Town of Exeter, NH

Natural Hazard Mitigation Plan Update 2018

Adopted by the

Exeter Select Board

October 15, 2018

Prepared with the Assistance of the

ROCKINGHAM PLANNING COMMISSION

This project was partially funded by

NH Homeland Security and Emergency Management

Certificate of Adoption

WHEREAS, the Town of Exeter received funding from the NH Office of Homeland Security and Emergency Management under a Pre-Disaster Mitigation Grant and assistance from Rockingham Planning Commission in the preparation of the Exeter Hazard Mitigation Plan Update 2018; and

WHEREAS, several public planning meetings were held between December 2017 and May 2018 regarding the development and review of the Exeter Hazard Mitigation Plan Update 2018; and

WHEREAS, the Exeter Hazard Mitigation Plan Update 2018 contains several potential future projects to mitigate hazard damage in the Town of Exeter; and

WHEREAS, a duly-noticed public hearing was held by the Exeter Select Board on July 9, 2018 to formally approve and adopt the Exeter Hazard Mitigation Plan Update 2018.

NOW, THEREFORE BE IT RESOLVED that the Exeter Select Board:

- The Plan is hereby adopted as the official plan of the Town of Exeter:
- The respective individuals identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;
- Future revisions and Plan maintenance required by 44 CFR 201.6 and FEMA are hereby adopted as part of this resolution for a period of five (5) years from the date of this resolution;
- An annual report of the progress of the implementation elements of the Plan shall be presented to the Select Board by the Town's Emergency Management Director or Town Manager.

NOW, THEREFORE BE IT RESOLVED that the Exeter Select Board adopts the Exeter Hazard Mitigation Plan Update 2018.

IN WITNESS THEREOF, the undersigned has affixed his/her signature and the corporate seal of the Town of Exeter on this 15th day of October.

_____ Select Board Chair

_____ Select Board

_____ Select Board

_____ Select Board

_____ Select Board

ATTEST

_____ Public Notary

RUSSELL J. DEAN
MY COMMISSION EXPIRES MARCH 8, 2022
NOTARY PUBLIC NEW HAMPSHIRE

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EXECUTIVE SUMMARY

The *Exeter Hazard Mitigation Plan* (herein also referred to as the *Plan*) was compiled to assist the Town of Exeter in reducing and mitigating future losses from natural hazard events. The *Plan* was developed by the Rockingham Planning Commission and participants from the Town of Exeter *Natural Hazard Mitigation Committee* and contains the tools necessary to identify specific hazards, and aspects of existing and future mitigation efforts.

The following *natural* hazards are addressed:

- Flooding
- Hurricane-High Wind Event
- Severe Winter Weather
- Wildfire
- Earthquake
- Drought
- Extreme Temperatures
- Sea Level Rise and Coastal Storm Surge

The list of *critical facilities* includes:

- Municipal facilities
- Communication facilities
- Fire stations and law enforcement facilities
- Exeter Hospital
- Schools
- Shelters
- Evacuation routes
- Vulnerable Populations

The *Exeter Hazard Mitigation Plan Update 2018* is considered a work in progress and should be revisited annually to assess whether the existing and suggested mitigation strategies are successful. Copies have been distributed to the Town Office and the Emergency Operations Center. A copy of the *Plan* is also on file at The Rockingham Planning Commission, New Hampshire Homeland Security and Emergency Management (NHHSEM) and the Federal Emergency Management Agency (FEMA). This Document was approved by both agencies prior to adoption at the local level.

CHAPTER I – INTRODUCTION

Background

The New Hampshire Homeland Security and Emergency Management (NHHSEM) has a goal for all communities within the State of New Hampshire to establish local hazard mitigation plans as a means to reduce and mitigate future losses from natural hazard events. The NHHSEM outlined a process whereby communities throughout the State may be eligible for grants and other assistance upon completion of a local hazard mitigation plan. A handbook entitled *Hazard Mitigation Planning for New Hampshire Communities* was created by NHHSEM to assist communities in developing local plans. The State's Regional Planning Commissions are charged with providing assistance to selected communities to develop local plans.

The *Exeter Hazard Mitigation Plan Update 2018* was prepared by participants from the Town of Exeter Hazard Mitigation Team with the assistance and professional services of the Rockingham Planning Commission (RPC) under contract with the New Hampshire Homeland Security and Emergency Management operating under the guidance of Section 44 CFR 201.6. The *Plan* serves as a strategic planning tool for use by the Town of Exeter in its efforts to identify and mitigate the future impacts of natural and/or man-made hazard events.

Methodology

The Rockingham Planning Commission (RPC) organized the first meeting with emergency management officials from the Town of Exeter on November 28, 2017 to begin the initial planning stages of the *Plan Update (primarily step 1).* This meeting precipitated the development of the *Natural Hazards Mitigation Committee* (herein after, the *Committee*). RPC and participants from the Town developed the content of the *Plan* using the ten-step process set forth in the *Hazard Mitigation Planning for New Hampshire Communities*. The following is a summary of the ten-step process conducted to compile the Plan. Publicly noticed work session meetings were also held on December 19, 2017, February 20, 2018, March 20, 2018, April 17, 2018(add other meeting dates here.) The Town of Exeter's Emergency Management Director and staff from the Rockingham Planning Commission solicited input on the Plan from local officials, abutting communities, and residents throughout the Plan development process.

The Town's 2013 Plan served as the starting point for discussion on hazards impacting the Town, as well as discussions on mitigation strategies. The 2013 Plan served as a reference for local land use regulations and policies, development of the Town's Capital Improvement Plan and department budgets, and has been referenced in several reports, including the 2016 NH Coastal Risks and Hazards Commission Final Report, the RPC's 2015 Regional Master Plan, the Town's 2017 Sea Level Rise and Coastal Storm Surge Vulnerability Assessment and other adaptation planning initiatives.

Step 1- Form the Committee

The Emergency Management Director invited Department Heads from all the Town's departments to participate in the Plan Update process, as well as staff from Exeter Hospital and SAU 16. As a result, the Plan Update Committee included the Emergency Management Director/Fire Chief, Assistant Fire Chief, Public Works Director, Public

Health Administrator, Water and Sewer Managing Engineer, Town Planner, Town Natural Resource Planner, Building Inspector/Code Enforcement Officer, Exeter Hospital's Emergency Management Director, and SAU 16's Facilities Manager. Public notices about the Plan Update process were posted on the Town website and the Rockingham Planning Commission's website and monthly newsletter. All meetings were open to the public, and RPC staff kept municipalities in the region informed of the Plan Update. In addition, RPC staff working in the abutting towns of Hampton, Hampton Falls, Kensington, Stratham, Newfields, Brentwood, Kingston, East Kingston and Epping kept local officials in these communities informed of the update to Exeter's Plan Update and the opportunity to comment on regional mitigation strategies.

Step 2 – Map the Hazards

Participants in the *Committee* identified areas where damage from historic natural disasters have occurred and areas where critical man-made facilities and other features may be at risk in the future for loss of life, property damage, environmental pollution and other risk factors. RPC generated a set of base maps with GIS (Geographic Information Systems) that were used in the process of identifying past and future hazards.

Step 3 – Identify Critical Facilities and Areas of Concern

Participants in the Committee identified facilities and areas that were important to the Town for emergency management purposes, for provision of utilities and community services, evacuation routes, and for recreational, historical, cultural and social value. These facilities and areas are identified on the Critical Facilities Map.

Step 4 – Identify Existing Mitigation Strategies

After collecting detailed information on each critical facility in Exeter, the Committee and RPC staff identified existing Town mitigation strategies relative to flooding, hurricane and wind events, severe winter weather, wildfire, earthquake, drought, extreme temperatures, and sea level rise and coastal storm surge. This process involved reviewing the Town's 2013 Hazard Mitigation Plan, the Town's Master Plan and Capital Improvements Program, Zoning Ordinance, Subdivision Regulations, Site Plan Review Regulations, 2017 Vulnerability Assessment, Emergency Operations Plan, and the Town's participation in the National Flood Insurance Program (NFIP).

Step 5 – Identify the Gaps in Existing Mitigation Strategies

The existing strategies were then reviewed by the RPC and the Committee for coverage and effectiveness, as well as the need for improvement.

Step 6 – Identify Potential Mitigation Strategies

A list was developed of additional hazard mitigation actions and strategies for the Town of Exeter. The existing Hazard Mitigation Plans of Portsmouth, North Hampton and Plaistow were just a few towns that were utilized to identify new mitigation strategies as well as the town Master Plan, Emergency Operations Plan, and Vulnerability Assessment.

Step 7 – Prioritize and Develop the Action Plan

The proposed hazard mitigation actions and strategies were reviewed, and each strategy was rated (good, average, or poor) for its effectiveness according to several factors (*e.g.*, technical and administrative applicability, political and social acceptability, legal authority, environmental impact, financial feasibility). Each factor was then scored, and all scores were totaled for each strategy. Strategies were ranked by overall score for preliminary prioritization then reviewed again under Step 8.

Step 8 - Determine Priorities

The preliminary prioritization list was reviewed to make changes and determine a final prioritization for new hazard mitigation actions and existing protection strategy improvements identified in previous steps. RPC also presented recommendations to be reviewed and prioritized by the Plan Update Committee.

Step 9 - Develop Implementation Strategy

Using the chart provided under Step 9 in the handbook, an implementation strategy was created which included person(s) responsible for implementation (who), a timeline for completion (when), and a funding source and/or technical assistance source (how) for each identified hazard mitigation actions. Also, when the Master Plan or the Exeter Capital Improvement Plan (CIP) is updated the *Exeter Hazard Mitigation Plan* shall be consulted to determine if strategies or actions suggested in the *Plan* can be incorporated into the Town's future land use recommendations and or capital expenditures.

