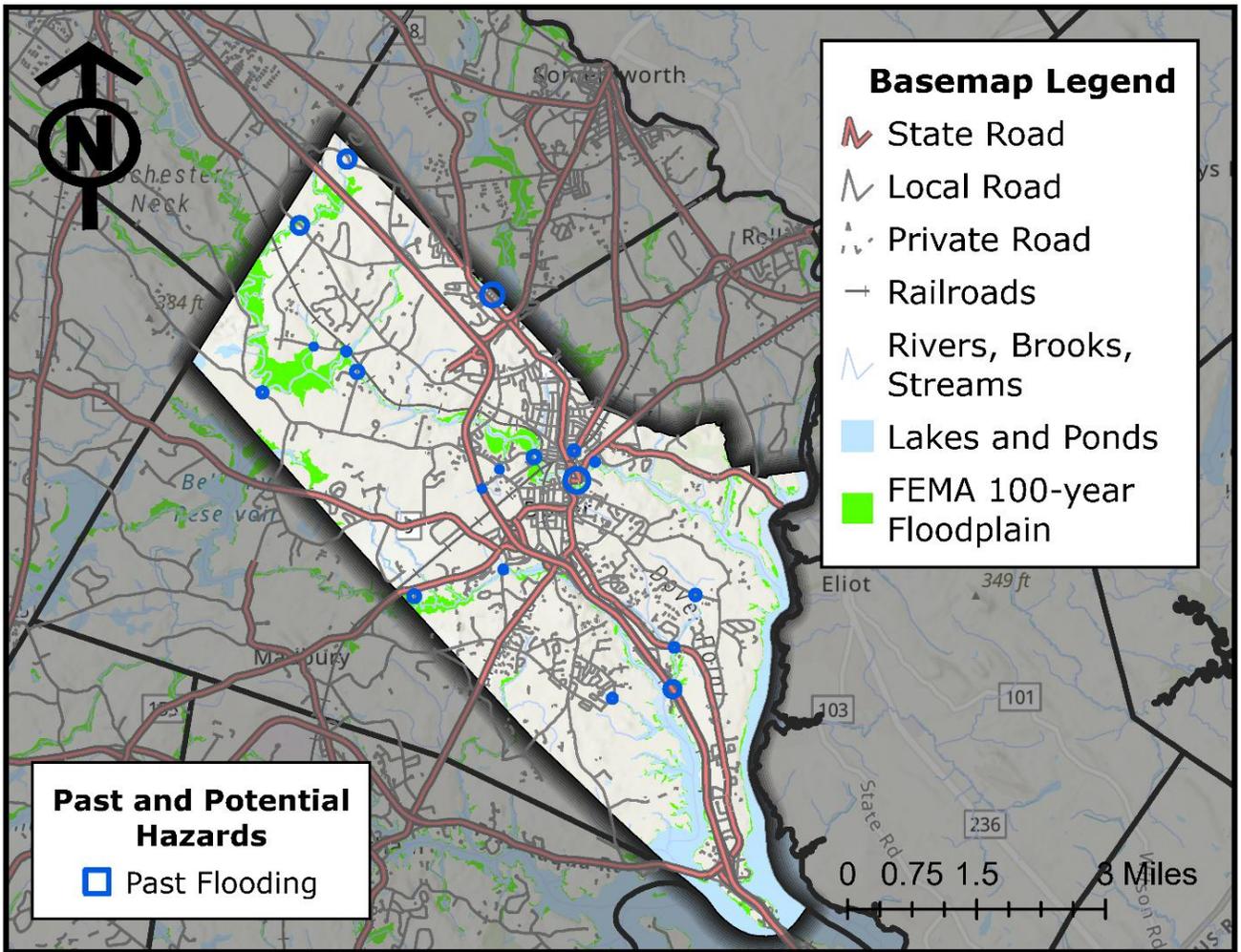
Extent: Although flooding of the full extent of this floodplain by definition would require a 100-year storm, smaller storms with a higher annual probability of occurrence could still flood significant portions of that floodplain. Some structures that could be impacted by a 100-year storm could also be affected by smaller, more frequent flooding. 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.

Previous Hazard Events: The Dover Hazard Mitigation Committee noted three events of flooding during the past five years:

- January 10, 2024: Heavy rains on frozen ground caused localized flooding at 6 Olive Meadow and 75 Oak Street. No injuries or deaths were reported; No damage to City infrastructure; structural damage to private property unknown.
- September 19, 2023: Heavy rains caused localized flooding at 75 Oak Street, 1 Center Drive, and 8 Cornerstone Drive. No injuries or deaths were reported; structural damage to private property unknown.
- December 14, 2019: Two to three inches of rain, combined with snowmelt, triggered a Flash Flood Warning and flooded low-lying areas and roads. No injuries or deaths were reported; No damage to City infrastructure; structural damage to private property unknown.

Probability of Future Events: With the impacts of climate change, flooding is likely to increase in the floodplain and low-lying areas. The Dover Hazard Mitigation Committee ranked inland flooding as a high probability to occur within the next ten years.

Map 2: Past & Potential Flooding



Drought

Risk Assessment: Medium

Average Impact: Medium

Future Probability: High



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 maintain streamflow during extended dry periods. Low streamflow and low ground-water levels commonly cause diminished water supply.

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

Category	Description	Possible Impacts
D0	Abnormally Dry	Going into drought: <ul style="list-style-type: none"> • short-term dryness slowing planting, growth of crops or pastures Coming out of drought: <ul style="list-style-type: none"> • some lingering water deficits • pastures or crops not fully recovered
D1	Moderate Drought	<ul style="list-style-type: none"> • Some damage to crops, pastures • Streams, reservoirs, or wells low, some water shortages developing or imminent • Voluntary water-use restrictions requested
D2	Severe Drought	<ul style="list-style-type: none"> • Crop or pasture losses likely • Water shortages common • Water restrictions imposed
D3	Extreme Drought	<ul style="list-style-type: none"> • Major crop/pasture losses • Widespread water shortages or restrictions
D4	Exceptional Drought	<ul style="list-style-type: none"> • Exceptional and widespread crop/pasture losses • Shortages of water in reservoirs, streams, and wells creating water emergencies

Extent:

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 cities and towns within the region. Agricultural land and residents who use dug shallower wells may be more vulnerable to the effects of drought.

Previous Hazard Events:

While the impacts of drought are typically not as damaging and disruptive as floods or storm events, the impacts of long-term drought or near drought conditions can impact crops and the water supply. During periods of severe drought, Dover has implemented mandatory water use restrictions which impact commercial, recreation, and fire fighting training.

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 Table 19.

In more recent years, drought has again become a problem in New Hampshire with at least three significant droughts within the last 25 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 summers of 2015 and 2016, most of central and southern New Hampshire experienced its most recent 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 Dover, illustrating the extent to which local drought conditions can vary both geographically and over time. Locally, drought impacts have not been well documented which makes it difficult to quantify.

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. Since then, there has been some level of drought or extreme dry conditions occurring each year.

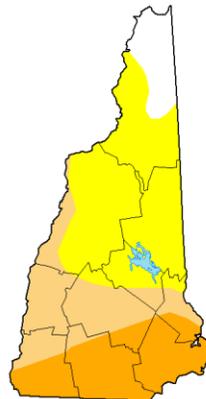
Table 19: Period of Drought in NH				
Date	Description	Impacts	Location	Additional Information
1929-1936	Regional Drought	No specific impacts available	Statewide	10 to > 25yr recurrence interval
1939-1944	Regional Drought	No specific impacts available	Statewide	10 to >25yr recurrence interval, severe 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

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.

**U.S. Drought Monitor
New Hampshire**



September 13, 2022
(Released Thursday, Sep. 15, 2022)
Valid 8 a.m. EDT

	Drought Conditions (Percent Area)					
	None	D0-D1	D1-D2	D2-D3	D3-D4	D4
Current	8.07	91.93	48.05	24.30	0.00	0.00
Last Week 09-06-2022	8.07	91.93	47.89	24.30	0.00	0.00
3 Months Ago 06-14-2022	94.44	5.56	0.91	0.00	0.00	0.00
Start of Calendar Year 01-04-2022	87.79	12.21	3.28	0.00	0.00	0.00
Start of Water Year 09-26-2021	78.93	21.07	3.30	0.46	0.00	0.00
One Year Ago 09-14-2021	74.44	25.56	6.55	0.46	0.00	0.00

Intensity:

None	D0 Abnormally Dry	D1 Moderate Drought	D2 Severe Drought
D1 Moderate Drought	D3 Extreme Drought	D4 Exceptional Drought	

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

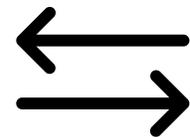
Author:
David Simeral
Western Regional Climate Center



With extreme variation in environmental conditions due to climate change possibly on the rise, drought probability is likely to grow in the future. 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 (>4 on Richter Scale)

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



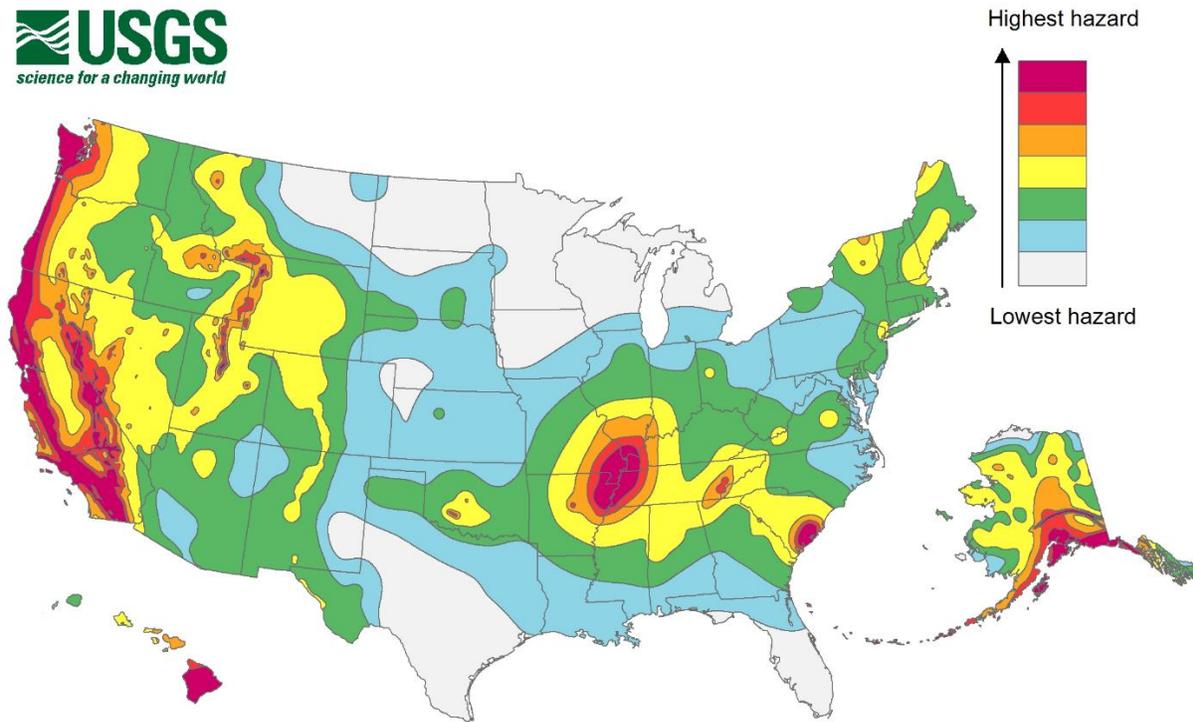
Definition:

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.

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. An earthquake can impact all areas of a jurisdiction. People at greatest risk are those who live in unreinforced masonry buildings constructed on filled land or unstable soil.

Location:

The risk from earthquakes is city-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 are a common event, but significantly damaging earthquakes are not.



Extent:

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.

MODIFIED MERCALLI SCALE		RICHTER SCALE	
I.	Felt by almost no one.	2.5	Generally not felt, but recorded on seismometers.
II.	Felt by very few people.		
III.	Tremor noticed by many, but they often do not realize it is an earthquake.	3.5	Felt by many people.
IV.	Felt indoors by many. Feels like a truck has struck the building.		
V.	Felt by nearly everyone; many people awakened. Swaying trees and poles may be observed.		
VI.	Felt by all; many people run outdoors. Furniture moved, slight damage occurs.	4.5	Some local damage may occur.
VII.	Everyone runs outdoors. Poorly built structures considerably damaged; slight damage elsewhere.		
VIII.	Specially designed structures damaged slightly, others collapse.	6.0	A destructive earthquake.
IX.	All buildings considerably damaged, many shift off foundations, Noticeable cracks in ground.		
X.	Many structures destroyed. Ground is badly cracked.	7.0	A major earthquake.
XI.	Almost all structures fall. Very wide cracks in ground.	8.0 and up	Great earthquakes.
XII.	Total destruction. Waves seen on ground surfaces, objects are tumbled and tossed.		

Previous Hazard Events:

According to maps produced by the USGS, there have been 202 earthquakes felt in NH since 1925. Of those 211, only six 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 Dover.

Table 20: 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%. The Hazard Mitigation Committee ranked this as a low probability of an earthquake (large enough to cause destruction) to impact Dover.

Extreme Temperatures

Risk Assessment: Medium

Average Impact: Low

Future Probability: High



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 98.6°F: mild hypothermia occurs when core body temperature drops between 90-95°F, 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 city-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: 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).

NOAA's National Weather Service

Heat Index
Temperature (°F)

	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

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.

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

■ Caution
 ■ Extreme Caution
 ■ Danger
 ■ Extreme Danger

Extreme Cold



	Temperature (°F)																	
	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: ■ 30 minutes ■ 10 minutes ■ 5 minutes
Wind Chill (°F) = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})
 Where: T= Air Temperature (°F) V= Wind Speed (mph) Effective 11/01/01

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.

Previous Hazard Events:

Extreme Heat

Since the last plan update, there have been several significant heat waves. While these events are uncomfortable for people and animals, they generally have not caused any serious impacts to people or property.

Extreme Cold

Since the last plan update, Dover 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 that are needed. The Hazard Mitigation Committee noted two cold-related events that had an impact during the past five-year period:

- January 24-26, 2026 - Severe cold temperatures caused several broken pipes throughout the City. There were no reported injuries or deaths due to this weather event.

- February 1-5, 2023 - Extreme cold wind chill temperatures dropped as low as 30 degrees below zero causing several broken pipes throughout the City. No injuries or deaths reported during this event.

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 90°F projected for the higher concentrations pathway (50-60 days) is twice as high as the projected increases for the lower concentration pathway (20-30 days).

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 32°F. More recently, between 1991-2020, Strafford County has experienced a decrease of about ten days a year, with an average of 144 days per year under 32°F. As such, the severity of cold extremes will likely decrease, along with snowfall and snow cover.

The Hazard Mitigation Committee ranked this as a high probability of future occurrence as extreme cold temperatures are happening at the time of this writing.

High Wind Events

Risk Assessment: Medium

Average Impact: Medium

Future Probability: High



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
 - Derecho - widespread, long-lived windstorm that is associated with a band of rapidly moving showers or thunderstorms. A typical derecho consists of numerous microbursts, downbursts, and downburst clusters. If the wind damage swath extends more than 240 miles and includes

wind gusts of at least 58 mph or greater along most of its length, then the event may be classified as a derecho.

Location:

The risk from high wind events is city-wide.

Extent:

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.

Enhanced Fujita Scale	
EF-0	65–85 mph winds
EF-1	86–110 mph
EF-2	111–135 mph
EF-3	136–165 mph
EF-4	166–200 mph
EF-5	>200 mph

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

Table 21: 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:

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 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 Dover.

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.