Step 10 - Adopt and Monitor the *Plan*

RPC staff compiled the results of Steps 1 to 9 in a draft document. This draft *Plan* was reviewed by members of the Committee and by staff members at the RPC. The draft *Plan* was also placed on the Town of Exeter website for review by the public, neighboring communities, agencies, businesses, and other interested parties to review and make comments via email. A duly noticed public meeting was held by the Exeter Select Board on May 21, 2018. The meeting allowed the community and neighboring towns to provide comments and suggestions for the *Plan* in person, prior to the document being finalized. A 30-day public comment period was established after the meeting to allow more time for public review and comment. The draft was revised to

incorporate comments received from the Select Board, the public and Town staff and then submitted to the NH HSEM and FEMA Region I for their review and comments. Any changes required by NH HSEM and FEMA were made and a revised draft document was then submitted to the Exeter Select Board for their final review. The Select Board adopted the Plan on October 15, 2018.

The Town, led by the Emergency Management Director, will continue to monitor the *Plan,* for effectiveness and accuracy, consulting with Town departments, boards, and commissions, and with local officials in abutting communities, as well as soliciting comments from the public about the Plan.

Hazard Mitigation Goals and Objectives of the Town of Exeter, New Hampshire

The Town of Exeter sets forth the following hazard mitigation goals and objectives:

- Reduce or avoid long-term vulnerabilities posed by natural hazards impacting Exeter, including the impacts from flooding, hurricanes and high wind events, severe winter weather, wildfire and conflagration, earthquakes, drought, extreme temperatures, and climate change, including sea-level rise and coastal storm surge.

- Improve upon the protection of the Town of Exeter's general population, the citizens of the State and guests, from all natural and man-made hazards.

- Reduce the potential impact of natural and man-made disasters on Exeter and the State's Critical Support Services.

- Reduce the potential impact of natural and man-made disasters on Exeter's Critical Facilities in the State.

- Reduce the potential impact of natural and man-made disaster on Exeter's and the State's infrastructure.
- Improve Exeter's Emergency Preparedness.
- Improve Exeter's Disaster Response and Recovery Capability.
- Reduce the potential impact of natural and man-made disasters on private property in Exeter.
- Reduce the potential impact of natural and man-made disasters on Exeter's and the State's economy.
- Reduce the potential impact of natural and man-made disasters on Exeter's and the State's natural environment.
- Reduce Exeter's and the State's liability with respect to natural and man-made hazards generally.
- Reduce the potential impact of natural and man-made disasters on Exeter's and the State's specific historic treasures and interests as well as other tangible and intangible characteristics that add to the quality of life to the citizens and guests of the State and the Town.
- Identify, introduce and implement cost effective Hazard Mitigation measures to accomplish Exeter's and the States' goals and objectives to raise the awareness and acceptance of hazard mitigation planning.

Through the adoption of this Plan the Town of Exeter concurs and adopts these goals and objectives.

Acknowledgements

The Exeter Select Board extends special thanks to those that assisted in the development of this Plan Update by serving as member of Natural Hazards Mitigation Committee:

Matt Berube, Water and Sewer Managing Engineer, Town of Exeter
Brian Comeau, Emergency Management Director/Fire Chief, Town of Exeter
Russell Dean, Town Manager, Town of Exeter
Doug Eastman, Building Inspector, Town of Exeter
Rich Kane, Coordinator of School Safety and Security, SAU 16
Ray Leblanc, Exeter Hospital Emergency Management
Kristen Murphy, Natural Resource Planner, Town of Exeter
Jennifer Perry, Public Works Director, Town of Exeter
Dave Sharples, Town Planner, Town of Exeter
Eric Wilking, Assistant Fire Chief/Deputy EMD, Town of Exeter

The Exeter Select Board offers thanks to the **NHHSEM** which provided funding and assistance with the development of this Plan Update.

In addition, thanks are extended to the staff of the **Rockingham Planning Commission** for professional services, process facilitation and preparation of this document.

CHAPTER II – COMMUNITY PROFILE

The Town of Exeter is located in Rockingham County, New Hampshire. Exeter is bordered by the towns of Kingston, East Kingston, Hampton Falls, Hampton, and Kensington to the south, Stratham to the east, Newfields to the north, and Brentwood and Epping to the west, as seen below in Figure 1. The Town's population was 14,306 at the 2010 U.S. Census. The Town is served by several major roads, including State Routes 101, 108, 150, 111 and 27, with easy access to Interstate 95. The Town is also served by the Amtrak Downeaster train. Land development in Exeter is primarily single family residential surrounded by undeveloped forest land and open space. Exeter has a vibrant downtown located along the Exeter-Squamscott River, and a commercial corridor which serves as a regional economic and retail hub.

Figure 1: Location Map of Exeter, New Hampshire

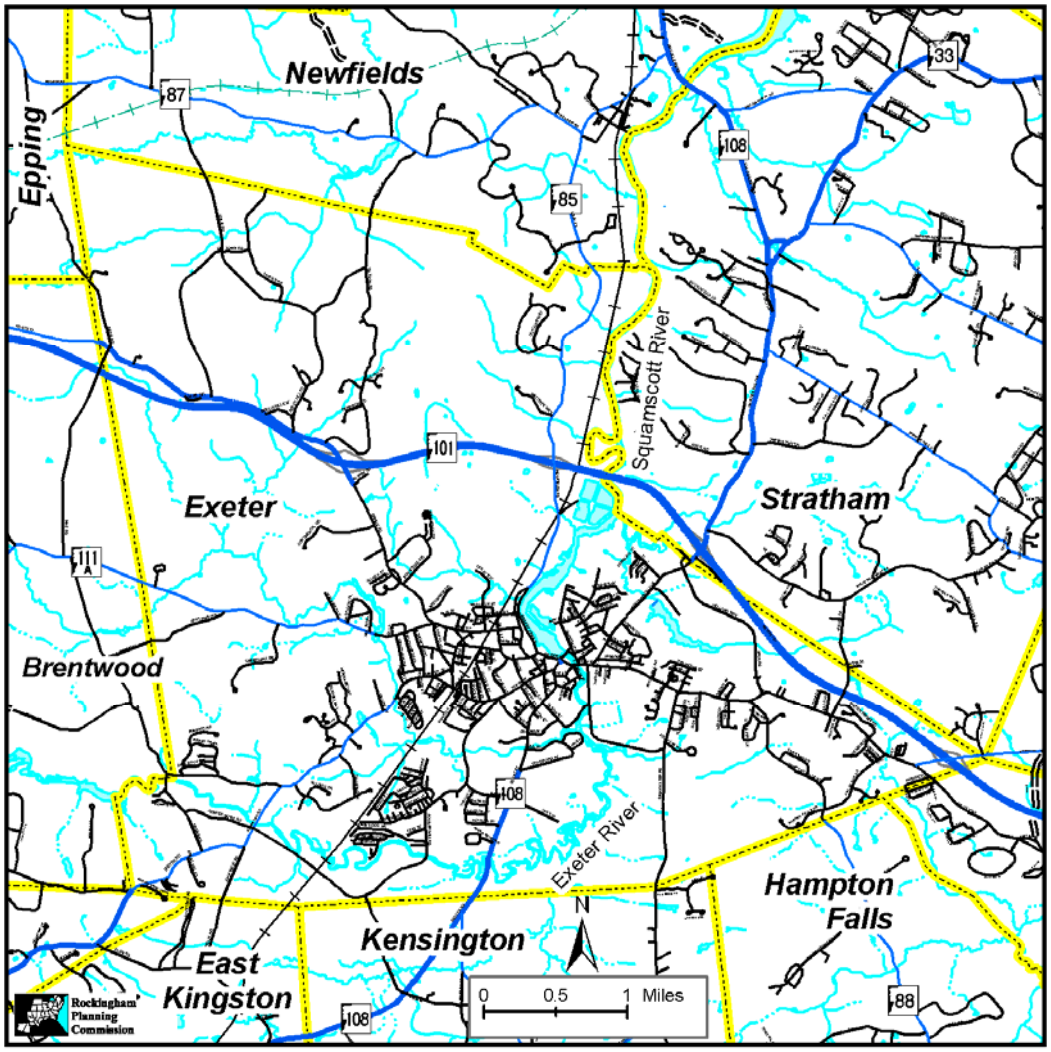
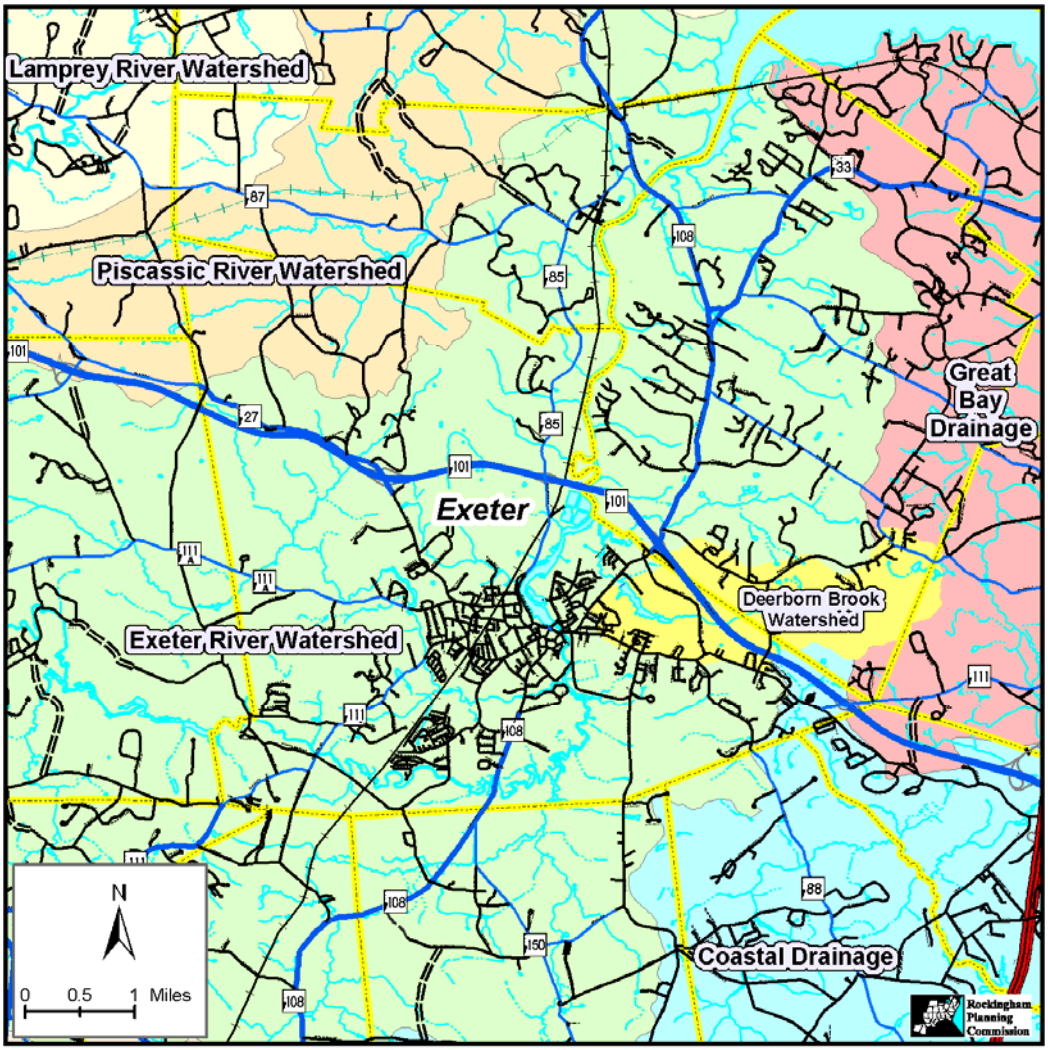