Locally, the committee noted the following high wind events in Dover:

- July 22, 2025 - Severe wind caused multiple power outages and downed trees across the City. There were no reported injuries, deaths, or structural damage related to this storm event. Most power outages were restored within 12 hours.
- December 18, 2023 - Severe wind and heavy rain downed trees onto utility wires, leading to the temporary closure of Sixth Street and Gulf Road while road crews cleaned up the debris. There were no reported injuries, deaths, or structural damage as a result of this storm event.
- March 2, 2021 - Wind gusts up to 55 mph caused power outages for approximately 2,000 customers, knocked out traffic lights, and downed trees across multiple roads. All roads were reopened within 12 hours and power was restored within 24 hours. There were no reported injuries, deaths, or structural damage as a result of this storm event.
- August 4, 2020 - Severe wind caused multiple power outages and downed trees across the City. There were no reported injuries, deaths, or structural damage related to this storm event. Most power outages were restored within 24 hours.

Probability of Future Events: The average annual probability of recurrence of a tornado impacting Dover is roughly 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 the City of Dover. The actual probability for Dover should be much lower, considering the great dependence of impact upon the actual track of any tornado. The NCDC identified two tornadoes that touched down relatively close (Durham and New Durham) to Dover, which would suggest the average annual probability of recurrence to be less than 3%. While tornadoes are not common, they would cause significant impacts. The probability of occurrence of a downburst is likely much higher. A tornado or downburst can impact the entire city but may cause greater damage to areas with higher densities, such as the downtown core area. The Hazard Mitigation Committee ranked this as a high probability of future occurrence due to the proximity of the ocean.

Infectious Diseases

Risk Assessment: Medium

Average Impact: Medium

Future Probability: High



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 city-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: 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:

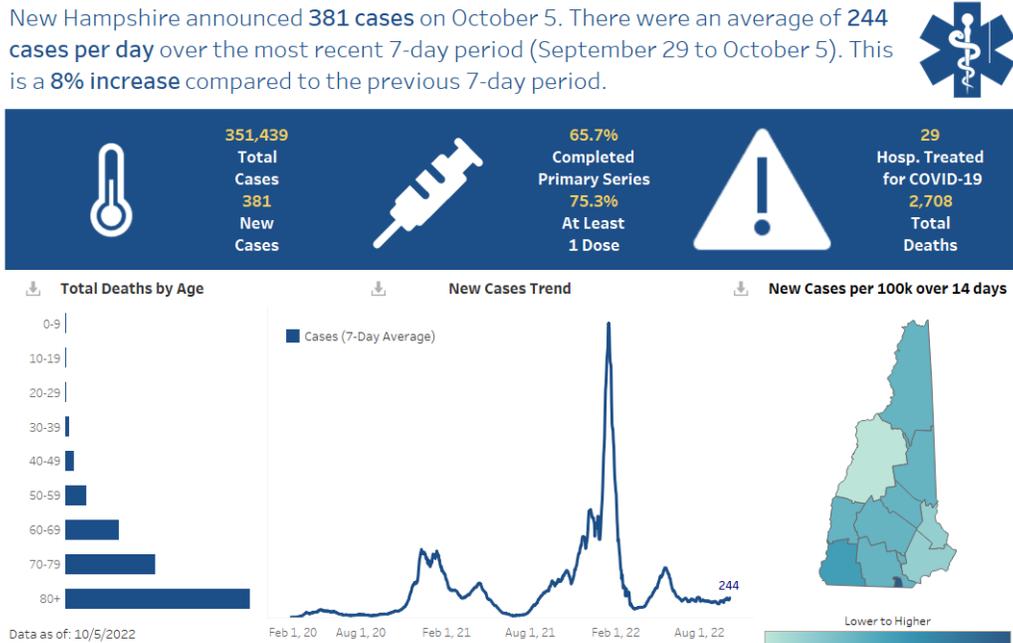
- **Endemic** – Constant presence and/or usual prevalence of a disease or infection agent in a population within a geographic area
- **Hyperendemic** – The persistent, high levels of disease occurrence
- **Cluster** – Aggregation of cases grouped in place and time that are suspected to be greater than 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 Dover in various ways, including large economic impacts in the downtown, a transition away from in-person meetings, and impacts to emergency responders. Mandatory shutdowns had an immediate impact on many local businesses, especially those that are service driven. Several restaurants cut expenses by providing take-out options and were able to thrive during this time.

To keep city officials, staff, and members of the public safe, municipal operations across the city were altered. Staff met internally to develop strategies and policies that were based on the latest science and recommendations from the CDC. These included an increase in cleaning and sanitizing routines for city buildings; providing masks and hand sanitizer for all employees; communicating important updates on the virus; and transitioning to some online meetings. The City purchased new software and equipment, including large screens and upgrades to their existing audio system to remove echoes, to ensure members of the public could adequately participate in Zoom 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.

Emergency personnel, along with City and School District Staff, also implemented temporary mitigation measures. The Police Department limited officer exposure to face-to-face interactions and contact by following up with residents on minor incidents over the phone (e.g., locked out of car/apartment), issuing hand summonses to defendants who otherwise would have been subject to arrest in some cases, reducing the number of traffic stops for lesser violations (e.g. missing headlight), placing finger printing for background investigations on hold, and outfitting cruiser with personal protective equipment and other safety measures. To ensure continuity of operations and command, the Department implemented a multi-tiered staffing plan to mitigate the impact of personnel becoming sick. These efforts included implementing a multi-tiered staffing response plan to ensure adequate staffing needs were met if a certain number of personnel became sick, as well as implemented a hybrid work plan for the two Division Commanders (Captains) that allowed them to ensure that they did not work in the office at the same time, thus mitigating command staffing shortfalls should both Captains along with the Department Chief become sick.

This is an example of communications with the public that was used to keep them informed about current conditions.



The Fire Department, in coordination with other departments, received COVID-related stimulus funding to coordinate regional vaccine clinics and to purchase cases of masks, cleaning supplies, and air-purifying respirators to improve response and ensure the health of staff and residents. Of note, emergency personnel responded to a large call volume at several of the assisted living and long-term facilities, which were one of the areas hit the hardest during the pandemic. These responses were often very challenging and had a significant impact on emergency personnel.

One of the most impacted organizations was the City’s School District. Along with each school’s Emergency Operations Plan (EOP), the district implemented multiple protocols to mitigate the spread of COVID and minimize its impact, which included directives that addressed Personal Protective Equipment (PPE) requirements for all staff and students (e.g. clear face shields, gloves, and surgical masks), 6’ social distancing, mitigation measures for staff involved in medical evaluation of students (e.g. Plexiglass, HEPA filters, and KN95 masks), continuous public outreach via fliers and electronic updates, and detailed screening forms that were required to be submitted for access to School District facilities. In addition to these protocols, the District has kept its EOPs updated to include protocols and mitigation strategies for COVID-19, as well as other outbreaks which may occur in the future.

Probability of Future Events: According to a [new 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, meaning that someone born in the year 2000 would have about a 38% chance of experiencing one by now – and that probability is likely growing.

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 that create 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 or ore, 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, so 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.

Extent: There is approximately 97% of all land in Dover that has a slope of 15% or less and 2.7% that has a slope between 15.1 – 25%. The City has 0.3% of all land with a slope greater than 25%. Therefore, most of the land is not steep enough for landslides.

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

Probability of Future Events: Landslides could occur in Dover 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 Dover will depend on specific soil/rock types and upon the probability of initiating events. The Hazard Mitigation Committee ranked this as a low probability of future occurrence due to the general topography of the city.

Lightning

Risk Assessment: Medium

Average Impact: Low

Future Probability: High



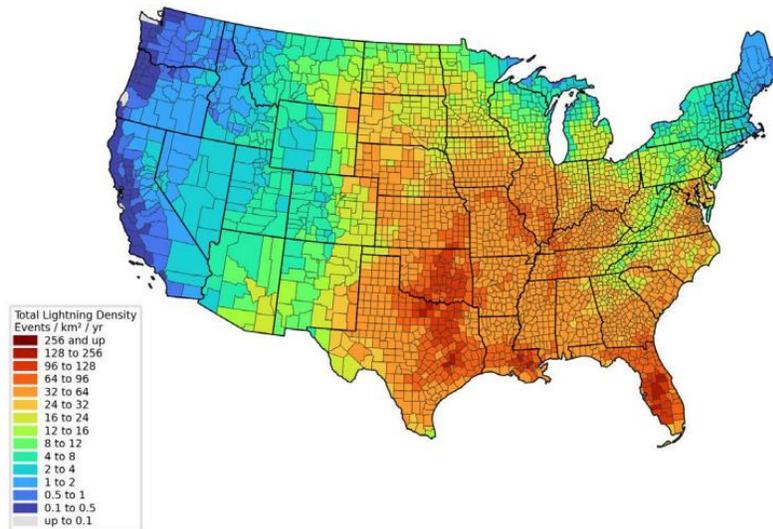
Definition: Lightning is a visible electric discharge produced by a thunderstorm. The discharge may occur within or between clouds, between a cloud and the air, between a cloud and the ground, or between the ground and a cloud.

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 lightning 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. The sound of 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 city-wide; areas at enhanced risk include tall 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.

Total lightning density 2015–2020 per county



VAISALA

2021 ANNUAL LIGHTNING REPORT

© Vaisala 2022

Extent: 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.). There is currently not a widely adopted scale 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.

Table 22: 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: Lightning strikes are not always reported to emergency personnel if emergency services are not needed, therefore it is difficult to fully know the location and impact of this hazard. There have been two incidents of reported lightning strikes that occurred during the past five years:

- August 8, 2023 – Lightning struck a house at 11 Glenwood Drive damaging electrical wiring and causing a small fire. There were no reported injuries or death resulting from this incident. The extent of structural damage and cost are unknown.
- September 2023 - Lightning struck the antenna of an emergency communication site on Salmon Falls Road causing a serious disruption to communications. There were no reported injuries or death resulting from this incident. The extent of structural damage and cost are unknown.

Probability of Future Events: It is highly likely that the city 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.

Severe Winter Weather

Risk Assessment: Medium

Average Impact: Medium

Future Probability: High



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
- Blizzard
- Nor'easter
- Ice Storm

Location: The risk from severe winter weather is city-wide.

Extent: 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 to older individuals. The most severe damage, though, often comes from ice storms and winter nor'easters.

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

Table 23: 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).

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.

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. 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

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). The severity of Nor'easters along coastal areas can also be measured by using storm tide and storm surge amounts as described in the coastal flooding section.

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.

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.

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: The following events list are noted for their severity:

- February 10-11, 2026: A winter storm brought 3 to 6 inches of snow, resulting in a parking ban and a two-hour school delay. No injuries, deaths, or structural damage reported.
- January 25-26, 2026: A major winter storm dropped 12 to 18 inches of snow, causing the closure of schools, city administrative offices, the library, and the pool for one day. No injuries, deaths, or structural damage reported.
- December 23, 2025: Heavy snow and freezing rain, resulting in a parking ban. No other impacts were noted.
- December 2, 2025: Heavy snow event dropped 6 to 9 inches of snow mixed with rain, closing public schools and city offices for one day. No injuries, deaths, or structural damage reported.
- January 19, 2025: Heavy snow event dropped 4 to 8 inches of heavy, wet snow, delaying curbside trash pickup by one day. No injuries, deaths, or structural damage reported.
- April 3-4, 2024: High-severity winter storm brought up to 21 inches of snow and wind gusts up to 55 mph. The storm downed trees and power lines, closed multiple roads, left over 1,600 Eversource customers without power, and forced the closure of schools and city facilities. No injuries, deaths, or structural damage reported.
- March 3, 2024: A winter storm brought snow and ice causing widespread power outages and downed trees. No injuries, deaths, or structural damage reported.
- January 5-7, 2024: A winter storm dropped 8 to 12 inches of snow, creating dangerous driving conditions and prompting a parking ban. No injuries, deaths, or structural damage reported.
- March 3, 2023: A winter storm brought 8 to 12 inches of snow, resulting in a parking ban, closure of the Recycling Center, and activation of a warming center. No injuries, deaths, or structural damage reported.

Probability of Future Events: Dover will continue to be impacted by severe, regional winter weather events that produce a variety of precipitation, including snow, rain, and sleet. As a result of 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. The Hazard Mitigation Committee ranked this as a high probability of future occurrence for short-term events.

Solar Storms and Space Weather

Risk Assessment: Low

Average Impact: Low

Future Probability: High



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 city-wide.

Impact: The entire city 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.

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 committee was not aware of any specific dates of occurrence. There have been no incidents of damage or interruption of communication services recorded in Dover.

Probability of Future Events: The committee discussed the increased awareness of these events and ranked it as a high probability that these events will occur during the next ten years.

Tropical Storms, Hurricanes, and Tropical Cyclones

Risk Assessment: High

Average Impact: High

Future Probability: High

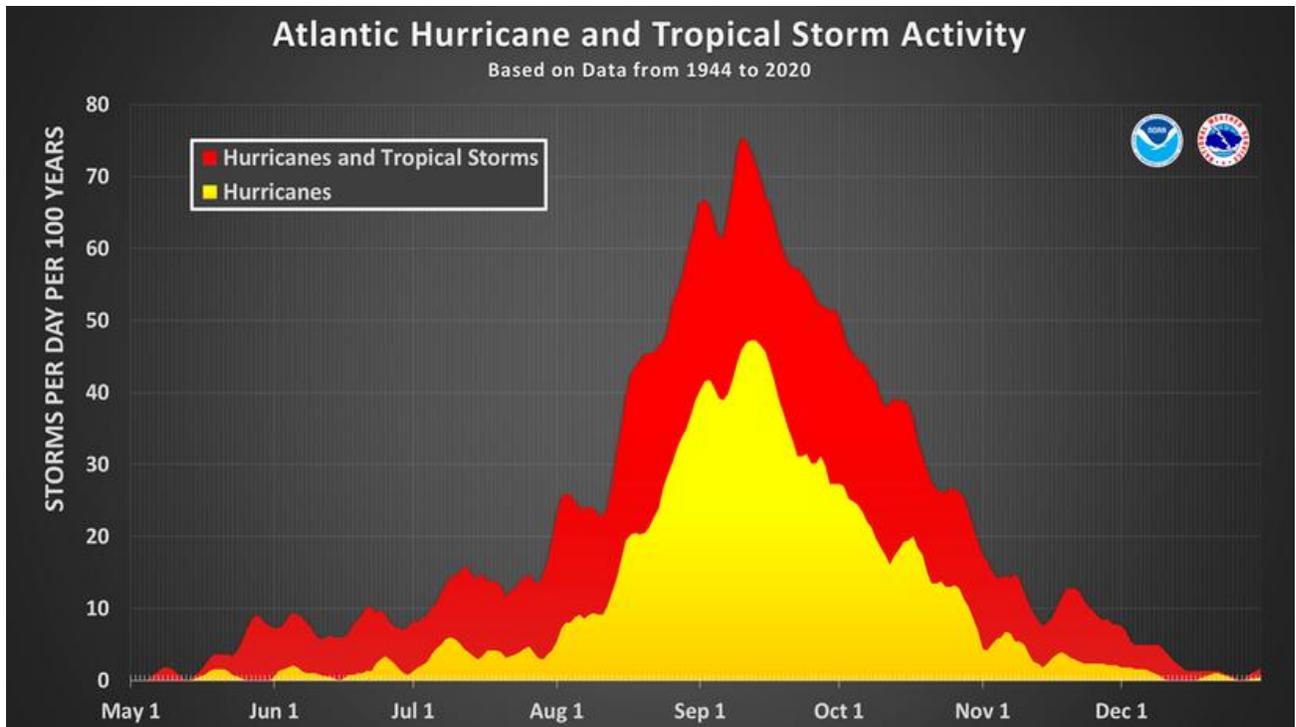


Definition: A tropical cyclone is the generic term for a non-frontal synoptic scale low-pressure system over tropical or sub-tropical waters with organized convection (i.e. thunderstorm activity) and defined cyclonic surface wind circulation. Once formed, a tropical cyclone is maintained by the extraction 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 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 39 mph and less than 74 mph.
- **Hurricane**: Once a tropical cyclone's maximum sustained winds reach 74 mph, the storm becomes a hurricane (in the North Atlantic and Northeast Pacific Ocean basins).
- **Major Hurricane**: A tropical cyclone with maximum sustained winds of 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 city-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.



Extent: The risk from severe tropical and post-tropical cyclones is city-wide. High winds and heavy rainfall will contribute to power outages and riverine flooding.

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.

Table 24: 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.

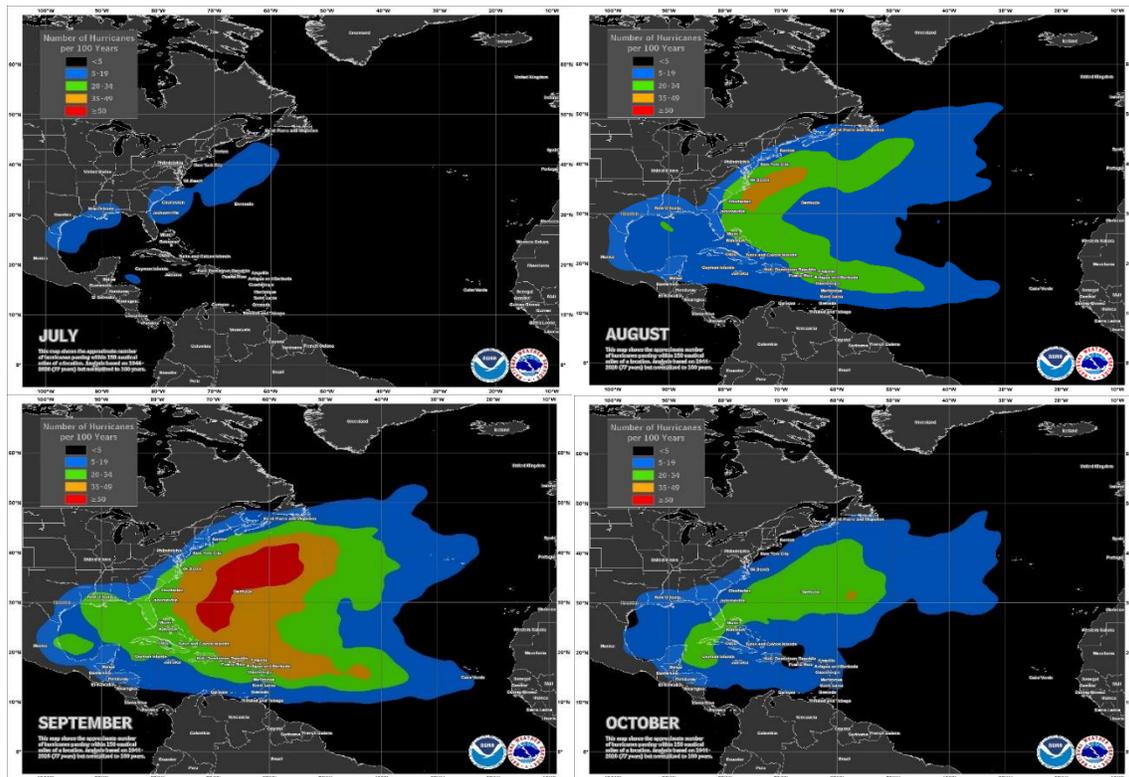
Previous Hazard Events: Over the past decade, Dover has experienced two significant storms, Tropical Storm Irene and Hurricane Sandy.

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 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. Dover experienced minimal impacts associated with rain and wind. Presidential Declaration FEMA-4095 requested funds for debris removal and emergency protective measures. 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 local impacts from tropical and post-tropical cyclones.



Probability of Future Events: Dover is vulnerable to hurricane hazards including severe wind, heavy rainfall, coastal and inland flooding.

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. Any significant impact on the city would be dependent on the exact track of these concentrated storms.

Hurricanes and tropical storms will continue to affect Dover and the recurrence potential of hurricane and tropical storm hazards is moderate. It is likely that the region will be impacted by a significant storm of tropical origin within the foreseeable future due to climate change and the increase and intensity of storm events. The Hazard Mitigation Committee ranked this as a high probability of future occurrence due to the proximity to the coast and coastal storm events.

Wildfire

Risk Assessment: Medium

Average Impact: Low

Future Probability: High



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: The risk from wildfire is city-wide with increased risk in heavily wooded areas.

Extent: 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:

Table 25: 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

Previous Hazard Events: 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 of 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, 87 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. Locally, the committee did not recall any wildfire events in the past six years.

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 Dover's vulnerability due to high wind events, drought, and long periods of extreme high temperatures. The Hazard Mitigation Committee, therefore, ranked this as a high probability of future occurrence.

Technological Hazards

Aging Infrastructure

Risk Assessment: High

Average Impact: Medium

Future Probability: High



Definition: The continued regression of the City's physical systems including, but not limited to, roads, bridges, culverts, utilities (water, sewer, stormwater), and sidewalks.

Location: The risk from aging infrastructure is city-wide.

Extent: The water, sewer, and stormwater infrastructure are aging; numerous bridges and culverts have shown deteriorating conditions and need rehabilitation or replacement.

Previous Hazard Events: While the committee acknowledged aging infrastructure as a high risk in Dover, there have not been any recent incidents that they considered to be a hazardous event. The concern is that the infrastructure is aging, so replacements and upgrades are needed to avoid such events.

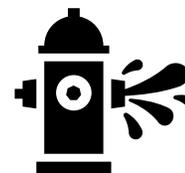
Probability of Future Events: Dover continues to employ methods of repairing, replacing, and upgrading aging infrastructure, but obstacles such as funding and staff shortages prove to be a recurring nuisance. The Hazard Mitigation Committee ranked this as a high probability of future occurrence due to the age of much of the infrastructure.

Conflagration

Risk Assessment: Medium

Average Impact: Medium

Future Probability: High



Definition: The New Hampshire State Hazard Mitigation Plan defines a conflagration as “a large and destructive fire that threatens human life, animal life, health, and/or property.” These fires could begin naturally (e.g. due to a lightning strike or combustion of dry brush), accidentally (e.g. a kitchen fire, vehicle accident, mechanical malfunction, or poorly-tended fire pit), or intentionally (arson). Urban conflagrations are more likely to begin as a result of human activity or mechanical malfunction associated within a building. Therefore, the severity of the fire and subsequent impacts to life, safety, and property, will be heavily dependent upon the building involved.

Modern fire and building codes are intended to slow the spread of fires within the building and ensure multiple points of egress in an emergency. Older construction, especially dense timber-framed construction, poses a higher threat for rapid spread. In industrial development or older construction, the presence of Tier II controlled substances or potentially hazardous building materials could result in release of those materials into the environment during a conflagration or direct exposure to victims and first-responders.

The State Hazard Mitigation Plan includes wildfires within its definition of conflagration; the hazard mitigation committee prefers to analyze wildfires and urban conflagrations as distinct hazard types with distinct causes, impacted areas, and strategies for mitigation and response. However, it is noted that fires that begin as either wildfires or urban conflagrations can spread to other areas and any fire could take on the characteristics of both a wildfire and urban conflagration if it became sufficiently large or spread through the Wildland Urban Interface (WUI). The National Forest Service defines the WUI as any location where “humans and their development meet or intermix with wildland fuel”. According to the US Forest Service Northern Research Station, in 2010 490,791 of New Hampshire’s 614,754 houses (78.8%) were located within the WUI.

Location: The risk from urban conflagration is city-wide especially in the downtown area.

Extent: Conflagrations are a city-wide hazard that could impact all locations, though for the purposes of this plan they are presumed to originate within buildings or urban areas to distinguish them from the “wildfire” hazard. Conflagrations are frequently measured in terms of the area impacted or the level of response required. This could include the area measured in square blocks or estimated value of fire damage, or in the case of response levels, may be described by a number of “alarms” indicating units or jurisdictions that contributed to the response.

Previous Hazard Events: There have been no incidents of conflagration in Dover in the past 6 years.

Probability of Future Events: Current development is subject to the updated International Building Codes and other fire, health, and safety codes. This means that new buildings are less likely to catch fire, or fire will spread more slowly, but adding new development to previously vacant property may still increase the overall risk of conflagration, especially in close proximity to older development. Redevelopment of existing older structures, on the other hand, would significantly reduce the risk that those structures pose by upgrading them to meet current codes. The Hazard Mitigation Committee ranked this as a high probability of future occurrence due to the dense population and land development within the city.

Dam Failure

Risk Assessment: Medium

Average Impact: Low

Future Probability: Low



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

Location: The location of dams in Dover is shown on pages 30 and 120.

Extent: 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 failure of the dam 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.

Dam Classification	Classification Definition	Number of Dams in Dover	Inspection Interval (Years)
High	Dam that has a high hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in probable loss of human life.		1
Significant	Dam that has a significant hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in no probable loss of lives but major economic loss to structures or property.		1
Low	Dam that has a low hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in no possible loss of life and low economic loss to structures/property.		1

Dam Classification	Classification Definition	Number of Dams in Dover	Inspection Interval (Years)
Non-Menace	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.		22

Previous Hazard Events: During the last five-year update period, there have been no impacts from dam failure. In 2019 and 2020, there were two high hazard dams that were removed to improve safety by eliminating the high hazard risks and to restore fish passage. [Sawyer Mill Dam Removal | Sustainability | VHB](#)

Probability of Future Events: The Hazard Mitigation Committee considered the dams in town and did not feel that it is likely for a dam failure within the next ten years that would be significant enough to cause damage or injury/death.

Known and Emerging Contaminates

Risk Assessment: Low

Average Impact: Low

Future Probability: High



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 city-wide.

Extent: There is 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 contaminate thresholds 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 source 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, to take a more proactive stance on groundwater protection,

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.

Previous Hazard Events: The committee did not identify any specific events, however, a discussion about this hazard occurred that concluded that 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. This could be further exacerbated by the effects of climate change.

Probability of Future Events: The Dover Hazard Mitigation Committee discussed the probability of emerging contaminants, such as PFAS, occurring in the near future (10 years), and ranked this as a high probability due to the increased awareness of this and other dangerous contaminants.

Hazardous Materials

Risk Assessment: Medium

Average Impact: Medium

Future Probability: High



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 city-wide.

Extent: Incidents involving hazardous materials could potentially occur at any residence or business or along any road; however, it is more likely that a large-scale incident would occur in the form of a spill along (add highways). The extent of such an incident can be difficult to predict and would depend upon the type and volume of materials involved.

Previous Hazard Events: During the last five-year update period, there have been two incidents of hazardous materials spills or leaks worth mentioning which have activated the Hazmat team.

- March 18, 2024: Spaulding Turnpike (NB) - 2000 gallons of diesel fuel spilled on the highway resulting in NH DES cleanup.
- December 20, 2025: Fourth Street - A large leak in a storage tank for home heating oil resulting in NH DES cleanup.

Probability of Future Events: The Hazard Mitigation Committee ranked the future probability of a hazardous materials incident as high due to the truck traffic on the highways running through and around the city.

Long-Term Utility Outage

Risk Assessment: Medium

Average Impact: Medium

Future Probability: Medium



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 one or more weeks. 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 city-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 at-risk populations could also be particularly vulnerable if the extended power outage occurred in conjunction with extreme heat or severe winter weather.

Extent: 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: Historically, power outages have coincided with storm and wind events due to impacts upon power lines. While power outages lasting multiple days in some areas have occurred, 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 records and other sources indicate that they will be highly correlated with high wind events such as thunderstorms and severe winter weather.

Radiological

Risk Assessment: Low

Average Impact: Low

Future Probability: Low



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

Location: Seabrook Station Nuclear Power Plant, located in Seabrook, New Hampshire is the sole nuclear power plant in New Hampshire. Seabrook Station is an 1150-megawatt pressurized water reactor (PWR), which began

operation in 1990 and is licensed to operate until 2026. Vermont's only nuclear power generator, Vermont Yankee, located in Vernon, Vermont, immediately across the Connecticut River from Hinsdale, NH ceased operations on December 29, 2014. The spent fuel from both these reactors is stored onsite.

An additional facility handling nuclear materials near New Hampshire is the Portsmouth Naval Shipyard which conducts maintenance and refueling of nuclear submarines at its facilities on the Piscataqua River. Depot modernization maintenance typically requires less than a year in port, and an engineered refueling overhaul is a two-year operation. The shipyard services up to four submarines at a time. All spent fuel removed from submarines is transported to the US Department of Energy's Idaho National Engineering and Environmental Laboratory.

Extent: When radioactive material from a plume, or a liquid or solid spill, falls on crops or produce, or on surface water supplies, the potential exists for this radiation to be taken into the body through eating or drinking these radiologically contaminated foodstuffs and drinking water.

We can limit or prevent plume exposure by moving people away from or out of the plume through the process of evacuation. Ingestion pathway exposure is best avoided or limited by preventing the ingestion of radiologically contaminated material from occurring because once radioactive material is ingested it may be very difficult to expel from the body.

Ingestion exposure protection can wait until more hazardous emergencies or radiation conditions are abated. Since response activities to limit or reduce plume or direct radiation exposure may involve complicated or multi-faceted response actions such as public evacuation, taking Potassium Iodide (KI), and /or instructing the public to shelter-in-place, most ingestion pathway response activities are usually not considered until after the release of radiation has been terminated. The only exception to this concept is the public instruction advising farmers to bring livestock in from pasture to a covered location and provide them with protected feed and water.

Previous Hazard Events: According to the committee, there has never been a radiological event in or near Dover in its history.

Possibility of Future Events: Dover has a very small possibility of a possible radiological event due to the contained development of the Seabrook Nuclear Plant. Any possible radiological events would come from transportation of nuclear waste.

Human-Caused Hazards

Cyber Threats

Risk Assessment: Medium

Average Impact: Low

Future Probability: High



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 type of attack 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 city-wide that have the potential to impact any location if critical services are disrupted, or any resident, business, contractor, or employee whose information is stored in city records in the event of a data breach. 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: 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 0 and 100:

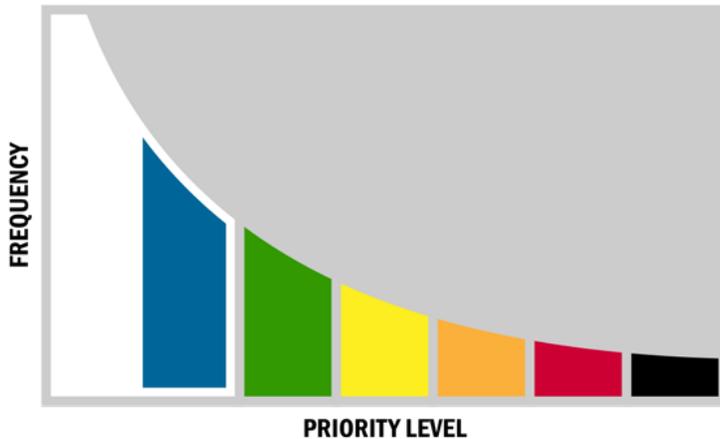
Each category has a weight, and the response to each category has an associated score. The categories are:

- 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.



■ 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 Low 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: The committee did not identify any specific cyber threats but they noted that the city has enhanced protection against future attempts and increased outreach and education for employees to be more aware of such threats, and to look for signs to identify one before opening emails and clicking links that may trigger one.

Probability of Future Events: Dover is most likely to be at risk from malware, phishing, and other methods of acquiring personal information. These threats may be targeted, as in the case of phishing emails sent to employee accounts, or threats that individuals encounter during their regular computer usage. Cyber threats are also constantly evolving 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. The Hazard Mitigation Committee ranked this as a high probability for future occurrence.

Mass Casualty Incident

Risk Assessment: High

Average Impact: Medium

Future Probability: High



Definition:

The definition of a mass casualty event is any large number of casualties produced in a relatively short period of time, usually as the result of a single incident such as a military aircraft accident, hurricane, flood, earthquake, or armed attack that exceeds local logistic support capabilities.

Location: This hazard can occur anywhere in the city.

Extent: The extent of this type of hazard may exceed the capacity of the local emergency services and require assistance from mutual aid of nearby towns and State services.