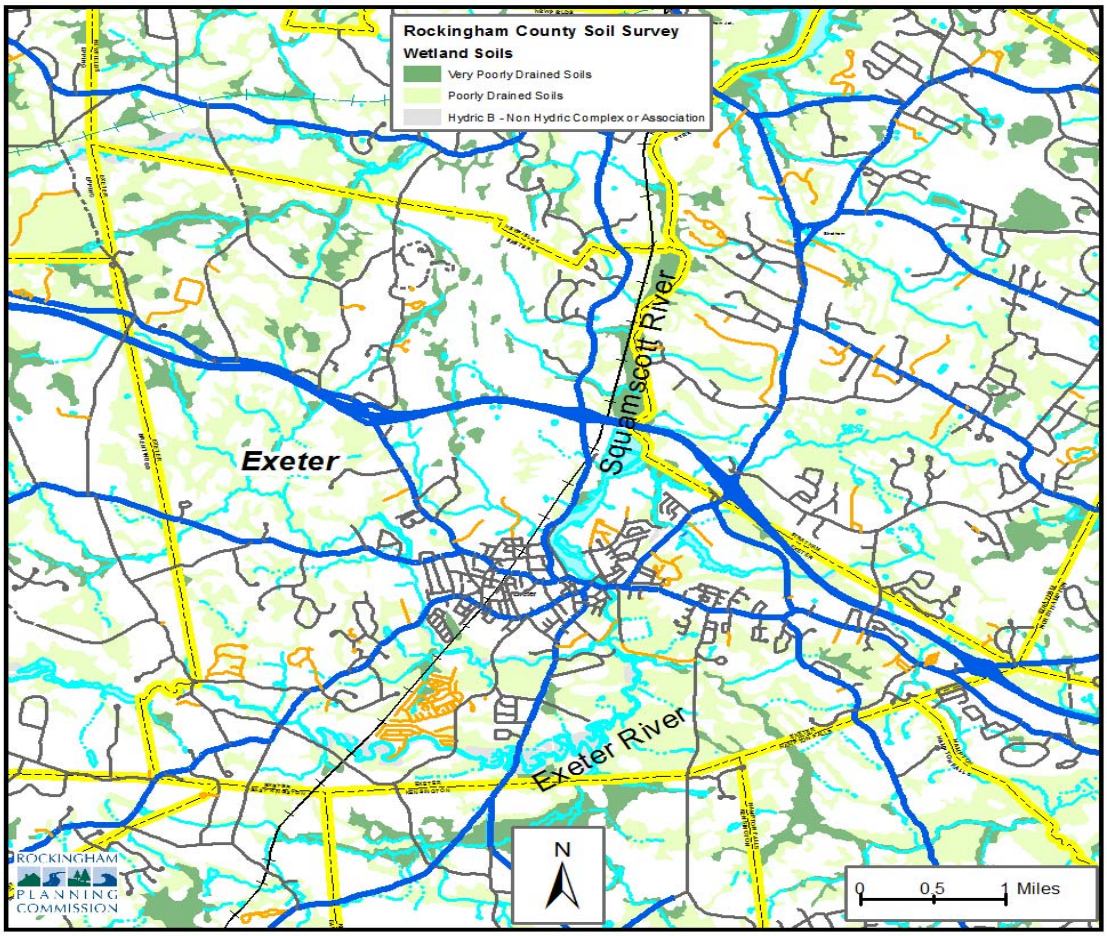
Figure 2: Watershed Map of Exeter, New Hampshire.



Exeter has portions of four regional watersheds: the Piscassic River, Exeter River, the tidal Squamscott River, and the Coastal Watershed. The first three watersheds are part of the larger Piscataqua River Basin, while the Coastal Watershed is part of the larger Coastal River Basin. To delineate meaningful drainage patterns, two sub-watersheds were identified in the 1994 Exeter Master Plan. The first is the Dearborn Brook Sub-Watershed which forms a portion of the Squamscott River Watershed, and the second is the Little River Sub-Watershed which forms a portion of the Exeter River Watershed. Figure 2 shows the Watershed Boundaries in the Town of Exeter.

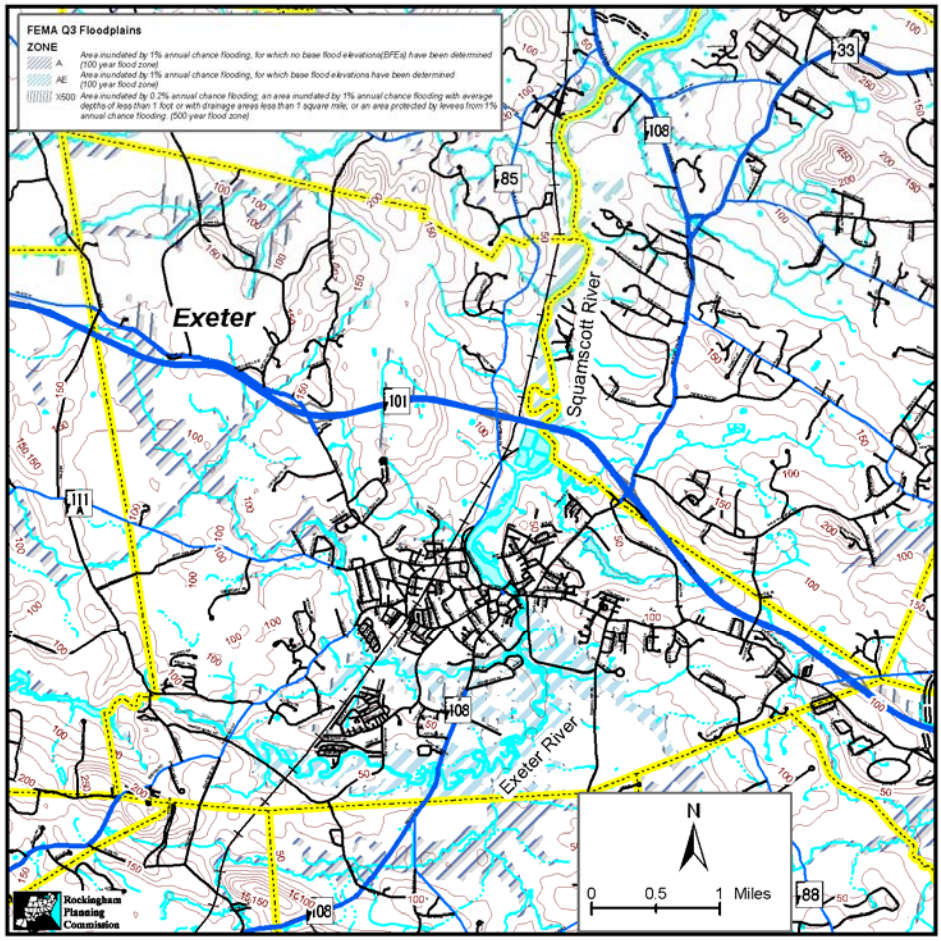
Wetlands are an important part of the Town of Exeter's surface water. Wetland, or hydric, soils include poorly and very poorly drained soils. These soil types are often associated with marine silts and clays where the water table is at or near the surface for five to nine months of the year. Exeter has mapped and identified Prime Wetlands in the community and has adopted stricter land use regulations for work adjacent to prime wetlands.

Figure 3: Wetlands Map of Exeter, New Hampshire. Wetland delineated as poorly and very poorly drained soils, and Wetlands from the National Wetland Inventory.



Floodplains for this *Plan* are defined as the 100-year and 500-year flood hazard zones, as depicted on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM). Floodplains in the Town of Exeter are shown below in Figure 4. Exeter maintains participation in the National Flood Insurance Program administered by FEMA. Development should be located away from wetlands and floodplains whenever possible. The filling of wetlands for building construction not only destroys wetlands and their numerous benefits but may also lead to groundwater contamination. Building within a flood zone may also reduce the floodplain's capacity to absorb and retain water during periods of excessive precipitation and runoff. Moreover, in regard to building within floodplains, contamination may result from flood damage to septic systems.

Figure 4: Floodplains of Exeter, New Hampshire



Current and Future Development Trends

Current Development is predicated on the Town of Exeter's Zoning Ordinance. The Town is divided into 24 zoning districts encompassing residential, commercial, corporate/technology, industrial, and healthcare zones, as well as overlays zones for the historic district, aquifer protection, shoreland protection, flood hazard and wetland conservation. For more information on these specific zones see the Exeter Zoning Ordinance. Map 1 – Existing Land Use shows current land use as defined by Exeter's current Existing Land Use chapter of the Master Plan. Commercial growth is expected to continue to be concentrated along Routes 27 and 108 and to include the renovation and replacement of some businesses in the downtown historic district. The Town has adopted and enforces land use regulations designed to mitigate hazards, including shoreland buffer protection, wetlands protection, stormwater management, and prevention of development on steep slopes. Despite these efforts, the Town's vulnerability may increase due to climate change and an increasing number of hazard events. Natural hazard identified in this Plan, as well as mitigation strategies discussed in this Plan, will be considered during local review of development proposals, especially as they relate to development in flood prone areas of town.

Map 1: Existing Land Use

CHAPTER III. – NATURAL HAZARDS IN THE TOWN OF EXETER

What are the Hazards?

The first step in planning for natural hazard mitigation is to identify hazards that may affect the Town. Some communities are more susceptible to certain hazards (i.e., flooding near rivers, hurricanes on the seacoast, etc.). The Town of Exeter is prone to several types of natural hazards. These hazards include: flooding, hurricanes or other high-wind events, severe winter weather, wildfires, earthquakes, drought, extreme temperatures, and sea level rise and coastal storm surge. Other natural hazards can and do affect the Town of Exeter, but these were the hazards prioritized by the Committee for mitigation planning. These were the hazards that were considered to occur with regularity and/or were considered to have high damage potential and are discussed below.

Natural hazards that are included in the State's Hazard Mitigation Plan that are not included in the in this Plan Update include: landslide, subsidence, radon and avalanche. Subsidence and avalanche are rated by the State as having Low and No risk in Rockingham County, respectively; due to this they were left out of the Plan. Exeter has no record of landslides and little chance of one occurring that could possibly damage property of cause injury; so, landslides were not included in this Plan. The State's Plan indicates that Rockingham County is at Moderate risk to radon; this hazard was not included in the Plan. When compared to natural hazards that could be potentially devastating to the Town (earthquakes or hurricanes) or natural hazards that occur with regularity (flooding or severe winter weather) it was not considered an effective use of the Committee's time to include radon in the *Plan* at this time. When the Plan is revised and updated in the future, possible inclusion of landslide, subsidence, radon and avalanche hazards will be reevaluated.

The hazard profiles below include a description of the natural hazard, the geographic location of each natural hazard (if applicable), the extent of the natural hazard (e.g. magnitude or severity), probability, past occurrences, and community vulnerability. Past occurrences of natural hazards were mapped on Map 2: Past and Future Hazards. Community vulnerability identifies the specific areas, general type of structures, specific structures, or general vulnerability of the Town of Exeter to each natural hazard. Probability was defined as high, a roughly 66-100% chance of reoccurrence; medium, roughly a 33-66% chance of reoccurrence; and low, roughly a 0-33% of reoccurrence.

Flooding

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

Inland floods are most likely to occur in the spring due to the increase in rainfall and melting of snow; however, floods can occur at any time of the year. A sudden thaw in the winter or a major downpour in the summer can cause flooding because there is suddenly a lot of water in one place with nowhere to go.

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

Erosion and Mudslides - Erosion is the process of wind and water wearing away soil. Typically, in New Hampshire, the land along rivers is relatively heavily developed. Mudslides 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. Erosion and mudslides become significant threats to development during floods. Floods speed up the process of erosion and increase the risk of mudslides.

Rapid Snow Pack Melt - Warm temperatures and heavy rains cause rapid snowmelt. Quickly melting snow coupled with moderate to heavy rains are prime conditions for flooding.

River Ice Jams - Rising waters in early spring often breaks ice into chunks, which float downstream and often pile up, causing flooding. Small rivers and streams pose special flooding risks because they are easily blocked by jams. Ice in riverbeds and against structures presents significant flooding threats to bridges, roads, and the surrounding lands.

Dam Breach and Failure - Dam failure results in rapid loss of water that is normally held by the dam. These kinds of floods are extremely dangerous and pose a significant threat to both life and property.

There are six dams within or immediately adjacent to Exeter's boundaries, these are:

- Low hazard dam at Colcord Pond (Little River off Brentwood Road)
- High hazard dam at Pickpocket Road (Exeter River)
- Significant hazard dam at the Town of Exeter sewage lagoons (Squamscott River) at the Wastewater Treatment Plant off Newfields Road
- Significant hazard dam at the stormwater holding pond lagoons (Squamscott River) off Jady Hill Avenue
- High hazard dam at the Water Treatment Plant/Dearborn Brook Reservoir off Portsmouth Avenue
- Low hazard dam at Sloans Brook at Sloans Brook Drive off Newfields Road

After much research and expense, the Town of Exeter removed the Great Dam along the Exeter River in downtown Exeter in 2016 to reduce the risk of flooding and improve water quality and wildlife habitat. An analysis to determine future management of the dam at Pickpocket Road, partially located in Brentwood, which is owned and operated by the Town of Exeter, is underway.

Severe Storms - Flooding associated with severe storms can inflict heavy damage to property. Heavy rains during severe storms are a common cause of inland flooding.

Sea Level Rise, Coastal Flooding and Storm Surge - Exeter's tidal coastline along the Squamscott River means homes and businesses, roadways and infrastructure, and critical natural habitats such as salt marsh and mud flats are at risk due to coastal flooding caused by storm surges and rising water levels in Great Bay.

Research shows the climate of New Hampshire and the Seacoast region has changed over the past century and predicts the future climate of the region will be affected by human activities that are warming the planet. Overall, New England has been getting warmer and wetter over the last century, and the rate of change has increased over the last four decades. The challenges posed by climate change, such as more intense storms, frequent heavy precipitation, heat waves, drought, extreme flooding, and higher sea levels could significantly alter the types and magnitudes of hazards faced by Exeter.

The Town's 2017 Vulnerability Assessment identified potential impacts from a changing climate, and produced a set of flood elevation maps, sea-level rise scenarios, and recommendations for adaptation planning.

Location - Exeter is vulnerable to flooding in several locations. Generally, the Town is at risk within the Flood Zones identified by FEMA on Flood Insurance Rate Maps (FIRM). As can be seen in Figure 4 in Chapter 2, Exeter has two major flood zones: A and X. These flood zones correspond to the Special Flood Hazard Area (100-year flood zone) and the 500-year flood zone respectively. There are also several areas susceptible to flooding that are not within these flood zones, these areas are listed below and displayed on Map 2: Past and Future Hazards.

- Franklin and River Street neighborhoods
- Court Street (NH Route 108) at the intersection of Bell Avenue and at the Exeter/Kensington town line
- Kingston Road (NH Route 111) at Brickyard Pond to West Side Drive
- Portsmouth Avenue (NH Route 108) abutting the Town of Exeter's Surface Water Treatment Plant, which lies in the 100-year floodplain
- Swasey Parkway is vulnerable to tidal storm surges
- Powder Mill Road at the railroad crossing the Exeter River
- Lary Lane neighborhood
- Brentwood Road (NH Route 111A) at the intersection of Greenleaf Drive and west of the intersection of Greenleaf Drive, and west of the intersection with Dogtown Road.
- Exeter River Landing at Little John Drive
- Exeter River Coop at Hilton Avenue
- Industrial Drive near the Rinks at Exeter and Stockbridge Funeral Home
- Gilman Lane, which accesses the Exeter River pump station and Stadium well

Extent - The extent of the flood zones can be seen in Map 2: Past and Future Hazards. This area includes FIRM Zones A and X, as well as, areas of locally chronic flood problems. The Town of Exeter actively manages six dams, listed above. Failure of the two low hazard dams could result in flooding of roadways and abutting forests and fields. Failure of the two significant hazard

dams could result in the discharge of stormwater and treated waste water into adjacent Squamscott River. Failure of the two high hazard dams could result is flooding of roadways, homes, and businesses.

Every dam is 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. A detailed breakdown of the classifications is as follows:

Non-Menace structure means a dam that is not a menace because it is in a location and of a size that failure or mis-operation 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 means a dam that has a low hazard potential because it is in a location and of a size that failure or mis-operation of the dam would result in any of the following:

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

Significant Hazard structure means a dam that has a significant hazard potential because it is in a location and of a size that failure or mis-operation of the dam would result in any of the following:

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

High Hazard means a dam that has a high hazard potential because it is in a location and of a size that failure or mis-operation of the dam would result in probable loss of human life as a result of:

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

Additional information is available online, https://www.fema.gov/media-library-data/20130726-1516-20490-7951/fema-333.pdf

Probability - High.

Past Occurrence - Flooding is a common hazard for the Town of Exeter. Several locations were identified by the Committee as areas of chronic reoccurring flooding or high potential for future flooding, as listed above and identified on Map 2. The Town has not experienced dam failure and maintains pro-active dam management program.

Community Vulnerability - Flooding is most likely to occur in the 100-year flood zones adjacent to the Exeter River, Little River, Dudley Brook and tidal Squamscott River.

National Flood Insurance Program (NFIP) - In 1968, Congress created the National Flood Insurance Program (NFIP) in response to the rising cost of taxpayer funded disaster relief for flood victims and the increasing amount of damage caused by floods. The Federal Insurance and Mitigation Administration (FIMA) a component of the Federal Emergency Management Agency (FEMA) manages the NFIP and oversees the floodplain management and mapping components of the program.

Communities participate in the NFIP by adopting and enforcing floodplain management ordinances to reduce flood damage. In exchange, the NFIP makes federally subsidized flood insurance available to homeowners, renters, and business owners in these communities. Flood insurance, Federal Grants and loans, Federal disaster assistance and federal mortgage insurance is unavailable for the acquisition or construction of structures located in the floodplain shown on the NFIP maps for those communities that do not participate in the program.

To get secure financing to buy, build or improve structures in the Special Flood Hazard areas, it is legally required by federal law to purchase flood insurance. Lending institutions that are federally regulated or federally insured must determine if the structure is in the SFHA and must provide written notice requiring flood insurance. Flood insurance is available to any property owner located in a community participating in NFIP.

Repetitive Loss Properties - A specific target group of repetitive loss properties is identified and serviced separately from other NFIP policies by the Special Direct Facility (SDF). The target group includes every NFIP insured property that, since 1978 and regardless of any change(s) of ownership during that period, has experienced four or more paid losses, two paid flood losses within a 10-year period that equal or exceed the current value of the insured property, or three or more paid losses that equal or exceed the current value of the insured property, regardless of any changes of ownership, since the buildings construction or back to 1978. Target group policies are afforded coverage, whether new or renewal, only through the SDF.