Previous Hazard Events: During the last five-year update period, there have not been any major accidents; however, the City recognizes this to be a real threat.

Probability of Future Events: The committee ranked this as a high probability that will likely happen within the next 10 years.

Terrorism/Violence (Large Crowd Events)

Risk Assessment: High

Average Impact: Medium

Future Probability: Medium



Definition: For the purposes of this plan, large crowd events refer to any large gathering of people that has the potential to require higher-than-usual levels of preparedness and/or response from emergency services. Additionally, large concentrations of residents increase the likelihood of property damage during celebratory events and holidays, particularly when widespread consumption of alcohol has occurred.

Location: The risk from large crowd events is city-wide.

Extent: Large crowd events are typically either scheduled in advance, as is the case with official City events, or tend to coincide with certain holidays, sporting events, or other high-profile occurrences. This correlation makes crowd events easier to predict than most hazards.

Previous Hazard Events: Large crowd events occur often in Dover; however, they have generally been friendly events with few or no problems or need for police enforcement.

Probability of Future Events: The committee ranked the probability of future events of this hazard as medium due to the many events that occur in the city throughout the year.

Transport Accident

Risk Assessment: Medium

Average Impact: Medium

Future Probability: High



Definition: A transport accident is any accident that occurs during transportation. Specifically, for this Plan, it refers to a rail, shipping, tractor trailer, or vehicle accident.

Location: The entire city is vulnerable to transportation accidents. However, Spaulding Turnpike, Route 9, Route 155, and Route 108 are the primary areas of Dover that would be affected by vehicle or tractor-trailer accidents. The intersection at Route 9 and Route 155 are hazardous as well as at Weeks Crossing.

Extent: Dover has 201.5 miles of paved roads and 14.3 miles of unpaved roads.

Previous Hazard Events: Based upon current transportation capabilities the State remains vulnerable to a potential transport accident. According to the New Hampshire Information and Analysis Center over the past twenty years New Hampshire has experienced an annual average of 117 fatal crashes (127 victims) due to vehicular transportation accidents.

Probability of Future Events: It is certain that transportation accidents will continue to be a hazard for Dover. While crashes will be limited mostly to the highway corridors, many more crashes will persist due to the main form of transportation being via car. The Hazard Mitigation Committee ranked this as a high probability for future occurrence.

CHAPTER 6: CLIMATE CHANGE

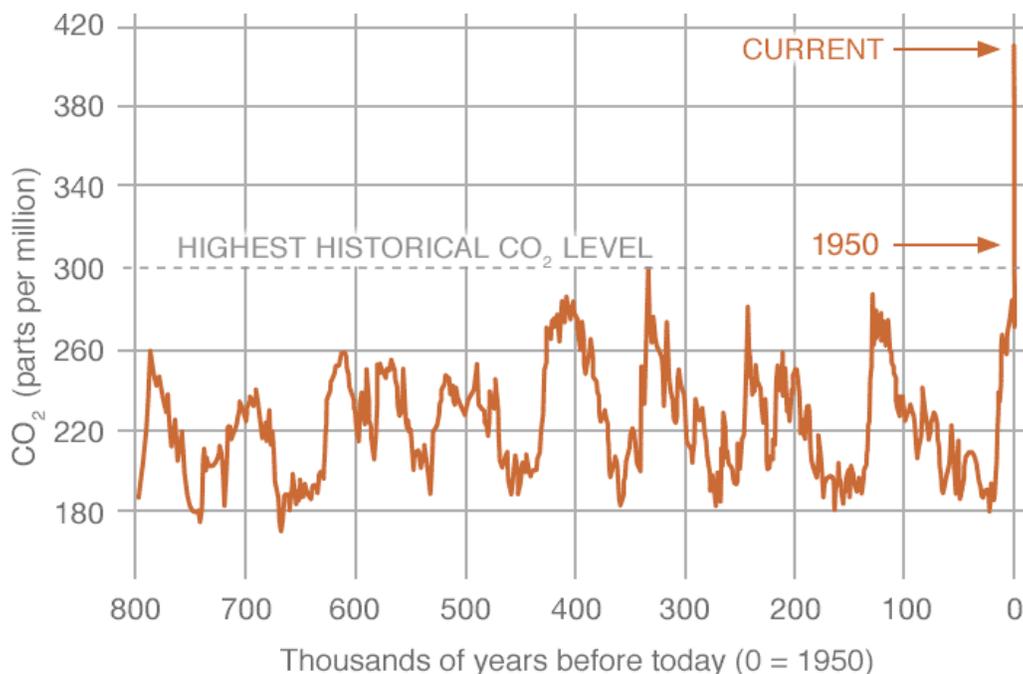
Increased Frequency and Intensity of Severe Weather Events

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](#) (CO₂) in the Earth’s atmosphere have reached 415 parts per million (ppm). For context, according to ice core samples, CO₂ concentrations never exceeded roughly 300 ppm over the last 400,000 years and studies have shown that human activities have raised atmospheric concentrations of CO₂ by 47% since pre-industrial levels in 1850.

Proxy Measurements of CO₂ 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 New Hampshire

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 data collected, 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 CO₂ 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.

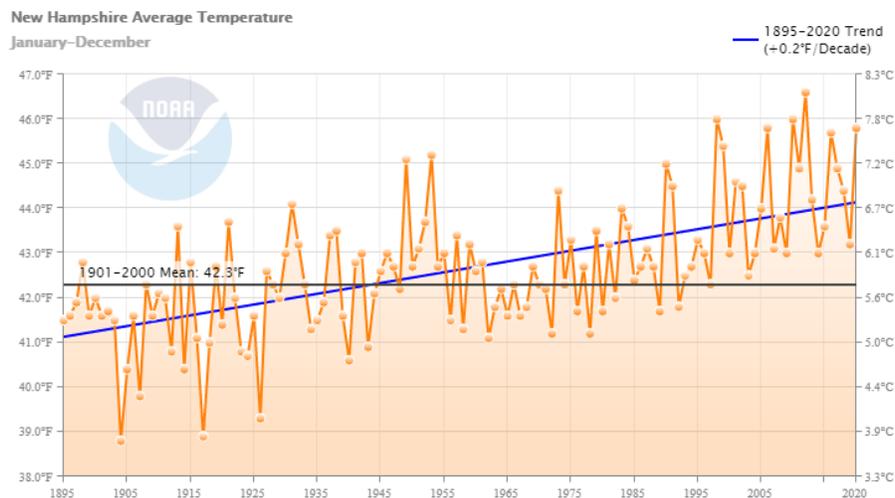
Air Pollution

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.

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.

NH Average Temperature Change (1895-2020)

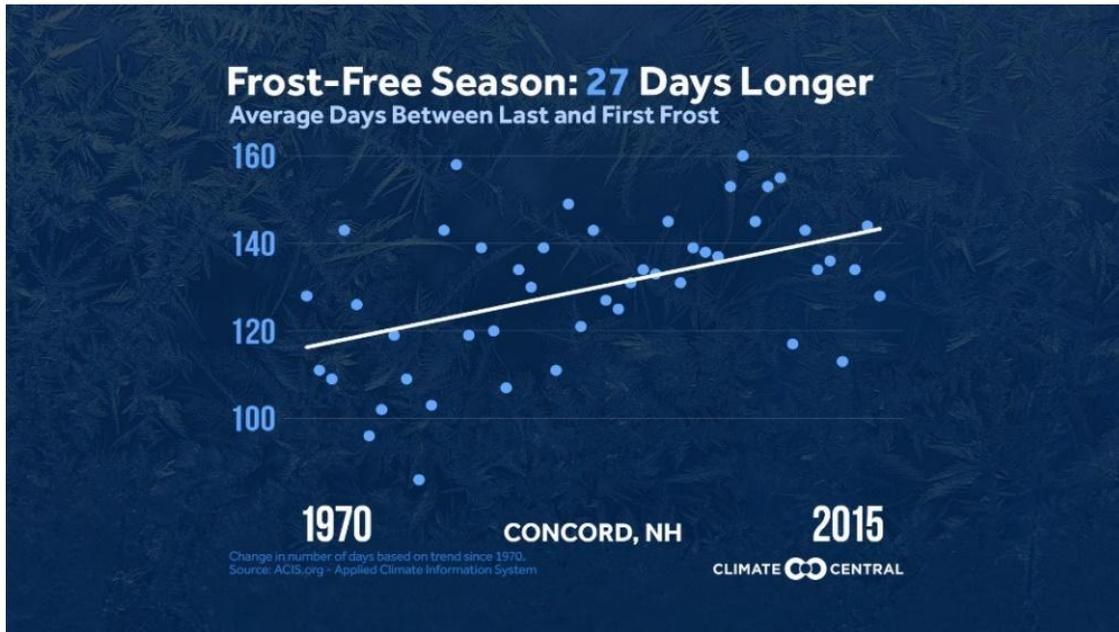


According to [Wake et al. 2014](#), while the number of hot days has increased slightly across southern New Hampshire, there has been a dramatic increase in the rate of winter warming over the last four decades at all three stations, which may be linked to decreases in snow cover through changes in surface albedo, or reflectivity. In Dover, 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.

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 and in Southern New Hampshire, the growing season has [increased by 10 days](#) per decade since 1960.

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.

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.

As oceans grow warmer, **ocean acidification** increases as well. Several factors contribute to this, an important one being ocean absorption of carbon dioxide from human activity. Another factor is increased pollutants from wastewater and stormwater runoff in coastal waters, which increases net primary production, resulting in higher respiration and carbon dioxide which in turn [furthers coastal acidification](#). Ocean acidification is important because carbonate ions—which are less abundant than hydrogen ions in the seawater—are [important block structures](#) for seashells and coral skeletons. Decreases in ions due to acidification make building and maintaining carbonate structures more difficult. [Local researchers](#) have recently begun to examine the effects of ocean acidification on marine species in the Gulf of Maine.

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.

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 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.

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 Hazard Mitigation Committee developed several overarching goals and objectives, which are adapted from the State of New Hampshire Multi-Hazard Mitigation Plan (2023).

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 Dover 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 City;
- 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; and
- Strengthen Continuity of Operations and Continuity of Government to ensure continuation 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; and
- 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 contaminants;
- 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; and
- Lessen the effects of technological hazards on communications infrastructure.

Human-Caused Hazard Objectives

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

- Advocate that grants related funding processes allow for expedient and effective actions to take place at the community and State-level;
- Identify Critical Infrastructure and Key Resources (CIKR) risks or vulnerabilities and protect or harden infrastructure against hazards;
- Improve the ability to respond and mitigate Cyber Events through increased training, exercising, improved equipment, and utilizing accepted technologies; and
- 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, UNH, schools, nursing homes, 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 Hazard Mitigation Committee 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.

This decision was made even though not all projects listed in Table 28 (Mitigation Actions) and Table 29 (Implementation Plan) are fundable under FEMA grant programs. The committee determined that this Plan was in large part a management document designed to assist city officials in all aspects of managing and tracking potential emergency planning strategies. For instance, the committee 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 Hazard Mitigation Committee identified 29 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. The STAPLEE method is commonly used by public administration officials and planners.

Table 27: 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 Hazard Mitigation Committee 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 Hazard Mitigation Committee evaluate the new hazard mitigation strategies that they had brainstormed throughout the multi-hazard mitigation planning process. While all actions would help improve Dover’s multi-hazard and responsiveness capability, funding availability will be a driving factor in determining what and when new mitigation strategies are implemented.

Table 28: Mitigation Actions

New Mitigation Projects	S	T	A	P	L	E	E	Total
1. Develop and complete drainage improvements and shoreland stabilization along Cocheco River in coordination with waterfront development project.	3	3	3	3	3	3	3	21
2. Review all existing CIP projects that are in design phase to ensure they are considering impacts from climate change, including sea-level rise and increases in extreme precipitation.	3	3	3	3	3	3	3	21
3. Ensure that all new and proposed CIP projects are required to consider the impacts from climate change, including sea-level rise and increases in extreme precipitation.	3	3	3	3	3	3	3	21
4. Review and update the floodplain management brochure. The updated brochure may include additional information on flood risk, revised freeboard and building permit requirements, and suggested flood-proofing techniques for homeowners.	3	3	3	3	3	3	3	21
5. Review the updated floodplain model ordinance from Office of Strategic Initiatives and update the City’s floodplain ordinance, as needed.	3	3	3	3	3	3	3	21
6. Review and update locations for additional warming/cooling stations throughout the city.	3	3	3	3	3	3	3	21
7. Continue to implement the ongoing signalization project to install cameras at all 33 traffic light locations to alleviate congestion areas and adjust timings as needed.	3	3	3	3	3	3	3	21
8. Street Reconstruction at Broadway - Design and proposed reconstruction including drainage curb, sidewalk, and road construction.	3	3	3	3	3	3	3	21
9. Pump Station Equipment Replacement and Maintenance - Equipment upgrades and replacements for several sewer-pumping stations, including portable or permanent backup power to all stations.	3	3	3	3	3	3	3	21
10. St. Thomas Street Drainage - Flooding occurs in this area due to the age of the infrastructure. Needs new design/reconstruction.	3	3	3	3	3	3	3	21
11. Tree Program - Using the City GPS and GIS program to identify City street trees. Also to determine the health and potential hazards.	3	3	3	3	3	3	3	21
12. Enhance reliability of traffic signals at critical intersections—provide alternative power supplies (batteries/generators) for traffic lights.	3	3	3	3	3	3	3	21
13. Site Development Design Criteria-Stormwater Management, Erosion Control, Flood Hazards	3	3	3	3	3	3	3	21
14. Improve resiliency for waste water system by advancing the Emergency Action Plan.	3	3	3	3	3	3	3	21
15. Review and update stormwater management regulations.	3	3	3	3	3	3	3	21
16. Subdivision Regulations update	3	3	3	3	3	3	3	21
17. Site Plan Regulations update	3	3	3	3	3	3	3	21
18. River Gauges - Would be installed on the bridges crossing the major rivers to assist emergency personnel during flooding events.	3	3	3	3	3	2	3	20

Table 28: Mitigation Actions								
New Mitigation Projects	S	T	A	P	L	E	E	Total
19. Implement additional emergency shelters and locations with back-up power.	3	3	3	3	3	2	3	20
20. Outer Sixth Street Replace Bridge & Culvert - Major overflows during heavy rain events. Replace bridge and raise the road. Provide additional access in and out of the North End area of the City.	3	3	3	3	2	3	3	20
21. Improve Crosby Road drainage to reduce chronic flooding.	3	3	2	3	2	3	3	19
22. New Wood Chipper - To provide additional resources to assist in clean up after an emergency event.	3	3	3	3	3	1	3	19
23. Review and incorporate changes into the City's Site Plan and/or Subdivision Regulations based on the state's model water efficiency landscaping ordinance.	1	3	3	2	3	3	3	18
24. Review the Shoreline Water Quality Protection Act and update as needed.	2	3	3	2	3	2	3	18
25. Tree Program - working with tree warden and Conservation Commission to identify forest timber opportunities. Also to determine the health and potential hazards.	3	3	2	3	2	2	3	18
26. Additional staffing needed: building and fire inspections and stormwater maintenance to mitigate impacts of heavy storm events.	2	3	3	2	3	2	3	18
27. Oak Street Railroad Bridge Replacement - Current bridge is only a 6-ton limit and is a major access thruway for both Dover and Rollinsford.	3	2	3	3	1	2	3	17
28. Raise County Farm Road - Maintain access to the Strafford County Complex, which includes the rest home, court, hospice care and jail.	3	3	2	3	2	2	2	17
29. County Farm Road Bridge Replacement - Would provide additional access in and out of the North End area of the City.	1	2	1	1	3	1	2	11

Implementation of Action Items

After reviewing the finalized STAPLEE numerical ratings, the Hazard Mitigation Committee prepared to develop the Implementation Plan (Table 29). To do this, the Hazard Mitigation Committee developed an implementation plan that outlined the following:

- ∴ Description
- ∴ Type of hazard
- ∴ 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, Table 29, 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).