The FEMA Regional Office provides information about repetitive loss properties to State and local floodplain management officials. The FEMA Regional Office may also offer property owners building inspection and financial incentives for undertaking measures to mitigate future flood losses. These measures include elevating buildings from the flood area, and in some cases drainage improvement projects. If the property owners agree to mitigation measures, their property may be removed from the target list and would no longer be serviced by the SDF.

Table 1: Exeter NFIP Policy and Loss Statistics

Policies in force	Insurance in Force	Number of Paid Losses (since 1978)	Total Losses Paid (Since 1978)
92	$20,790,800	90	$1,225,035
Source: FEMA Policy and claims database, as of March, 2018			

Exeter NFIP Repetitive Flooding Losses - Exeter joined the Regular Program of the NFIP on May 17, 1982. As of March 2018, Exeter has had 13 repetitive loss residential and 4 non-residential properties according to New Hampshire Office of Strategic Initiatives records. This is determined by any repetitive damage claims on those properties that hold flood insurance through the NFIP.

Floodplain Management Goals/Reducing Flood Risks - A major objective to floodplain management is to continue participation in the NFIP. Communities that agree to manage Special Flood hazard Areas shown on NFIP maps participate in the NFIP by adopting minimum standards. The minimum requirements are the adoption of the floodplain Ordinances and Subdivision/Site Plan Review requirements for land designated as Special Flood hazard Areas. Under Federal Law, any structure located in the floodplain is required to have flood insurance. Federally subsidized flood insurance is available to any property owner located in a community participating in the NFIP. Communities that fail to comply with the NFIP will be put on probation and/or suspended. Probation is a first warning where all policy holders receive a letter notifying them of a $50 increase in their insurance. In the event of suspension, the policyholders lose their NFIP insurance and are left to purchase insurance in the private sector, which is of significantly higher cost. If a community is having difficulty complying with NFIP policies, FEMA is available to meet with staff and volunteers to work through the difficulties and clear up any confusion before placing the community on probation or suspension.

Potential Administrative Techniques to Minimize Flood Losses in Exeter - A potential step in mitigating flood damage is participating in NFIP. Exeter continues to consistently enforce NFIP compliant policies in order to continue its participation in this program and has effectively worked within the provisions of NFIP. Below is a list of actions Exeter should consider, or continue to perform, in order to comply with NFIP:

- Participate in NFIP training offered by the State and/or FEMA (or in other training) that addresses flood hazard planning and management;
- Establish Mutual Aid Agreements with neighboring communities to address administering the NFIP following a major storm event;
- Address NFIP monitoring and compliance activities;
- Revise/adopt subdivision regulations, erosion control regulations, board of health regulations to improve floodplain management in the community;
- Prepare, distribute or make available NFIP insurance and building codes explanatory pamphlets or booklets;
- Identify and become knowledgeable of non-compliant structures in the community;
- Inspect foundations at time of completion before framing to determine if lowest floor is at or above Base Flood Elevation (BFE), if they are in the floodplain;
- Require the use of elevation certificates;
- Enhance local officials, builders, developers, local citizens and other stakeholders' knowledge of how to read and interpret the FIRM;
- Work with elected officials, the state and FEMA to correct existing compliance issues and prevent any future NFIP compliance issues through continuous communications, training and education.

Hurricane-High Wind Events

Description - Significantly high winds occur especially during hurricanes, tornadoes, winter storms and thunderstorms. Falling objects and downed power lines are dangerous risks associated with high winds. In addition, property damage and downed trees are common during high wind occurrences.

Hurricanes - A hurricane is a tropical cyclone in which winds reach speeds of 74 miles per hour or more and blow in a large spiral around a relatively calm center. The eye of the storm is usually 20-30 miles wide and may extend over 400 miles. High winds are a primary cause of hurricane-inflicted loss of life and property damage. Hurricanes can also include coastal storm surge. The Saffir–Simpson hurricane wind scale (SSHWS), or the Saffir–Simpson hurricane scale (SSHS) for short, classifies hurricanes into five categories distinguished by the intensities of their sustained winds. To be classified as a hurricane, a tropical cyclone must have maximum sustained winds of at least 74 mph, Category 1. The highest classification in the scale, Category 5, is reserved for storms with winds exceeding 156 mph. The Saffir/Simpson Hurricane Scale is included in Appendix C.

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

Tornadoes produce the most violent winds on earth, at speeds of 280 mph or more. In addition, tornadoes can travel at a forward speed of up to 70 mph. Damage paths can be in excess of one mile wide and 50 miles long. Violent winds and debris slamming into buildings cause the most structural damage. The Enhanced Fujita Scale is the standard scale for rating the severity of a tornado as measured by the damage it causes. A tornado is usually accompanied by thunder, lightning, heavy rain, and a loud "freight train" noise. In comparison with a hurricane, a tornado covers a much smaller area but can be more violent and destructive.

Severe Thunderstorms - All thunderstorms contain lightning. During a lightning discharge, the sudden heating of the air causes it to expand rapidly. After the discharge, the air contracts quickly as it cools back to ambient temperatures. This rapid expansion and contraction of the air causes a shock wave that we hear as thunder, which can damage building walls and break glass.

Lightning - Lightning is a giant spark of electricity that occurs within the atmosphere or between the atmosphere and the ground. As lightning passes through air, it heats the air to a temperature of about 50,000 degrees Fahrenheit, considerably hotter than the surface of the sun. Lightning strikes can cause death, injury and property damage.

Hail - Hailstones are balls of ice that grow as they're held up by winds, known as updrafts, which blow upwards in thunderstorms. The updrafts carry droplets of supercooled water – water at a below freezing temperature – but not yet ice. The supercooled water droplets hit the balls of ice and freeze instantly, making the hailstones grow. The faster the updraft, the bigger the stones can grow. Most hailstones are smaller in diameter than a dime, but stones weighing more than a pound have been recorded. Details of how hailstones grow are complicated, but the results are irregular balls of ice that can be as large as baseballs, sometimes even bigger. While crops are the major victims, hail is also a hazard to vehicles and windows.

Location - Hurricane events are more potentially damaging with increasing proximity to the coast. Exeter's proximity to the Atlantic Coast makes hurricanes and high wind events severe threats. For this Plan, high-wind and lightning events were considered to have an equal chance of affecting any part of the Town of Exeter, however Pickpocket Road and Pickpocket Ridge were identified by the committee as an area of town at risk of high wind events.

Extent – Hurricane strength is measured using the Saffir-Simpson scale, located in the appendix of this Plan. Exeter is located within Zone II hurricane-susceptible region (indicating a design wind speed of 160 mph). From 1950 to 2018 Rockingham County was subject to 9 tornado events, these included 2 type F0 (Tornado, 40-72 mph), 2 type F1 (Moderate Tornado, 73-112 mph), 4 type F2 (Significant Tornado, 113-157 mph) and 1 type F3 (Severe Tornado, 158-206 mph). Type 3 tornados can cause severe damage including tearing the roofs and walls from well-

constructed homes, trees can be uprooted, trains over-turned, and cars lifted off the ground and thrown. Between 1900 and 2018 2 hurricanes have made landfall in New Hampshire, a category 1 and a category 2. Measurement scales for thunderstorms, lightning risk, and hail are located in the appendix of this Plan.

Probability -High. The State of New Hampshire's Multi-Hazard Mitigation Plan Update 2013 rates Rockingham County with high likelihood of hurricane, tornado and "Nor'-Easters" events. Also, it rates the risk of downbursts, lightning and hail events as moderate.

Past Occurrence – Between 1635 and 2018 14 hurricanes have impacted the State of New Hampshire. The worst of these occurred on September 21, 1938, with wind speeds of up to 186 mph in MA and 138 mph elsewhere. Thirteen of 494 people killed by this storm were residents of New Hampshire. The Storm caused $12,337,643 in damages (1938 dollars), timber not included. Hurricanes Sandy and Irene created areas of localized flooding in Exeter and power loss. High wind events in 2010, 2014 and 2016 resulted in extensive power outages, downed wires and trees. Neither lightning nor tornadoes have impacted Exeter in recent memory.

Community Vulnerability – The Committee determined that lightning and high wind and heavy rain associated with hurricanes can impact every neighborhood in Exeter before, during and after the storm, resulting in downed trees, flooding of ponds, rivers, streams, roads and basements, and damage to home, businesses and infrastructure.

Severe Winter Weather

Description – Severe winter weather in the form of heavy snow storms, ice storms and Nor'easters are a threat to the community with subzero temperatures from extreme wind chill and storms causing low visibility for commuters. Heavy snow loads from storms are known to collapse buildings. Ice storms disrupt power and communication services. Extreme cold affects vulnerable populations, including the elderly.

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

Ice Storms - An ice storm involves rain, which freezes upon impact. Ice coating at least one-fourth inch in thickness is heavy enough to damage trees, overhead wires and similar objects. Ice storms also often produce widespread power outages.

Nor'easter - A Nor'easter is large weather system traveling from South to North passing along or near the seacoast. As the storm approaches New England and its intensity becomes increasingly apparent, the resulting counterclockwise cyclonic winds impact the coast and inland areas form a Northeasterly direction. The sustained winds may meet or exceed hurricane force, with larger bursts, and may exceed hurricane events by many hours (or days) in terms of duration.

Location - Severe winter weather events have an equal chance of affecting any part of the Town of Exeter.

Extent - Large snow events in Southeastern New Hampshire can produce 30 inches of snow. Portions of central New Hampshire recorded snowfalls of 98" during one slow moving storm in February of 1969. Ice storms occur with regularity in New England. The Sperry-Piltz ice accumulation scale is found in the Appendix of this Plan. Seven severe ice storms have been recorded that affected New Hampshire since 1929. These events caused disruption of transportation, loss of power and millions of dollars in damage.

Probability - High. The State of New Hampshire's Multi-Hazard Mitigation Plan Update 2013 rates Rockingham County with high likelihood of heavy snows and ice storms.

Past Occurrence – Exeter has been impacted by six severe winter storms in the past five years. A storm on January 2, 2009 resulted in the removal of tree debris and wind-blown debris. A storm on March 29, 2010 caused flooding that damaged roads and culverts. The "Halloween storm" on October 31, 2011 resulted in widespread power outages, fallen trees, and closed roads. A severe winter storm struck the region on March 19, 2013 with heavy snow fall resulting in 48 hours of snow removal. A severe winter storm in 2015 and two Nor'easters in 2018 required extensive snow removal and removal of fallen trees.