The following abbreviations are used in the Responsibility column to identify the person that will be leading the action to get it started:

CSD – Community Services Director
EMD – Emergency Management Director
FC – Fire Chief
PC – Police Chief
PL – Planning Director

Table 29 New Mitigation Projects	Type of Hazard	Local Responsible Agent	Potential Funding Source	Cost Effectiveness	Timeframe
				Low: < \$10K	6 months – 1 year
				Medium: \$10K-\$50K	2-3 years
				High: > \$50K	4-5 years
1. *Develop and complete drainage improvements and shoreland stabilization along Cocheco River in coordination with waterfront development project.	Flood	CSD	City Budget-TIF (Tax Increment Financing)	High	4-5 years
2. *Review all existing CIP projects that are in design phase to ensure they are considering impacts from climate change, including sea-level rise and increases in extreme precipitation.	Flood	CSD	City Budget	Medium	4-5 years
3. *Ensure that all new and proposed CIP projects are required to consider the impacts from climate change, including sea-level rise and increases in extreme precipitation.	Flood	CSD	City Budget	Medium	4-5 years
4. *Review and update the floodplain management brochure. The updated brochure may include additional information on flood risk, revised freeboard and building permit requirements, and suggested flood-proofing techniques for homeowners.	Flood	PL	City Budget	Low	6 months – 1 year
5. *Review the updated floodplain model ordinance from Office of Planning and Development and update the City’s floodplain ordinance, as needed.	Flood	PL	City Budget	Medium	6 months – 1 year
6. *Review and update locations for additional warming/cooling stations throughout the city.	All Hazards	FC	City Budget	Low	6 months – 1 year

Table 29 New Mitigation Projects	Type of Hazard	Local Responsible Agent	Potential Funding Source	Cost Effectiveness	Timeframe
				Low: < \$10K	6 months – 1 year
				Medium: \$10K-\$50K	2-3 years
				High: > \$50K	4-5 years
7. *Continue to implement the ongoing signalization project to install cameras at all 33 traffic light locations to alleviate congestion areas and adjust timings as needed.	All Hazards	CSD	City Budget	High	4-5 Years
8. *Street Reconstruction at Broadway – Design and proposed reconstruction including drainage curb, sidewalk, and road construction.	Flood	CSD	CIP Budget	High	4-5 Years (10 years)
9. *Pump Station Equipment Replacement and Maintenance – Equipment upgrades and replacements for several sewer-pumping stations, including portable or permanent backup power to all stations.	All Hazards	CSD	City Budget	High	4-5 Years
10. *St. Thomas Street Drainage – Flooding occurs in this area due to the age of the infrastructure. Needs new design/reconstruction.	Flood	CSD	City Budget	High	4-5 Years
11. *Tree Program – Using the City GPS and GIS program to identify City street trees. Also to determine the health and potential hazards.	High Wind, Tropical Storm	PL	PREP grant	Medium	6 months – 1 Year
12. *Enhance reliability of traffic signals at critical intersections– provide alternative power supplies (batteries/generators) for traffic lights.	Heavy Wind Event, Hurricane/ Tropical Storm, Lightning	CSD	City Budget	Medium	6 months – 1 Year
13. Site Development Design Criteria-Stormwater Management, Erosion Control, Flood Hazards	Flood	CSD	City Budget	Low	6 months – 1 Year

Table 29 New Mitigation Projects	Type of Hazard	Local Responsible Agent	Potential Funding Source	Cost Effectiveness	Timeframe
				Low: < \$10K	6 months – 1 year
				Medium: \$10K-\$50K	2-3 years
				High: > \$50K	4-5 years
14. *Improve resiliency for waste water system by advancing the Emergency Action Plan.	All Hazards	CSD	City Budget	Medium	6 months – 1 Year
15. *Review and update stormwater management regulations.	Flood	PL	City Budget	Low	6 months – 1 Year
16. Subdivision Regulations update.	All Hazards	PL	City Budget	Low	2-3 Years
17. Site Plan Regulations update.	All Hazards	PL	City Budget	Low	2-3 Years
18. *River Gauges installed on the bridges crossing the major rivers.	Flood	CSD	City Budget	Low	2-3 Years
19. Implement additional emergency shelters and locations with back-up power.	All Hazards	FC	City Budget	Medium	2-3 Years
20. Improve Crosby Road drainage to reduce chronic flooding.	Flood	CSD/Private partnerships	City Budget	High	4-5 Years
21. *Outer Sixth Street Replace Bridge & Culvert – Major overflows during heavy rain events. Replace bridge and raise the road. Provide additional access in and out of the North End area of the City.	Flood	CSD	City Budget	High	6 months – 1 Year
22. *New Wood Chipper – To provide additional resources to assist in clean up after an emergency event.	High Wind, Tropical Storm, Flood	CSD	City Budget	High	2-3 Years
23. *Review and incorporate changes into the City’s Site Plan and/or Subdivision Regulations based on the state’s model water efficiency landscaping ordinance.	Drought, Emerging Contaminants	PL	City Budget	Medium	2-3 Years
24. *Review the Shoreline Water Quality Protection Act and update as needed.	Flood, Emerging Contaminants	PL	City Budget	Medium	2-3 Years

Table 29 New Mitigation Projects	Type of Hazard	Local Responsible Agent	Potential Funding Source	Cost Effectiveness	Timeframe
				Low: < \$10K	6 months – 1 year
				Medium: \$10K-\$50K	2-3 years
				High: > \$50K	4-5 years
25. Tree Program –working with tree warden and Conservation Commission to identify forest timber opportunities. Also to determine the health and potential hazards.	High Wind, Tropical Storm	CSD	City Budget or PREP Grant	Medium	2-3 Years
26. *Additional staffing needed: building and fire inspections and stormwater maintenance to mitigate impacts of heavy storm events.	All Hazards	PL/CSD	City Budget	High	2-3 Years
27. *Oak Street Railroad Bridge Replacement –Current bridge is only a 6-ton limit and is a major access thruway for both Dover and Rollinsford.	All Hazards	CSD	NHDOT or State Bridge Funding	High	4-5 Years
28. *Raise County Farm Road – Maintain access to the Strafford County Complex, which includes the rest home, court, hospice care, and jail.	Flood	CSD	City Budget	High	4-5 Years
29. *County Farm Road Bridge Replacement – Would provide additional access in and out of the North End area of the City.	Flood	CSD	City Budget	High	4-5 Years

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 states. 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 multi-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 City functions, annual questionnaires or surveys, and posting on websites. Public announcements will be made through postings on the City website. 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 be reviewed as well during the monitoring and update of the plan to determine feasibility of future implementation.

CHAPTER 9: PLAN ADOPTION

Signed Certificate of Adoption

WHEREAS, the City of Dover 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 2026 Multi-Hazard Mitigation Plan Update, City of Dover, NH; and

WHEREAS, several public planning meetings were held between October 28, 2025 and February 11, 2026 regarding the development and review of the 2026 Multi-Hazard Mitigation Plan Update, City of Dover, NH; and

WHEREAS, the 2026 Multi-Hazard Mitigation Plan Update, City of Dover, NH contains several potential future projects to mitigate hazard damage in the City of Dover; and

WHEREAS, a duly noticed public meeting was held by the City Council of the City of Dover on _____ to formally approve and adopt the 2026 Multi-Hazard Mitigation Plan Update, City of Dover, NH.

NOW, THEREFORE BE IT RESOLVED that the City Council of the City of Dover adopts the 2026 Multi-Hazard Mitigation Plan Update, City of Dover, NH.

ADOPTED AND SIGNED this day of _____, 2026

City Council of the City of Dover, Chair

City Seal or Notary

Date _____

Final Approval Letter from FEMA

To be filled out.

APPENDICES

Appendix A: Bibliography

Appendix B: Planning Process Documentation

Appendix C: Summary of Possible All-Hazard Mitigation Strategies

Appendix D: Technical and Financial Assistance for All-Hazard Mitigation

Appendix E: Successful Outreach Campaigns

Appendix F: Maps

Appendix A: Bibliography

Documents

- Local Mitigation Planning Policy Guide, FEMA, released April 19, 2022
- Dover Hazard Mitigation Plan 2018
- State of New Hampshire Multi-Hazard Mitigation Plan., adopted 2023
- National Climatic Data Center

Appendix B: Planning Process Documentation

The Hazard Mitigation Committee met six times between October 28, 2025 and February 1, 2026 to discuss the range of hazards included in this plan as well as brainstorm mitigation needs and strategies to address these hazards and their impacts on people, business, and infrastructure in Dover. All meetings were geared to accommodate brainstorming, open discussion, and an increased awareness of potential threats to the City. This process results in significant cross talk regarding all types of natural and man-made hazards. All feedback from participants of the committee was incorporated into the Plan.

List of Meetings with Hazard Mitigation Committee		
Meeting	Date	Agenda Items
Meeting #1	10/28/25	Reviewed update process, timeframe, committee responsibilities, and in-kind match; status of the previous Action Plan; and risk assessment.
Meeting #2	11/13/25	Updated past and potential hazard descriptions; and critical facilities.
Meeting #3	11/25/25	Mapping exercise to show past and potential hazards and updated critical facilities.
Meeting #4	12/16/25	Conducted brainstorming session for new mitigation actions and priorities.
Meeting #5	1/20/26	Finalized mitigation actions and discussed goals/strategies
Meeting #6	2/1/26	Reviewed gaps in the overall draft of the plan.

Hazard Mitigation Committee Meeting #1

October 28, 2025

2:00 p.m.

Teams Meeting

<https://tinyurl.com/nhzmkcf>

MEETING AGENDA

1. Introductions
2. Update Process: Timeframe, Committee Responsibilities, In-kind Match
3. Status of 2018 Action Plan
4. Risk Assessment
5. Review Existing Programs and Policies
6. Potential Dates for Future Meetings (please bring your calendar for Nov. and Dec.)
 - a. Meeting #2 - TBD
 - b. Meeting #3 - TBD

Hazard Mitigation Committee Meeting #2

November 13, 2025

2:00 p.m.

Teams Meeting Link:

[Join the meeting now](#)

MEETING AGENDA

1. Review Existing Programs and Policies
2. Hazard Identification-
 - a. Past hazard areas
 - b. Potential hazard areas/areas of concern
3. Potential Dates for Future Meetings (please bring your calendar for Dec.)
 - a. Meeting #3 - November 25 at 2:00
 - b. Meeting #4 - TBD

Hazard Mitigation Committee Meeting #3

November 25, 2025

2:00 p.m.

Teams Meeting

<https://tinyurl.com/3un8wkpj>

MEETING AGENDA

1. Critical Facilities
 - a. Review and update critical facilities list
2. Determine Outreach Methods
 - a. Review survey questions
 - b. Notices to surrounding communities
3. Begin to identify actions for the Action Plan
4. Additional Input on Hazard event/impact and areas of concern from meeting #2
5. Potential Dates for Future Meetings (please bring your calendar for December)
 - a. Meeting #4 – Week of December 15th

Hazard Mitigation Committee Meeting #4

December 16, 2025

2:00 p.m.

Teams Meeting

(see meeting invite to join)

MEETING AGENDA

1. STAPLEE Chart
 - a. Determine new mitigation actions and complete the STAPLEE Chart
2. Gaps in Protection
 - a. Review the proposed actions identified in the STAPLEE Chart and determine if there are gaps in protection for the Medium and High ranked hazards
3. Develop the Action Plan
 - a. Determine the person responsible and timeline for the actions identified in the STAPLEE Chart
4. Additional Input on Hazard event/impact and areas of concern from meeting #2
5. Review Hazard Mitigation Goals
6. Potential Date for Next Meeting (please bring your calendar for January)
 - a. Meeting #5 – Week of January 19th

Hazard Mitigation Committee Meeting #5

January 20, 2026

2:00 p.m.

Teams Meeting

MEETING AGENDA

<https://bit.ly/4pET8a5> or use the meeting invite to join

1. Develop the Action Plan
 - a. Determine the person responsible and timeline for the actions identified in the STAPLEE Chart
2. Additional Input on Hazard event/impact and areas of concern from meeting #2
3. Review Hazard Mitigation Goals
4. Potential Date for Next Meeting if needed (please bring your calendar for February)
 - a. Meeting #6 – Week of February 2nd

Hazard Mitigation Committee Meeting #6

February 11, 2026

2:00 p.m.

Teams Meeting

MEETING AGENDA

<https://teams.microsoft.com/meet/22936965067817?p=g2Pf0ZfApUoxwSjiF4>

or use the meeting invite to join

1. Review of draft
 - a. Review the draft sections and identify changes that are needed.

Appendix C: Summary of Possible All-Hazard Mitigation Strategies

I. RIVERINE MITIGATION

A. Prevention

Prevention measures are intended to keep the problem from occurring in the first place, and/or keep it from getting worse. Future development should not increase flood damage. Building, zoning, planning, and/or code enforcement personnel usually administer preventative measures.

1. **Planning and Zoning**- Land use plans are put in place to guide future development, recommending where - and where not - development should occur and where it should not. Sensitive and vulnerable lands can be designated for uses that would not be incompatible with occasional flood events - such as parks or wildlife refuges. A Capital Improvements Program (CIP) can recommend the setting aside of funds for public acquisition of these designated lands. The zoning ordinance can regulate development in these sensitive areas by limiting or preventing some or all development - for example, by designating floodplain overlay, conservation, or agricultural districts. All zoning should be carefully reviewed on a consistent basis by municipal officials to make sure guidelines are up-to-date and are acting in accordance with best management practices.
2. **Open Space Preservation** - Preserving open space is the best way to prevent flooding and flood damage. Open space preservation should not, however, be limited to the floodplain, since other areas within the watershed may contribute to controlling the runoff that exacerbates flooding. Land Use and Capital Improvement Plans should identify areas to be preserved by acquisition and other means, such as purchasing easements. Aside from outright purchase, open space can also be protected through maintenance agreements with the landowners, or by requiring developers to dedicate land for flood flow, drainage and storage.
3. **Floodplain Development Regulations** - Floodplain development regulations typically do not prohibit development in the special flood hazard area, but they do impose construction standards on what is built there. The intent is to protect roads and structures from flood damage and to prevent the development from aggravating the flood potential. Floodplain development regulations are generally incorporated into subdivision regulations, building codes, and floodplain ordinances.
 - a. **Subdivision Regulations:** These regulations govern how land will be divided into separate lots or sites. They should require that any flood hazard areas be shown on the plat, and that every lot has a buildable area that is above the base flood elevation.
 - b. **Building Codes:** Standards can be incorporated into building codes that address flood proofing for all new and improved or repaired buildings.
 - c. **Floodplain Ordinances:** Communities that participate in the National Flood Insurance Program are required to adopt the minimum floodplain management regulations, as developed by FEMA. The regulations set minimum standards for subdivision regulations and building codes. Communities may adopt more stringent standards than those set forth by FEMA.

4. **Stormwater Management** - Development outside of a floodplain can contribute significantly to flooding by covering impervious surfaces, which increases storm water runoff. Storm water management is usually addressed in subdivision regulations. Developers are typically required to build retention or detention basins to minimize any increase in runoff caused by new or expanded impervious surfaces, or new drainage systems. Generally, there is a prohibition against storm water leaving the site at a rate higher than it did before the development. One technique is to use wet basins as part of the landscaping plan of a development. It might even be possible to site these basins based on a watershed analysis. Since detention only controls the runoff rates and not volumes, other measures must be employed for storm water infiltration - for example, swales, infiltration trenches, vegetative filter strips, and permeable paving blocks.
5. **Drainage System Maintenance** - Ongoing maintenance of channel and detention basins is necessary if these facilities are to function effectively and efficiently over time. A maintenance program should include regulations that prevent dumping in or altering water courses or storage basins; regrading and filling should also be regulated. Any maintenance program should include a public education component, so that the public becomes aware of the reasons for the regulations. Many people do not realize the consequences of filling in a ditch or wetland, or regrading.

B. Property Protection

Property protection measures are used to modify buildings subject to flood damage, rather than to keep floodwaters away. These may be less expensive to implement, as they are often carried out on a cost-sharing basis. In addition, many of these measures do not affect a building's appearance or use, which makes them particularly suitable for historical sites and landmarks.

1. **Relocation** - Moving structures out of the floodplain is the surest and safest way to protect against damage. Relocation is expensive, however, so this approach will probably not be used except in extreme circumstances. Communities that have areas subject to severe storm surges, ice jams, etc. might want to consider establishing a relocation program, incorporating available assistance.
2. **Acquisition** - Acquisition by a governmental entity of land in a floodplain serves two main purposes: 1) it ensures that the problem of structures in the floodplain will be addressed; and 2) it has the potential to convert problem areas into community assets, with accompanying environmental benefits. Acquisition is more cost effective than relocation in those areas that are subject to storm surges, ice jams, or flash flooding. Acquisition, followed by demolition, is the most appropriate strategy for those buildings that are simply too expensive to move, as well as for dilapidated structures that are not worth saving or protecting. Acquisition and subsequent relocation can be expensive, however, there are government grants and loans that can be applied toward such efforts.
3. **Building Elevation** - Elevating a building above the base flood elevation is the best on-site protection strategy. The building could be raised to allow water to run underneath it, or fill could be brought in to elevate the site on which the building sits. This approach is cheaper than relocation, and tends to be less disruptive to a neighborhood. Elevation is required by law for new and substantially improved residences in a floodplain, and is commonly practiced in flood hazard areas nationwide.

4. **Floodproofing** - If a building cannot be relocated or elevated, it may be floodproofed. This approach works well in areas of low flood threat. Floodproofing can be accomplished through barriers to flooding, or by treatment to the structure itself.
 - a. **Barriers:** Levees, floodwalls and berms can keep floodwaters from reaching a building. These are useful, however, only in areas subject to shallow flooding.
 - b. **Dry Floodproofing:** This method seals a building against the water by coating the walls with waterproofing compounds or plastic sheeting. Openings, such as doors, windows, etc. are closed either permanently with removable shields or with sandbags.
 - c. **Wet Floodproofing:** This technique is usually considered a last resort measure, since water is intentionally allowed into the building in order to minimize pressure on the structure. Approaches range from moving valuable items to higher floors to rebuilding the floodable area. An advantage over other approaches is that simply by moving household goods out of the range of floodwaters, thousands of dollars can be saved in damages.

5. **Sewer Backup Protection** - Storm water overloads can cause backup into basements through sanitary sewer lines. Houses that have any kind of connection to a sanitary sewer system - whether it is downspouts, footing drain tile, and/or sump pumps, can be flooded during a heavy rain event. To prevent this, there should be no such connections to the system, and all rain and ground water should be directed onto the ground, away from the building. Other protections include:
 - a. Floor drain plugs and floor drain standpipe, which keep water from flowing out of the lowest opening in the house.
 - b. Overhead sewer - keeps water in the sewer line during a backup.
 - c. Backup valve - allows sewage to flow out while preventing backups from flowing into the house.

6. **Insurance** - Above and beyond standard homeowner insurance, there is other coverage a homeowner can purchase to protect against flood hazard. Two of the most common are National Flood Insurance and basement backup insurance.
 - a. **National Flood Insurance:** When a community participates in the National Flood Insurance Program, any local insurance agent is able to sell separate flood insurance policies under rules and rates set by FEMA. Rates do not change after claims are paid because they are set on a national basis.
 - b. **Basement Backup Insurance:** National Flood Insurance offers an additional deductible for seepage and sewer backup, provided there is a general condition of flooding in the area that was the proximate cause of the basement getting wet. Most exclude damage from surface flooding that would be covered by the NFIP.

C. Natural Resource Protection

Preserving or restoring natural areas or the natural functions of floodplain and watershed areas provide the benefits of eliminating or minimizing losses from floods, as well as improving water quality and wildlife habitats. Parks, recreation, or conservation agencies usually implement such activities. Protection can also be provided through various zoning measures that are specifically designed to protect natural resources.

1. **Wetlands Protection** - Wetlands are capable of storing large amounts of floodwaters, slowing and reducing downstream flows, and filtering the water. Any development that is proposed in a wetland is regulated by either federal and/or state agencies. Depending on the location, the project might fall under the jurisdiction of the U.S. Army Corps of Engineers, which in turn, calls upon several other agencies to review the proposal. In New Hampshire, the N.H. Wetlands Board must approve any project that impacts a wetland. Many communities in New Hampshire also have local wetland ordinances.

Generally, the goal is to protect wetlands by preventing development that would adversely affect them. Mitigation techniques are often employed, which might consist of creating a wetland on another site to replace what would be lost through the development. This is not an ideal practice since it takes many years for a new wetland to achieve the same level of quality as an existing one, if it can at all.

2. **Erosion and Sedimentation Control** - Controlling erosion and sediment runoff during construction and on farmland is important, since eroding soil will typically end up in downstream waterways. Because sediment tends to settle where the water flow is slower, it will gradually fill in channels and lakes, reducing their ability to carry or store floodwaters.
3. **Best Management Practices** - Best Management Practices (BMPs) are measures that reduce non-point source pollutants that enter waterways. Non-point source pollutants are carried by storm water to waterways, and include such things as lawn fertilizers, pesticides, farm chemicals, and oils from street surfaces and industrial sites. BMPs can be incorporated into many aspects of new developments and ongoing land use practices. In New Hampshire, the Department of Environmental Services has developed Best Management Practices for a range of activities, from farming to earth excavations.

D. Emergency Services

Emergency services protect people during and after a flood. Many communities in New Hampshire have emergency management programs in place, administered by an emergency management director (very often the local police or fire chief).

1. **Flood Warning** - On large rivers, the National Weather Service handles early recognition. Communities on smaller rivers must develop their own warning systems. Warnings may be disseminated in a variety of ways, such as sirens, radio, television, mobile public address systems, or door-to-door contact. It seems that multiple or redundant systems are the most effective, giving people more than one opportunity to be warned.
2. **Flood Response** - Flood response refers to actions that are designed to prevent or reduce damage or injury, once a flood threat is recognized. Such actions and the appropriate parties include:
 - a. Activating the emergency operations center (emergency director)
 - b. Sandbagging designated areas (Highway Department)
 - c. Closing streets and bridges (police department)
 - d. Shutting off power to threatened areas (public service)
 - e. Releasing children from school (school district)
 - f. Ordering an evacuation (Board of Selectmen/emergency director)

- g. Opening evacuation shelters (churches, schools, Red Cross, municipal facilities)

These actions should be part of a flood response plan, which should be developed in coordination with the persons and agencies that share the responsibilities. Drills and exercises should be conducted so that the key participants know what they are supposed to do.

3. **Critical Facilities Protection** - Protecting critical facilities is vital, since expending efforts on these facilities can draw workers and resources away from protecting other parts of the city. Critical facilities fall into two categories:
 - a. **Buildings or locations vital to the flood response effort:**
 - i. Emergency operations centers
 - ii. Police and fire stations
 - iii. Highway garages
 - iv. Selected roads and bridges
 - v. Evacuation routes
 - b. **Buildings or locations that, if flooded, would create disasters:**
 - c. Hazardous materials facilities
 - d. Schools

All such facilities should have their own flood response plan that is coordinated with the community's plan. Schools will typically be required by the state to have emergency response plans in place.

4. **Health and Safety Maintenance** - The flood response plan should identify appropriate measures to prevent danger to health and safety. Such measures include:
 - a. Patrolling evacuated areas to prevent looting
 - b. Vaccinating residents for tetanus
 - c. Clearing streets
 - d. Cleaning up debris

The Plan should also identify which agencies will be responsible for carrying out the identified measures. A public information program can be helpful to educate residents on the benefits of taking health and safety precautions.

E. Structural Projects

Structural projects are used to prevent floodwaters from reaching properties. These are all man-made structures, and can be grouped into the six types discussed below. The shortcomings of structural approaches are:

- Can be very expensive
 - Disturb the land, disrupt natural water flows, & destroy natural habitats.
 - Are built to an anticipated flood event, and may be exceeded by a greater-than expected flood
 - Can create a false sense of security.
1. **Diversions** - A diversion is simply a new channel that sends floodwater to a different location, thereby reducing flooding along an existing watercourse. Diversions can be surface channels, overflow weirs,

or tunnels. During normal flows, the water stays in the old channel. During flood flows, the stream spills over the diversion channel or tunnel, which carries the excess water to the receiving lake or river. Diversions are limited by topography; they won't work everywhere. Unless the receiving water body is relatively close to the flood prone stream and the land in between is low and vacant, the cost of creating a diversion can be prohibitive. Where topography and land use are not favorable, a more expensive tunnel is needed. In either case, care must be taken to ensure that the diversion does not create a flooding problem somewhere else.

2. **Levees/Floodwalls** - Probably the best known structural flood control measure is either a levee (a barrier of earth) or a floodwall made of steel or concrete erected between the watercourse and the land. If space is a consideration, floodwalls are typically used, since levees need more space. Levees and floodwalls should be set back out of the floodway, so that they will not divert floodwater onto other properties.
3. **Reservoirs** - Reservoirs control flooding by holding water behind dams or in storage basins. After a flood peaks, water is released or pumped out slowly at a rate the river downstream can handle. Reservoirs are suitable for protecting existing development, and they may be the only flood control measure that can protect development close to a watercourse. They are most efficient in deeper valleys or on smaller rivers where there is less water to store. Reservoirs might consist of man-made holes dug to hold the approximate amount of floodwaters, or even abandoned quarries. As with other structural projects, reservoirs:
 - a. are expensive
 - b. occupy a lot of land
 - c. require periodic maintenance
 - d. may fail to prevent damage from floods that exceed their design levels
 - e. may eliminate the natural and beneficial functions of the floodplain.
4. **Channel Modifications** - Channel modifications include making a channel wider, deeper, smoother, or straighter. These techniques will result in more water being carried away, but, as with other techniques mentioned, it is important to ensure that the modifications do not create or increase a flooding problem downstream.
5. **Dredging:** Dredging is often cost-prohibitive because the dredged material must be disposed of in another location; the stream will usually fill back in with sediment. Dredging is usually undertaken only on larger rivers, and then only to maintain a navigation channel.
6. **Drainage Modifications:** These include man-made ditches and storm sewers that help drain areas where the surface drainage system is inadequate or where underground drainage ways may be safer or more attractive. These approaches are usually designed to carry the runoff from smaller, more frequent storms.
7. **Storm Sewers** - Mitigation techniques for storm sewers include installing new sewers, enlarging small pipes, street improvements, and preventing back flow. Because drainage ditches and storm sewers convey water faster to other locations, improvements are only recommended for small local problems

where the receiving body of water can absorb the increased flows without increased flooding. In many developments, streets are used as part of the drainage system, to carry or hold water from larger, less frequent storms. The streets collect runoff and convey it to a receiving sewer, ditch, or stream. Allowing water to stand in the streets and then draining it slowly can be a more effective and less expensive measure than enlarging sewers and ditches.

F. Public Information

Public information activities are intended to advise property owners, potential property owners, and visitors about the particular hazards associated with a property, ways to protect people and property from these hazards, and the natural and beneficial functions of a floodplain.

1. **Map Information** - Flood maps developed by FEMA outline the boundaries of the flood hazard areas. These maps can be used by anyone interested in a particular property to determine if it is flood-prone. These maps are available from FEMA, the NH Homeland Security and Emergency Management (HSEM), the NH Office of Energy and Planning (OEP), or your regional planning commission.
2. **Outreach Projects** - Outreach projects are proactive; they give the public information even if they have not asked for it. Outreach projects are designed to encourage people to seek out more information and take steps to protect themselves and their properties. Examples of outreach activities include:
 - a. Presentations at meetings of neighborhood groups
 - b. Mass mailings or newsletters to all residents
 - c. Notices directed to floodplain residents
 - d. Displays in public buildings, malls, etc.
 - e. Newspaper articles and special sections
 - f. Radio and TV news releases and interview shows
 - g. A local flood proofing video for cable TV programs and to loan to organizations
 - h. A detailed property owner handbook tailored for local conditions. Research has shown that outreach programs work, although awareness is not enough. People need to know what they can do about the hazards, so projects should include information on protection measures. Research also shows that locally designed and run programs are much more effective than national advertising.
3. **Real Estate Disclosure** - Disclosure of information regarding flood-prone properties is important if potential buyers are to be in a position to mitigate damage. Federally regulated lending institutions are required to advise applicants that a property is in the floodplain. However, this requirement needs to be met only five days prior to closing, and by that time, the applicant is typically committed to the purchase. State laws and local real estate practice can help by making this information available to prospective buyers early in the process.
4. **Library** - Your local library can serve as a repository for pertinent information on flooding and flood protection. Some libraries also maintain their own public information campaigns, augmenting the activities of the various governmental agencies involved in flood mitigation.

5. **Technical Assistance** - Certain types of technical assistance are available from the NFIP Coordinator, FEMA, and the Natural Resources Conservation District. Community officials can also set up a service delivery program to provide one-on-one sessions with property owners.

An example of technical assistance is the *flood audit*, in which a specialist visits a property. Following the visit, the owner is provided with a written report detailing the past and potential flood depths and recommending alternative protection measures.

6. **Environmental Education** - Education can be a great mitigating tool if people can learn what not to do before damage occurs. The sooner the education begins the better. Environmental education programs for children can be taught in the schools, park and recreation departments, conservation associations, or youth organizations. An activity can be as involved as course curriculum development or as simple as an explanatory sign near a river.

Education programs do not have to be limited to children. Adults can benefit from knowledge of flooding and mitigation measures; decision makers, armed with this knowledge, can make a difference in their communities.

II. EARTHQUAKES

A. Preventive

1. Planning/zoning to keep critical facilities away from fault lines
2. Planning, zoning and building codes to avoid areas below steep slopes or soils subject to liquefaction
3. Building codes to prohibit loose masonry overhangs, etc.

B. Property Protection

1. Acquire and clear hazard areas
2. Retrofitting to add braces, remove overhangs
3. Apply Mylar to windows and glass surfaces to protect from shattering glass
4. Tie down major appliances, provide flexible utility connections
5. Earthquake insurance riders

C. Emergency Services

Earthquake response plans to account for secondary problems, such as fires and hazardous material spills

D. Structural Projects

Slope stabilization

III. DAM FAILURE

A. Preventive

1. Dam failure inundation maps
2. Planning/zoning/open space preservation to keep area clear
3. Building codes with flood elevation based on dam failure

4. Dam safety inspections
5. Draining the reservoir when conditions appear unsafe

B. Property Protection

1. Acquisition of buildings in the path of a dam breach flood
2. Flood insurance

C. Emergency Services

1. Dam condition monitoring
2. Warning and evacuation plans based on dam failure

D. Structural Projects

1. Dam improvements, spillway enlargements
2. Remove unsafe dams

IV. WILDFIRES

A. Preventive

1. Zoning districts to reflect fire risk zones
2. Planning and zoning to restrict development in areas near fire protection and water resources
3. Requiring new subdivisions to space buildings, provide firebreaks, on-site water storage, wide roads, multiple accesses
4. Building code standards for roof materials and spark arrestors
5. Maintenance programs to clear dead and dry brush, trees
6. Regulation on open fires

B. Property Protection

1. Retrofitting of roofs and adding spark arrestors
2. Landscaping to keep bushes and trees away from structures
3. Insurance rates based on distance from fire protection

C. Natural Resource Protection

Prohibit development in high-risk areas

D. Emergency Services

Fire Fighting

V. WINTER STORMS

A. Prevention

Building code standards for light frame construction, especially for wind-resistant roofs

B. Property Protection

1. Storm shutters and windows

2. Hurricane straps on roofs and overhangs
3. Seal outside and inside of storm windows and check seals in spring and fall
4. Family and/or company severe weather action plan & drills:
 - a. include a **NOAA** Weather Radio
 - b. designate a shelter area or location
 - c. keep a disaster supply kit, including stored food and water
 - d. keep snow removal equipment in good repair; have extra shovels, sand, rock, salt and gas
 - e. know how to turn off water, gas, and electricity at home or work

C. Natural Resource Protection

Maintenance program for trimming trees and shrubs

D. Emergency Services

1. Early warning systems/NOAA Weather Radio
2. Evacuation plans

Appendix D: Technical and Financial Assistance for All-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 as to 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.