Community Vulnerability - Severe winter weather has struck Exeter and every other community in the region on an annual basis in recent memory. The Committee determined that heavy snow, strong and gusty winds, and frigid temperatures can impact all parts of town equally, resulting in downed trees and power lines, extended power outages, and unsafe driving condition. Extended power outages and the resulting loss of heat in homes of elderly residents are of concern. Rapid snow melt after severe winter weather can result in flooding of rivers and streams, posing risk to roads and structures. The Committee identified the elderly and vulnerable populations, utility lines and towers, and trees at greatest risk from severe winter weather.

Wildfire

Description - Wildfire is defined as an uncontrolled and rapidly spreading fire, including grass and forest fires. A forest fire is an uncontrolled fire in a woody area. They often occur during drought and when woody debris on the forest floor is readily available to fuel the fire. Grass fires are uncontrolled fires in grassy areas.

Location - The Committee identified the following areas of Town at-risk to wildfires, which are also located on Map 2 Past and Future Hazards:

- The Oakland's Town Forest
- Marsh land abutting the Squamscott River
- Marsh land abutting the Pan Am rail line
- Front Street to the Town line

- Newfields Road to the Town line

Extent - A wildfire in the Town of Exeter is unlikely, but if a crown fire were to occur it could be very damaging to several small sections of Town, such as the Town Forest. A large grass fire could damage structures and neighborhood buildings near large open areas. The Wildland-Urban Interface Scale, a tool to quantify the expected severity of wildfire events in developed areas, is included in Appendix K.

Probability - Moderate. The State of New Hampshire's Multi-Hazard Mitigation Plan Update 2013 rates Rockingham County with moderate risk to wildfires.

Past Occurrence - The majority of wildfires in Exeter are minor brush fires. No Large fires have occurred within recent memory.

Community Vulnerability - The Committee determined that all forested and open areas in Exeter are prone to wildfires, with the threat increasing during periods of drought. The Committee summarized the threat as follows:

- Structures located near large open vegetated areas prone to lightning strikes
- Vulnerability increases during drought events
- Tree debris created by high wind and winter storm events

Earthquakes

Description – Seismic activity including landslides and other geologic events. Geologic events are often associated with California, but New England is considered a moderate risk earthquake zone. An earthquake is a rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric and phone lines, and often cause landslides, flash floods, fires, and avalanches. Larger earthquakes usually begin with slight tremors but rapidly take the form of one or more violent shocks, and end in vibrations of gradually diminishing force called aftershocks. The underground point of origin of an earthquake is called its focus; the point on the surface directly above the focus is the epicenter. The magnitude and intensity of an earthquake is determined using scales such as the Richter Magnitude Scale, located in the Appendix of this Plan.

Location – An earthquake has an equal chance of affecting all areas on Exeter.

Extent - New England is particularly vulnerable to the injury of its inhabitants and structural damage because of our built environment. Few New England States currently include seismic design in their building codes. Massachusetts introduced earthquake design requirements into their building code in 1975 and Connecticut very recently did so. However, these specifications are for new buildings, or very significantly modified existing buildings only. Existing buildings, bridges, water supply lines, electrical power lines and facilities, etc. have rarely been designed for earthquake forces (New Hampshire has no such code specifications).

Probability - Moderate. The State of New Hampshire's Multi-Hazard Mitigation Plan 2013 ranks all the Counties in the State with at moderate risk to earthquakes.

Past Occurrence - Large earthquakes have not affected the Town of Exeter within recent memory.

Community Vulnerability - The Committee determined that earthquakes do not pose a frequent threat to Exeter, but if one were to occur the most vulnerable structures include dams, bridges, brick structures, infrastructure and utility lines, as well as secondary hazards such as fire, power outages or a hazardous material leak or spill.

Drought

Description - Drought is a period of unusually constant dry weather that persists long enough to cause deficiencies in water supply (surface or underground). Droughts are slow-onset hazards that can severely affect municipal water supplies, crops, recreation resources, and wildlife. If drought conditions extend over several years, the direct and indirect economic impacts can be significant. High temperatures, high winds, and low humidity can worsen drought conditions and make area more susceptible to wildfire. In addition, human actions and demands for water resources can accelerate drought-related impacts.

Location – The Committee determined that drought poses risks to water supplies throughout Town, both private and municipal. Risks of wildfire associate with drought conditions are greatest in forested and open grassland areas.

Extent - Although New Hampshire is typically thought of as a water-rich state, there are times the demand for water can be difficult to meet. A combination of increased population and extended periods of low precipitation can cause reduced water supplies. Drought can impact Exeter after extended periods with limited rain and snowfall, often for several months, and is a town-wide hazard, impacting both private wells and the Town's municipal water system surface water and groundwater supplies. The Town of Exeter monitors the information provided by NH DES Drought Management Program. The U.S. Drought Monitor Scale is located in the appendix of this Plan.

Probability - Low.

Past Occurrence - The State of New Hampshire Multi-Hazard Mitigation Plan Update 2013 rates Rockingham Count at low risk for drought. However, drought conditions persisted across southern New Hampshire for much of 2016, resulting in the Town of Exeter issuing a voluntary outdoor watering ban. Over 60 fires within Town were attributed to the drought, as were reports of private wells running dry.

Community Vulnerability - The Committee determined that water supply and fire flow are the most at risk due to drought conditions:

Extreme Temperatures

Description - Extreme temperatures are typically recognized as conditions where temperatures consistently stay ten degrees or more above a region's average high temperature for 24-72 hours (extreme heat) or stay ten degrees or more below a region's average low temperature for a 24-72-hour period (extreme cold). Fatalities can result from extreme temperatures, as they can push the human body beyond its limits.

Location – Extreme temperatures can affect all areas of Exeter.

Extent - Extreme heat events impact Exeter for 2-3 days each summer, and extreme cold events impact the Town 5-7 days each winter. Heat Index measures a number in degrees Farenheit that tells how hot it feels when relative humidity is added to the air temperature. The National Weather Service Heat Index is included in this Plan as Appendix K, and the Wind Chill Chart is included as Appendix L.

Probablility – High.

Past Occurrence - Annually

Community Vulnerability - The Committee determined that all parts of Exeter are at risk of impacts associated with extreme temperatures. The young, elderly and vulnerable populations are especially vulnerable to heat stroke. The EMD maintains a list of these populations, including addresses for homes, day care centers, and congregate care facilities.

Table 2: State of New Hampshire
Presidentially Declared Disasters (DR) and Emergency Declarations (EM) 1982-2018
Source: *State of NH Multi-Hazard Mitigation Plan, 2013 Update and FEMA*

Date Declared	Event	FEMA DR	Program	Amount	Counties Declared
08/27/86	Severe storms/flooding	FEMA-771-DR	PA	$1,005,000	Cheshire and Hillsborough
04/16/87	Severe storms/flooding	FEMA-789-DR	PA/IA	$4,888,889	Carroll, Cheshire, Grafton, Hillsborough, Merrimack, Rockingham, and Sullivan
08/29/90	Severe storms/winds	FEMA-876-DR	PA	$2,297,777	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, and Sullivan
09/09/91	Hurricane	FEMA-917-DR	PA	$2,293,449	Statewide
11/13/91	Coastal storm/flooding	FEMA-923-DR	PA/IA	$1,500,000	Rockingham
03/16/93	Heavy snow	FEMA-3101-DR	PA	$832,396	Statewide
01/03/96	Storms/floods	FEMA-1077-DR	PA	$2,220,384	Carroll, Cheshire, Coos, Grafton, Merrimack, and Sullivan
10/29/96	Severe storms/flooding	FEMA-1144-DR	PA	$2,341,273	Grafton, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan
01/15/98	Ice storm	FEMA-1199-DR	PA/IA	$12,446,202	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, Strafford, and Sullivan
07/02/98	Severe storms	FEMA-1231-DR	PA/IA	$3,420,120	Belknap, Carroll, Grafton, Merrimack, Rockingham, and Sullivan
10/18/99	Hurricane/tropical storm Floyd	FEMA-1305-DR	PA	$750,133	Belknap, Cheshire, and Grafton
3/2001	Snow emergency	FEMA-3166-EM	PA	$4,500,000	Cheshire, Coos, Grafton, Hillsborough, Merrimack, Rockingham, and Strafford
2/17/2003 - 2/18/2003	Snow emergency	FEMA-3177-EM	PA	$3,000,000	Cheshire, Hillsborough, Merrimack, Rockingham, and Strafford
09/12/03	Severe storms/flooding	FEMA-1489-DR	PA	$1,300,000	Cheshire and Sullivan
03/11/03	Snow emergency	FEMA-3177-EM	PA	$3,000,000	Cheshire, Hillsborough, Merrimack, Rockingham, and Strafford

01/15/04	Snow emergency	FEMA-3193-EM	PA	$3,200,000	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, and Sullivan
03/30/05	Snow emergency	FEMA-3207-EM	PA	$4,654,738	Belknap, Carroll, Cheshire, Grafton, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan
03/30/05	Snow emergency	FEMA-3208-EM	PA	$1,417,129	Carroll, Cheshire, Coos, Grafton, and Sullivan
04/28/05	Snow emergency	FEMA-3211-EM	PA	$2,677,536	Carroll, Cheshire, Hillsborough, Rockingham, and Sullivan
10/26/05	Severe storm/flooding	FEMA-1610-DR	PA/IA	$14,996,626	Belknap, Cheshire, Grafton, Hillsborough, Merrimack, and Sullivan
05/31/06	Severe storm/flooding	FEMA-1643-DR	PA/IA	$17,691,586	Belknap, Carroll, Grafton, Hillsborough, Merrimack, Rockingham, and Strafford
4/15/2007 - 4/23/2007	Severe storm/flooding	FEMA-1695-DR	PA/IA	$27,000,000	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan
08/11/08	Severe storms/tornado/flooding	FEMA-1782-DR	PA	$1,691,240	Belknap, Carroll, Merrimack, Rockingham, and Strafford
09/05/08	Severe storms/flooding	FEMA-1787-DR	PA	$4,967,595	Belknap, Coos, and Grafton
10/03/08	Severe storms/flooding	FEMA-1799-DR	PA	$1,050,147	Hillsborough and Merrimack
12/11/08	Severe winter storm	FEMA-3297-EM	DF A/P A	$900,000	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan
01/02/09	Severe winter storm	FEMA-1812-DR	DF A/P A	$19,789,657	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan
03/29/10	Severe winter storm	FEMA-1892-DR	PA	$9,103,138	Merrimack, Rockingham, Strafford, and Sullivan
05/12/10	Severe winter storm	FEMA-1913-DR	PA	$3,057,473	Hillsborough and Rockingham
07/22/11	Severe storms/flooding	FEMA-4006-DR	PA	$1,664,140	Coos and Grafton