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

Purpose:

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

Federal / Non-Federal cost share:

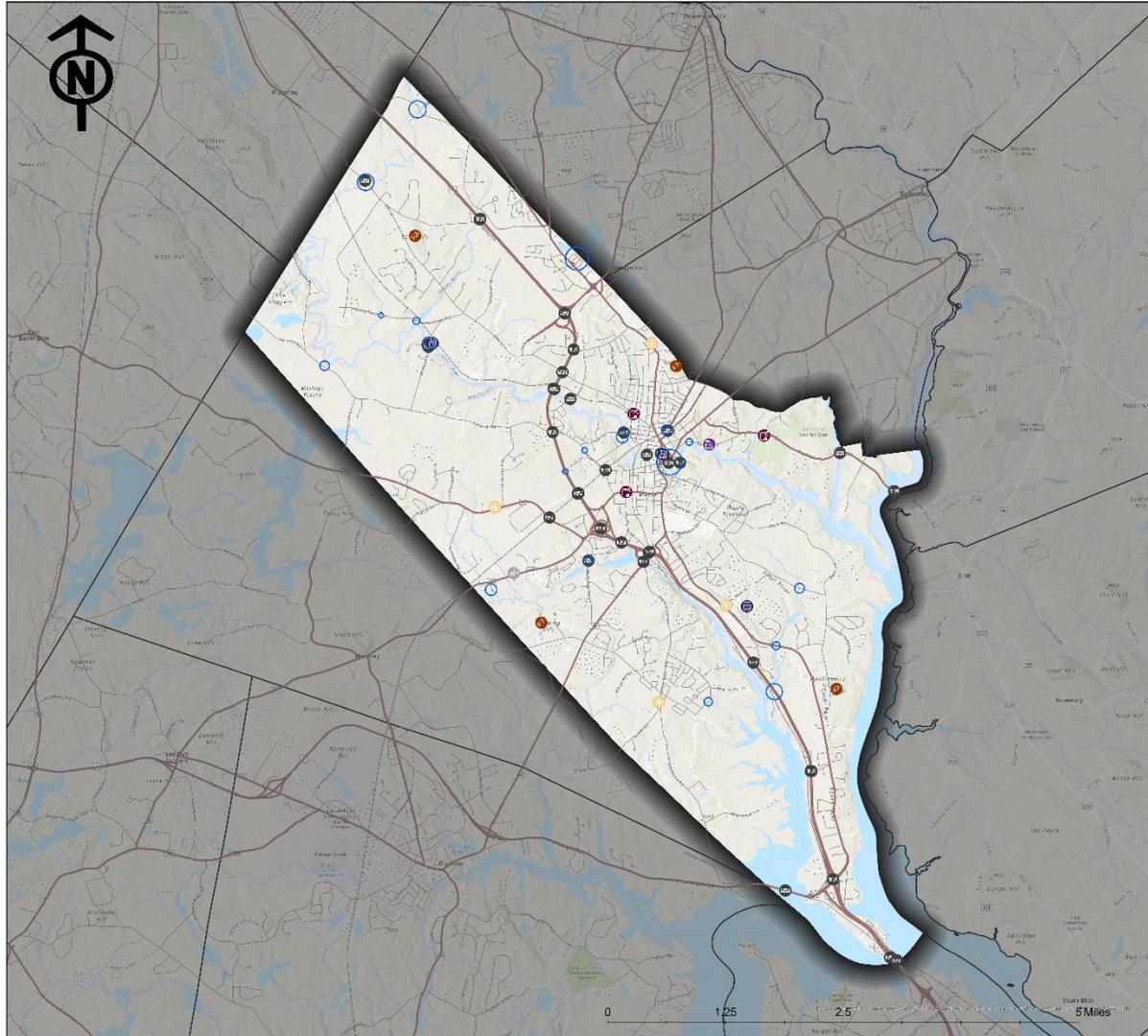
75 / 25 %; up to 90 % Federal cost-share funding for projects approved in States, Territories, and Federally-recognized Indian tribes with FEMA-approved Standard or Enhanced Mitigation Plans or Indian tribal plans that include a strategy for mitigating existing and future SRL properties.

Appendix E: Successful Outreach Campaigns

1. Tool for outreach material w/ search function: <https://cfpub.epa.gov/npstbx/index.cfm>
2. NH DES “Scoop the Poop” media kit:
<https://www.des.nh.gov/resource-center/publications?keys=scoopthepoop+media&purpose=Guidance+&subcategory=Watershed+Management>
3. Cumberland County Interlocal Stormwater Working Group, Education Plan per permit year, EXTENSIVE statistics on outreach campaigns & methods, specifically deals with MS4:
https://static1.squarespace.com/static/5e4af21b92caed7f481a25b7/t/5f21788798148a15d80e1258/1596029063333/Stormwater_Awareness_Approved_7.2020.pdf
 - a. Annual Reports found here: <https://www.cumberlandswcd.org/iswg>
 - b. Comprehensive lesson catalog for outreach/engagement with kids, lesson materials can also be rented from the Cumberland County Soil and Water Conservation District:
<https://static1.squarespace.com/static/5e4af21b92caed7f481a25b7/t/5ffdca6ab8611c9d82eebb/1610468027536/Education+Lessons+Catalog.pdf>
4. Messages about flood safety on city benches, outreach about flooding at CSU’s housing fair for student renters/property owners: <https://successwithcrs.us/fort-colins-colorado/>
5. Pages 61-62 case study on using open houses for floodproofing outreach:
<https://www.floodsciencecenter.org/koha?id=980>
6. Tool for outreach: enviroscares hands on models, watershed/nonpoint source and wetland/floodplain, mentioned in case study from link above (p 67-68)
<https://www.enviroscares.com/category/hands-on-models>
7. Newspaper article on pet waste campaign: <https://www.ajc.com/neighborhoods/north-fulton/roswell-launches-dog-waste-education-and-outreach-campaign/KDA2H34NVJFN3KRSE3L3OB4IK4/>
8. One-month social media campaign plan with materials on pet waste education:
<https://www.dupagerivers.org/seasonal-campaigns/pet-waste/>
9. “Write as rain” stormwater outreach campaign, won first place for best education and outreach in the bay (Chesapeake stormwater network) <https://askhrgreen.org/rainyday/>

Appendix F: Maps

Map 3: Critical Infrastructure



Critical Infrastructure & Past and Potential Hazards

Hazard Mitigation Plan (2026)
Dover, NH

Critical Infrastructure Legend

- Bridge
- Communication Function
- Dam
- Gas Regulator Station
- Power Station/Substation
- Smaller Voltage Substation
- Switching Station

Past and Potential Hazards

- Past Flooding

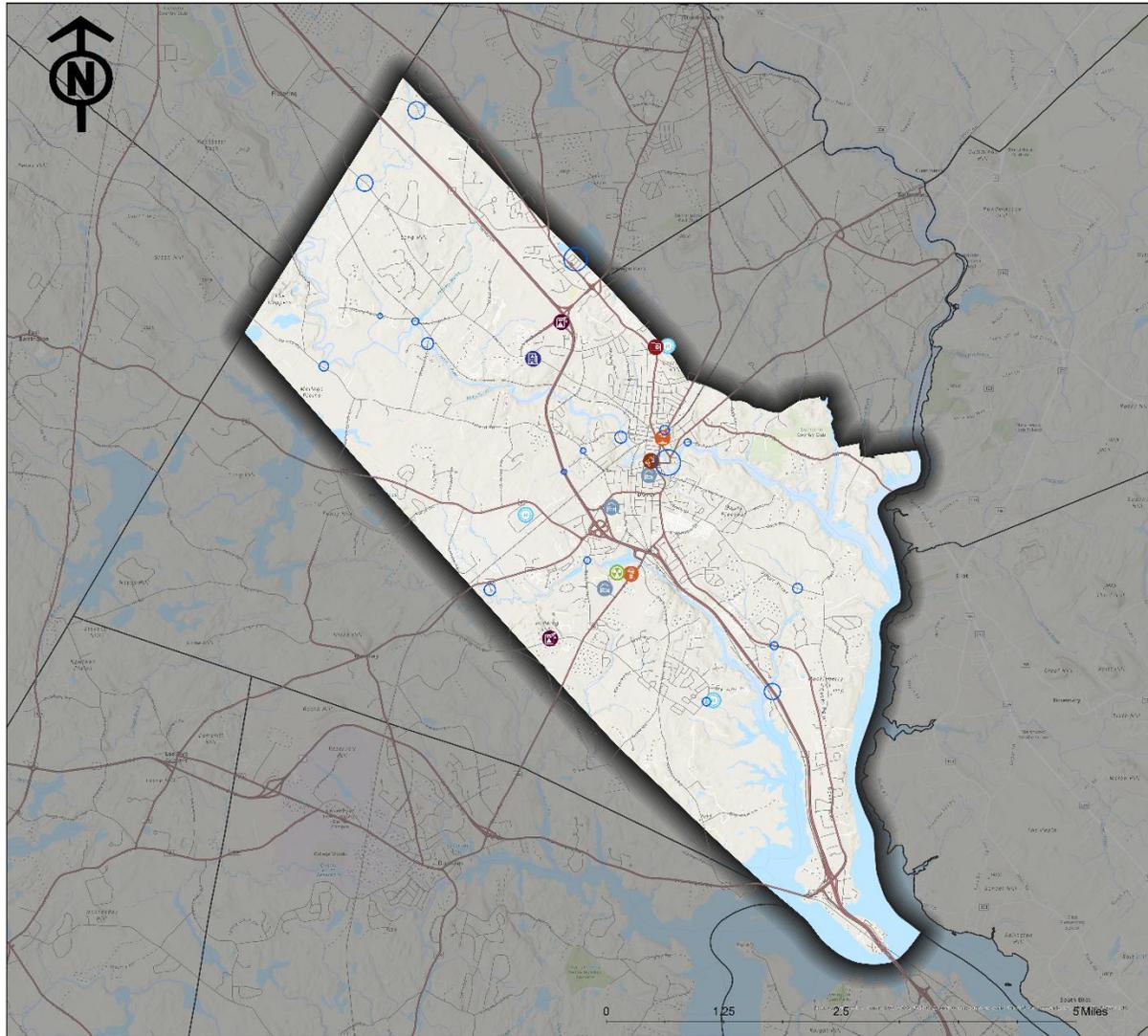
Basemap Legend

- Municipal Boundaries
- State Road
- Local Road
- Private Road
- Railroads
- Rivers, Brooks, Streams
- Lakes and Ponds

Prepared by Strafford Regional Planning Commission
150 Wakefield Street #12, Rochester, NH 03867
603-984-3500
Author: Stephen Geis
Date: 2/19/2026

Base data layers generally from ESRI, NH GRANIT, NHDOT, MEGIS, USGS, and the Town of Strafford. These agencies and organizations have derived this data using a variety of data source materials, at different time frames, through different methodologies, with varying levels of accuracy. As such, errors are often inherent in GIS data and should be used for planning purposes only. The presented data is sometimes only a subset of the original data. Please visit the original location of the data, contact the original host source, or contact SRPC for information on the full data set.

Map 4: Emergency Response Facilities



Critical Infrastructure & Past and Potential Hazards

Hazard Mitigation Plan (2026)
Dover, NH

Emergency Response Facilities Legend

- Administrative (IT)
- Emergency Operations Center
- Emergency Shelter
- Communication Function
- Emergency Fuel
- Emergency Medical Evacuation
- Fire Aid
- Medical Treatment Facility
- Radioactive Reception Center

Past and Potential Hazards

- Past Flooding

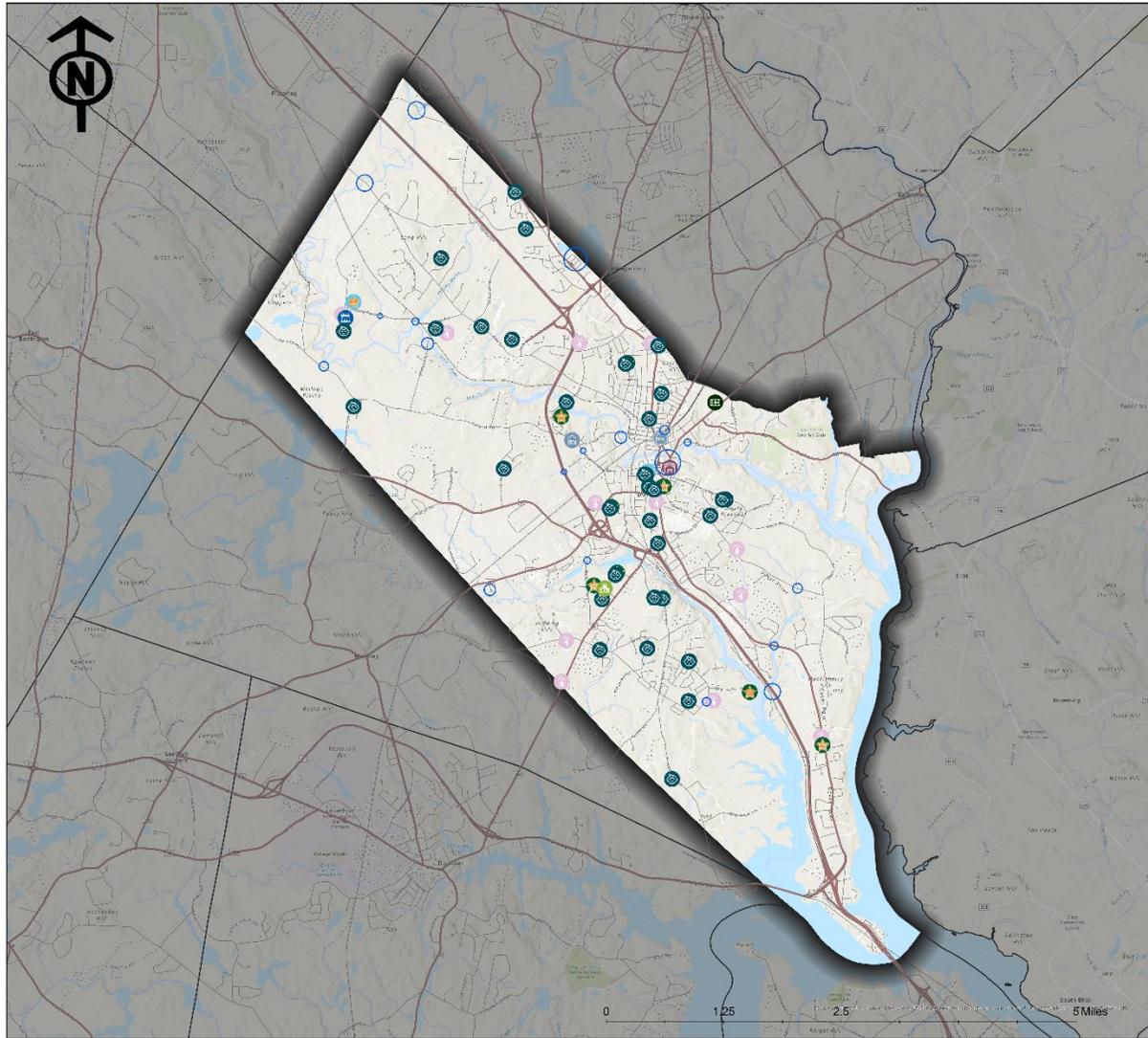
Basemap Legend

- Municipal Boundaries
- State Road
- Local Road
- Private Road
- Railroads
- Rivers, Brooks, Streams
- Lakes and Ponds

Prepared by Strafford Regional Planning Commission
150 Wakefield Street #12, Rochester, NH 03867
603-994-3500
Author: Stephen Geis
Date: 2/19/2026

Base data layers generally from ESRI, NH GRANIT, NHDOT, MEGIS, USGS, and the Town of Strafford. These agencies and organizations have derived this data using a variety of otod source materials, at different time frames, through different methodologies, with varying levels of accuracy. As such, errors are often inherent in GIS data and should its used for planning purposes only. The presented data is sometimes only a subset of the original data. Please visit the original location of the data, contact the original host source, or contact SRPC for information on the full data set.