09/03/11	Tropical storm Irene	FEMA-4026-DR	PA/IA	$11,101,752	Belknap, Carroll, Coos, Grafton, Merrimack, Strafford, and Sullivan
12/07/11	October Nor'easter	FEMA-4049-DR	PA	$4,411,457	Hillsborough and Rockingham
06/18/12	Severe storms/flooding	FEMA-4065-DR	PA	$3,046,189	Cheshire
10/30/12	Hurricane Sandy	DR-4095 EM-3360	PA DFA	$2,132,376	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan
2/8/2013 - 2/10/2013	Severe storm/blizzard	DR-4105	PA	$6,127,598	Belknap, Carroll, Cheshire, Hillsborough, Merrimack, Strafford, and Rockingham
6/26/2013 – 7/3/2013	Severe storms/flooding	DR-4139	PA	$6,389,705	Cheshire, Sullivan, and Grafton
1/26/2015 – 1/29/2015	Severe winter storm/snowstorm	DR-4209	PA	$4,607,527	Strafford, Rockingham, and Hillsborough
3/14/2017 – 3/15/2017	Severe winter storm/snowstorm	DR-4316	PA	$80,306.55	Belknap and Carroll
1/1/2017 – 1/2/2017	Severe storms/flooding	DR-4329	PA	NA	Grafton and Coos
10/29/2017 - 11/1/2017	Severe Storm/flooding	DR-4355	PA	NA	Sullivan, Merrimack, Belknap, Carroll, Grafton, Coos
3/2/2018 – 3/8/2018	Severe Storm/flooding	DR-4370	PA, IA	NA	Rockingham
3/13/2018 – 3/14/2018	Severe Winter Storm/snowstorm	DR-4371	PA. IA	NA	Carroll, Strafford, Rockingham
Program Key: PA: Public Assistance IA: Individual Assistance DFA: Direct Federal Assistance					

Map 2: Past and Future Hazards

CHAPTER IV – CRITICAL FACILITIES

The Critical Facilities List for the Town of Exeter has been identified by Exeter's Hazard Mitigation Committee. The Critical Facilities List has been broken up into four categories. The first category contains facilities needed for Emergency Response in the event of a disaster. The second category contains Non-Emergency Response Facilities that have been identified by the committee as non-essential. These are not required in an emergency response event but are considered essential for the everyday operation of Exeter. The third category contains Facilities/Populations that the committee wishes to protect in the event of a disaster. The fourth category contains Potential Resources, which can provide services or supplies in the event of a disaster. Map 3: Critical Facilities at the end of this Chapter identifies the location of the facilities and the evacuation routes. A detailed description of critical facilities can be found in Table 3 through Table 6.

Table 3: Category 1 - Emergency Response Services and Facilities

Map ID# Red	Critical Facility Name	Address	Description
1	Cell Tower	Guinea Road	Communication Infrastructure
2	Cell Tower	Watson Road	Communication Infrastructure
3	Cell Tower	Commerce Way	Communication Infrastructure
4	Cell Tower	115 Epping Road	Communication Infrastructure
5	Electric Substation	River Street	Power supply
6	Exeter Hospital	5 Alumni Drive	Back-up Power, Helipad
7	Exeter Safety Complex	20 Court Street	EOC, fuel, back-up power
8	Exeter Town Offices	10 Front Street	Back-up Power
9	Exeter Public Works	13 Newfields Road	Fuel

Table 4: Category 2 - Non-Emergency Response Facilities:

The town has identified these facilities as non-emergency facilities; however, they are considered essential for the everyday operation of Exeter.

Map ID# Yellow	Critical Facility Name	Address	Description
1	Sewer Pump Station	Colcord Pond Drive	Back-up generator
2	Sewer Pump Station	Court Street	Back-up generator
3	Sewer Pump Station	Folsom Way	Back-up generator
4	Sewer Pump Station	Front Street	Back-up generator
5	Water Pump Station	Kingston Road	Back-up generator
6	Sewer Pump Station	Langdon Avenue	Back-up generator
7	PEA Power Station	Marston Street	Power supply
8	Electric Substation	Portsmouth Avenue	Power supply

9	Wastewater Treatment Plant	13 Newfields Road	Sewage treatment
10	Sewer Pump Station	Webster Avenue	Back-up generator
11	Sewer Pump Station	Riverbend Circle	Back-up generator
12	Sewer Pump Station	Riverwoods Drive	Back-up generator
13	Surface Water Treatment Plant	109 Portsmouth Avenue	Water treatment
14	Water Supply Reservoir	109 Portsmouth Avenue	Water supply
15	Water Supply Well	50 Lary Lane	Water supply
16	Water Pump Station	33 Gilman Lane	Water supply
17	Surface Water Supply Intake	Gilman Lane	Water supply
18	Water Tower	9 Cross Road	Water supply
19	Water Tower	13 Fuller Way	Water supply
20	Water Tower	Meeting Place Drive	Water supply
21	Telephone Building	Center Street	Communications
22	Water Supply Well	33 Gilman Lane	Water Supply
23	Water Supply Well	45 Bell Avenue	Water Supply
24	Groundwater Treatment Plant	48 Lary Lane	Water Supply
25	Sewer Pump Station	279 Water Street	Back-up power

Table 5: Category 3 - Facilities/Populations to Protect:

The third category contains people and facilities that need to be protected in event of a disaster.

Map ID# Green	Critical Facility Name	Address	Description
1	Exeter High School	Blue Hawk Drive	School
2	Lincoln Street School	25 Lincoln Street	School
3	Main Street School	40 Main Street	School
4	Seacoast School of Technology	40 Linden Street	School
5	Former High School Fields	Linden Street	Recreation
6	Appleseeds Day School	15 Hampton Road	Child care
7	Building Blocks School	125 Kingston Road	Child care
8	Decolores Children Center	87 Epping Road	Child care
9	Exeter Day School	11 Marlboro Street	School
10	Great Bay Kids Company	64 Epping Road	Child care
11	Montessori School of Exeter	307 Epping Road	School
12	Phillips Exeter Academy (PEA)	20 Main Street	School
13	PEA Harris Family Children's Center	20 Main Street	Child care
14	PEA Stadium	Gilman Street	Recreation
15	PEA Fields	Gilman Street	Recreation

16	PEA Love Gym	Court Street	Recreation
17	Elms Campground	188 Court Street	Recreation
18	Green Gate Campground	185 Court Street	Recreation
19	Rinks at Exeter	40 Industrial Drive	Recreation
20	Town Pool and Fields	4 Hampton Road	Recreation
21	Brickyard Pond Fields	Kingston Road	Recreation
22	American Independence Museum	Center Street	Historic resource
23	Exeter Bandstand	Front Street	Attraction
24	OSRAM	13 Portsmouth Avenue	Hazardous materials
25	Exeter Historical Society	47 Front Street	Historic resource
26	Gilmore Garrison House	12 Water Street	Historic resource
27	Hartman Oil Company	122 Epping Road	Fuel source
28	Exeter Center	8 Hampton Road	Elderly housing
29	Squamscott View	277 Water Street	Elderly housing
30	Sunbridge Langdon Place	17 Hampton Road	Elderly housing
31	Boulders at Riverwoods	Timber Lane	Elderly housing
32	Ridge at Riverwoods	Timber Lane	Elderly housing
33	Calvary Baptist Church	12 Little River Road	Religious facility
34	Calvary Chapel Seacoast	104 Epping Road	Religious facility
35	Christs Church Episcopal	43 Pine Street	Religious facility
36	Church of Jesus Christ Latter Day Saints	55 Hampton Falls Road	Religious facility
37	Community Church of Exeter	134 Front Street	Religious facility
38	Congregational Church	21 Front Street	Religious facility
39	Exeter Assembly of God	47A Hampton Falls Road	Religious facility
40	Exeter Christian Fellowship	50 Newfields Road	Religious facility
41	Exeter Presbyterian Church	73 Winter Street	Religious facility
42	Faith Lutheran Church	4 Elm Street	Religious facility
43	First Baptist Church of Exeter	2 Spring Street	Religious facility
44	First Unitarian Church of Exeter	12 Elm Street	Religious facility
45	Phillips Church	Tan Lane	Religious facility
46	St. Michael's Catholic Church	9 Lincoln Street	Religious facility
47	St. Vincent de Paul Assistance Center	53 Lincoln Street	Food pantry
48	United Methodist Church	307 Epping Road	Religious facility

Table 6: Category 4 - Potential Resources:

This category contains facilities that provide potential resources for services or supplies in the event of a natural disaster.

Map ID# Blue	Critical Facility Name	Address	Resources
1	AMTRAK Rail Station	Lincoln Street	Transportation
2	Arjay's Hardware	Lincoln Street	Building Supplies
3	Exeter Lumber	120 Portsmouth Avenue	Building Supplies
4	First Student Transportation	Epping Road	Transportation
5	Market Basket Supermarket	Portsmouth Ave, Stratham, NH	Food and water
6	Shaws Supermarket	Portsmouth Ave, Stratham, NH	Food and water
7	Simpson Gravel Pit	Kingston Road	Sand and gravel
8	Hannaford's Supermarket	Portsmouth Avenue	Food, water, supplies
9	Walmart	Route 125, Epping, NH	Food, water, supplies
10	Lowe's	Rt. 125, Epping, NH	Building, construction supplies

Map 3: Critical Facilities Map

CHAPTER V. – POTENTIAL HAZARD DAMAGE

Identifying Vulnerable Facilities

It is important to determine which critical facilities are the most vulnerable and to estimate their potential loss. The first step is to identify the facilities most likely to be damaged in a hazard event. To do this, the location of critical facilities illustrated on Map 3 was compared to the location of various topographical elements, floodplains, roads, and water bodies using GIS (Geographic Information Systems). Vulnerable facilities were identified by comparing their location to possible hazard events. For example, all the structures within the 100-year and 500-year floodplains were identified and used in conducting the potential loss analysis for flooding.