Map 5: Facilities & Populations to Protect



Critical Infrastructure & Past and Potential Hazards

Hazard Mitigation Plan (2026)
Dover, NH

Populations to Protect Legend

-  Nursing Home
-  Courthouse
-  Event Facility
-  Homeless Shelter
-  Jail
-  School
-  Preschool/Daycare
-  Recovery Facility
-  Recreation
-  Special Education Program

Past and Potential Hazards

-  Past Flooding

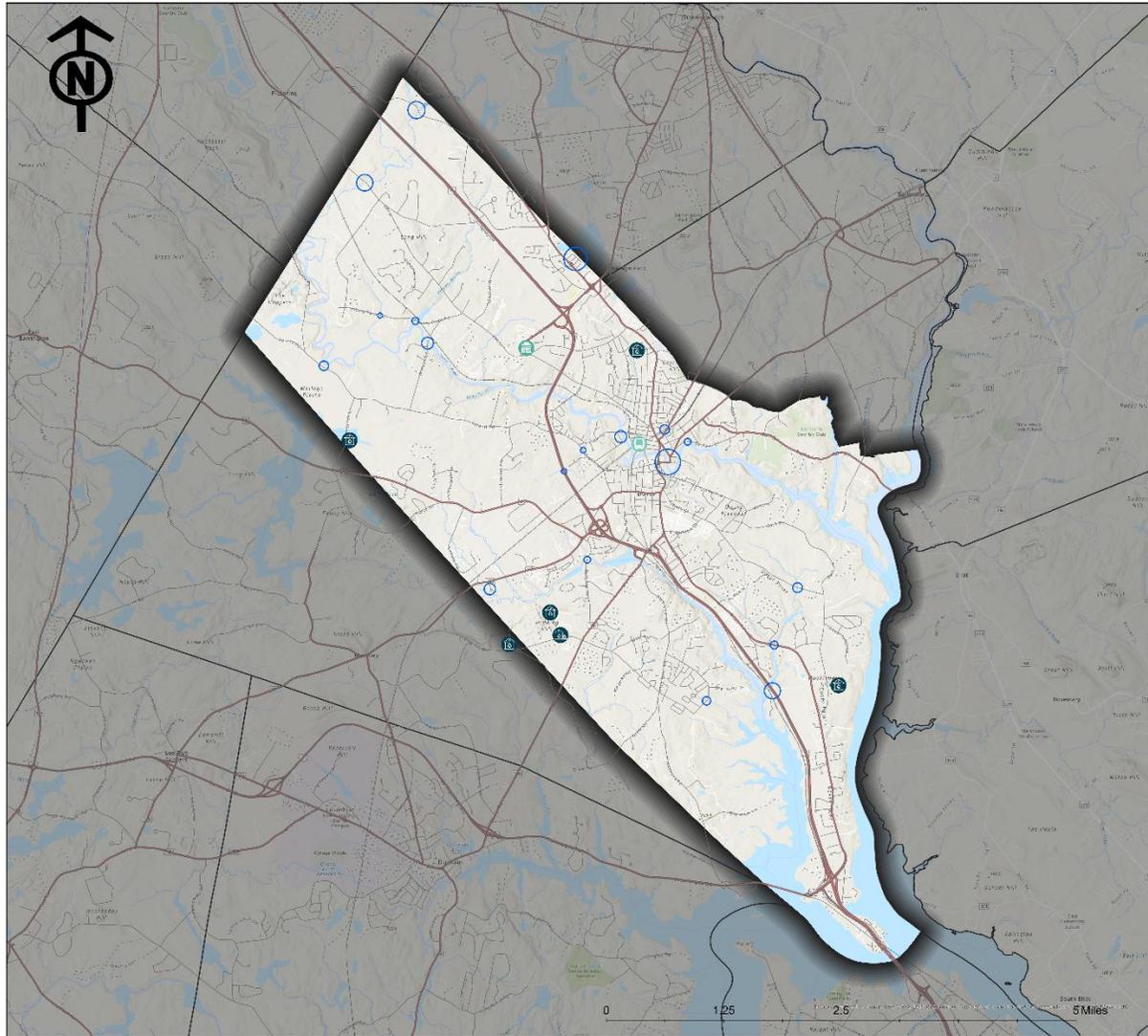
Basemap Legend

-  Municipal Boundaries
-  State Road
-  Local Road
-  Private Road
-  Railroads
-  Rivers, Brooks, Streams
-  Lakes and Ponds

Prepared by Strafford Regional Planning Commission
150 Wakefield Street #12, Rochester, NH 03867
603-994-3500
Author: Stephen Geis
Date: 2/19/2026

Base data layers generally from ESRI, NH GRANIT, NHDOT, MEGIS, USGS, and the Town of Strafford. These agencies and organizations have derived this data using a variety of otod source materials, at different time frames, through different methodologies, with varying levels of accuracy. As such, errors are often inherent in GIS data and should its used for planning purposes only. The presented data is sometimes only a subset of the original data. Please visit the original location of the data, contact the original host source, or contact SRPC for information on the full data set.

Map 6: Non-emergency Response Facilities



Critical Infrastructure & Past and Potential Hazards

Hazard Mitigation Plan (2026)
Dover, NH

Non-Emergency Response Facilities Legend

- Potential Logistics and Staging
- Residential Waste
- Transportation Center
- Water Treatment Facility

Past and Potential Hazards

- Past Flooding

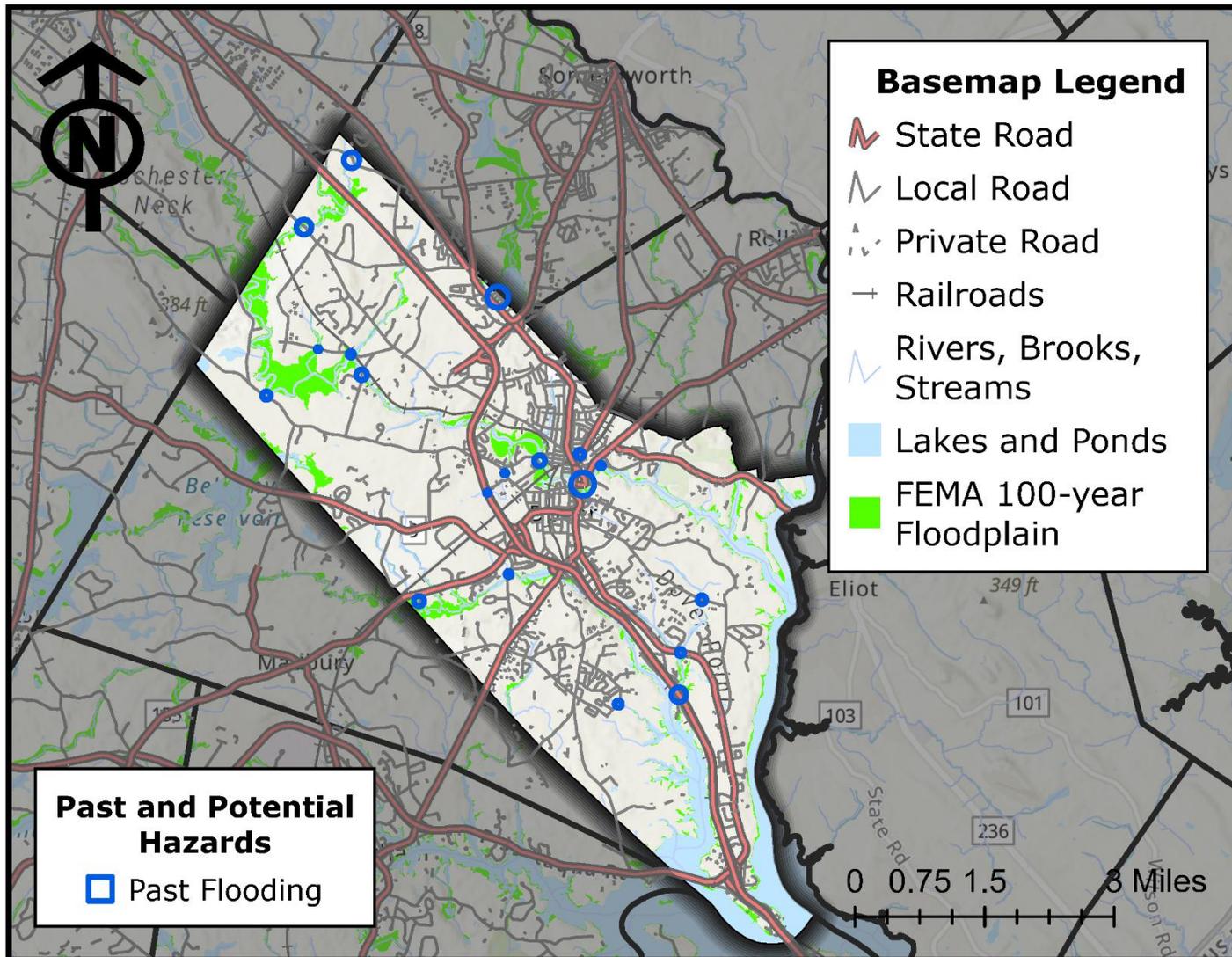
Basemap Legend

- Municipal Boundaries
- State Road
- Local Road
- Private Road
- Railroads
- Rivers, Brooks, Streams
- Lakes and Ponds

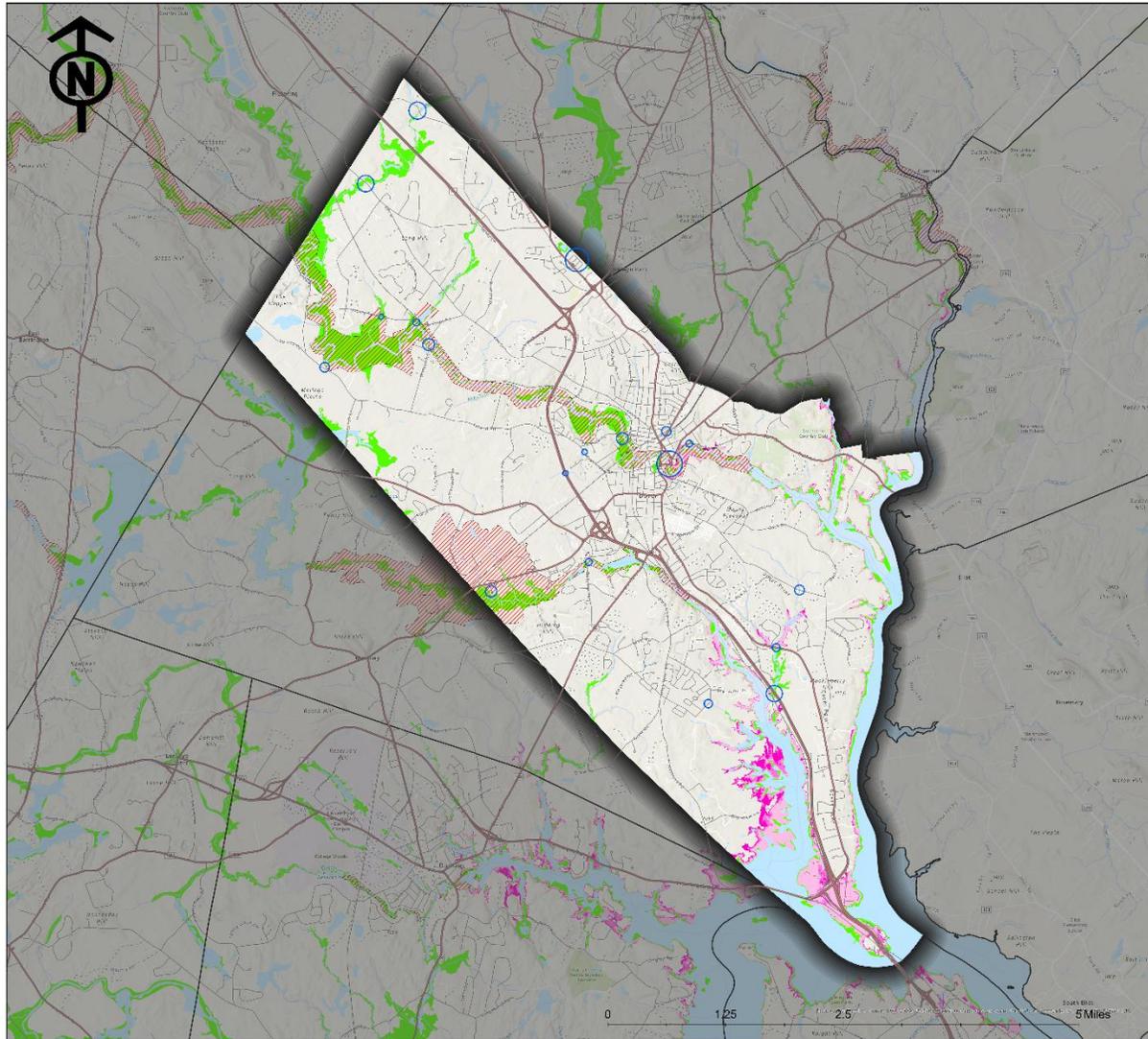
Prepared by Strafford Regional Planning Commission
150 Wakefield Street #12, Rochester, NH 03867
603-994-3500
Author: Stephen Gels
Date: 2/19/2026

Base data layers generally from ESRI, NH GRANIT, NHDOT, MEGIS, USGS, and the Town of Strafford. These agencies and organizations have derived this data using a variety of cited source materials, at different time frames, through different methodologies, with varying levels of accuracy. As such, errors are often inherent in GIS data and should not be used for planning purposes only. The presented data is sometimes only a subset of the original data. Please visit the original location of the data, contact the original host source, or contact SRPC for information on the full data set.

Map 7: Flooding



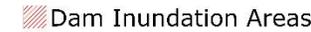
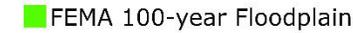
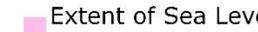
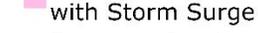
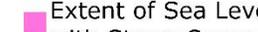
Map 8: Flood Sea Level Rise



Critical Infrastructure & Past and Potential Hazards

Hazard Mitigation Plan (2026)
Dover, NH

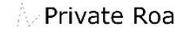
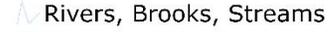
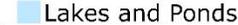
Sea Level Rise and Flooding Legend

-  Dam Inundation Areas
-  FEMA 100-year Floodplain
-  Extent of Sea Level Rise of 1.7' with Storm Surge
-  Extent of Sea Level Rise of 4.0' with Storm Surge
-  Extent of Sea Level Rise of 6.3' with Storm Surge

Past and Potential Hazards

-  Past Flooding

Basemap Legend

-  Municipal Boundaries
-  State Road
-  Local Road
-  Private Road
-  Railroads
-  Rivers, Brooks, Streams
-  Lakes and Ponds

Prepared by Strafford Regional Planning Commission
150 Wakefield Street #12, Rochester, NH 03867
603-994-3500
Author: Stephen Geis
Date: 2/19/2026

Base data layers generally from ESRI, NH GRANIT, NHDOT, MEGIS, USGS, and the Town of Strafford. These agencies and organizations have derived this data using a variety of otod source materials, at different time frames, through different methodologies, with varying levels of accuracy. As such, errors are often inherent in GIS data and should its used for planning purposes only. The presented data is sometimes only a subset of the original data. Please visit the original location of the data, contact the original host source, or contact SRPC for information on the full data set.

Map 9: Dover Slopes