Calculating the Potential Loss

The next step in completing the loss estimation involved assessing the level of damage from a hazard event on structures in Exeter. For the purpose of estimating general losses, the total value for all structures in Exeter in 2017, residential, commercial and industrial of was used, for a total of $1,228,464,100.

The damage estimates are divided into two categories based on hazard types: hazards that are location specific (e.g. flooding), and hazards that could affect all areas of Exeter equally, such as extreme temperatures. Damage estimates from hazards that could affect all of Exeter equally are much rougher estimates, based on percentages of the total assessed value of all structures in the community. Damage estimates from hazards with a specific location are derived from the assessed values of the parcels within the hazard area. Assessing and tax map data were used to determine buildings at risk. After identifying the parcels and buildings that are at risk, the next step was to calculate a damage estimate for each potential hazard area. The following discussion summarizes the potential loss estimates due to natural hazard events.

Flooding – Special Flood Hazard Zones - The average replacement value was calculated by adding up the assessed values of all structures in the 100 and 500-year floodplains. Because of the scale and resolution of the FIRM maps and imagery this is only an approximation of the total structures located within the 100 and 500-year floodplains. The Federal Emergency Management Agency (FEMA) has developed a process to calculate potential loss for structures during flood. The potential loss was calculated by multiplying the replacement value by the percent of damage expected from the hazard event. Residential and non-residential structures were combined.

The costs for repairing or replacing bridges, railroads, power lines, telephone lines, and contents of structures are not included in this estimate. In addition, the figures used were based on buildings which are one or two stories high with basements. The following calculation is based on eight-foot flooding and assumes that, on average, one or two-story buildings with basements receive 49% damage (Understanding Your Risks, Identifying Hazards and Estimating Losses, FEMA page 4-13):

Potential Structure Damage: 49%
Approximately 443 structures assessed at $600,000 = $130,242,000 potential damage

The following calculation is based on four-foot flooding and assumes that, on average, one or two-story buildings with basements receive 28% damage (Understanding Your Risks, Identifying Hazards and Estimating Losses, FEMA page 4-13):

Potential Structure Damage: 28%
Approximately 443 structures assessed at $600,000 = $74,424,000 potential damage

The following calculation is based on two-foot flooding and assumes that, on average, one or two-story buildings with basements receive 20% damage (Understanding Your Risks, Identifying Hazards and Estimating Losses, FEMA page 4-13):

Potential Structure Damage: 20%
Approximately 443 structures assessed at $600,000 = $53,160,000 potential damage

Several areas of Exeter were identified as having high risk of flooding. These areas are identified in Chapter III and Map 2: Past and Future Hazards. Potential losses were also calculated for these at-risk areas in the same manner as those structures in the 100 and 500-year floodplains. These assessments are only based on the potential damages to building within the identified at-risk areas.

Table 7: Percentages of structural and content damage estimated, based on the assessed value of a flooded parcel. Also shows the functional downtime and displacement time for each flood event.

Flood Depth	One-foot	Two-foot	Four-foot
% Structural Damage: Buildings	15%	20%	28%
% Structural Damage: Mobile Homes	44%	63%	78%
% Contents Damage: Buildings	22.5%	30%	42%
% Contents Damage: Mobile Homes	30%	90%	90%
Flood Functional Downtime: Buildings	15 days	20 days	28 days
Flood Functional Downtime: Mobile Homes	30 days	30 days	30 days
Flood Displacement Time: Buildings	70 days	110 days	174 days
Flood Displacement Time: Mobile Homes	302 days	365 days	365 days

Hurricane/ High Wind Events

Hurricane - Hurricanes do affect the Northeast coast periodically. Since 1900, 2 hurricanes have made landfall in the State of New Hampshire. Due to the coastal location of the Town of Exeter, hurricanes and storm surges present a real hazard to the community. Even degraded hurricanes or tropical storms could still cause significant damage to the structures and infrastructure of the Town of Exeter. The assessed value of all residential and commercial structures in the Town of Exeter in 2017 was $1,228,464,100. Assuming 1% to 5% damage, a hurricane could result in $1,224,641 to $614,232,050 of structure damage.

Tornado - Tornadoes are relatively uncommon natural hazards in New Hampshire. On average, about six tornadoes touch down each year. Damage largely depends on where the tornado strikes. If is strikes an inhabited area, the impact could be severe. The assessed value of all residential and commercial structures in the Town of Exeter in 2017 was $1,228,464,100. Assuming 1% to 5% damage, a tornado could result in $1,224,641 to $614,232,050 of structure damage.

Severe Lightning - The amount of damage caused by lightning will vary according to the type of structure hit and the type of contents inside. There is now record of monetary damages inflicted in the Town of Exeter from lightning strikes.

Severe Winter Weather

Heavy Snowstorms - Heavy snowstorms typically occur during January and February. New England usually experiences at least one or two heavy snow storms with varying degrees of severity each year. Power outages, extreme cold and impacts to infrastructure are all effects of winter storms that have been felt in Exeter in the past. All of these impacts are a risk to the community, including isolation, especially of the elderly, and increased traffic accidents. Damage caused because of this type of hazard varies according to wind velocity, snow accumulation and duration. The assessed value of all residential and commercial structures in the Town of Exeter in 2017 was $1,228,464,100. Assuming 1% to 5% damage, a heavy snowstorm could result in $1,224,641 to $614,232,050 of structure damage.

Ice Storms - Ice storms often cause widespread power outages by downing power lines, making power lines at risk in Exeter. They can also cause severe damage to trees. Ice storms in Exeter could be expected to cause damage ranging from a few thousand dollars to millions of dollars, depending on the severity of the storm.

Wildfire

The risk of fire is difficult to predict based on location. Forest fires are more likely to occur during years of drought. The area identified as at risk to wildfire (Map 2: Past and Future Hazards) by the Hazard Mitigation Committee is in the northern section of Town and includes the Town Forest. The assessed value of all residential and commercial structures in the Town of Exeter in 2017 was $1,228,464,100. Assuming 1% to 5% damage, a wildfire could result in $1,224,641 to $614,232,050 of structure damage.

Earthquakes

Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric and phone lines and are often associated with landslides and flash floods. Four earthquakes in New Hampshire between 1924-1989 had a magnitude of 4.2 or more. Two of these occurred in Ossipee, one west of Laconia, and one near the Quebec border. If an earthquake were to impact the Town of Exeter, underground utilities would also be susceptible. In addition, buildings that are not built to a high seismic design level would be susceptible to structural damage. The assessed value of all residential and commercial structures in the Town of Exeter in 2017 was $1,228,464,100. Assuming 1% to 5% damage, an earthquake could result in $1,224,641 to $614,232,050 of structure damage.

Drought

Extended drought can impact municipal water supplies, private drinking wells, and make vegetated areas more susceptible to wildfire (see above). The Town has no record of monetary damage in related to drought.

Extreme Temperatures

The Committee determined that all parts of town are at risk of impacts associated with extreme heat and cold. Young and elderly populations are particularly vulnerable and the EMD can direct vulnerable residents to heating and cooling stations.

Sea Level Rise, Coastal Storm Surge

In addition to the potential of flood damage and high wind damage discussed above, sea level rise and coastal storm surge could damage building and infrastructure along the Squamscott River and its tributaries. In 2017, he Rockingham Planning Commission completed a Vulnerability Assessment for the Town of Exeter of impacts associated with projected sea level rise and coastal storm surge. The Assessment estimated the value of infrastructure impacted by a 6.3-foot sea level rise scenario, plus storm surge, would be $32,480, 100.

CHAPTER VI – EXISTING HAZARD MITIGATION PROGRAMS

The next step involves identifying existing mitigation strategies for the hazards likely to affect the town and evaluate their effectiveness. This section outlines those programs and recommends improvements and changes to these programs to ensure the highest quality emergency service possible.

Table 8: Existing Hazard Mitigation Programs for the Town of Exeter

Existing Protection	Description-Area Covered	Responsible Local Agent	Effectiveness (Poor, Average, Good)	Recommended Changes-Actions-Comments
2015 Town of Exeter Local Emergency Management Plan	Town-wide	EMD, Police and Fire Departments, DPW	Good	Plan is updated every 3 years
2017 Zoning Regulations	Town-wide	Code Enforcement Office	Good	Review and amended annually
2009 Town Building Code	Town-wide	Building Inspector	Good	Adopt Seismic Design Code
NFIP Floodplain Ordinance	Development restriction in Special Flood Hazard Areas	Building Inspector and Planning Board	Good	Reviewed annually to correspond with federal guidelines and town priorities
2018 Town Master Plan	Town-wide	Town Planner, Planning Board	Good	Updates occur annually
2017 Town Capital Improvements Plan	Town-wide	Town Administrator/Department Heads	Good	Updated annually and should review mitigation actions as found in this plan prior to update
2017 Elevation Certificates	Component of building permit	Building Inspector	Good	Should be reviewed annually for NFIP compliance and effectiveness

Existing Protection	Description-Area Covered	Responsible Local Agent	Effectiveness (Poor, Average, Good)	Recommended Changes-Actions-Comments
Emergency Services	Town-wide	EMD, Police Chief, Fire Chief	Good	Emergency Personnel training occurs regularly for effective emergency response.
CEMPS (Comprehensive Emergency Management Planning for Schools)	Schools	SAU 16 Superintendent, EMD	Good	Should be annually reviewed for town and school official emergency preparedness.
FEMA Community Rating System	Town-wide	Building Inspector	Average	In process
2013 Emergency Water Plan	Town Water System	Water and Sewer Department	Good	Plan to be reviewed annually
2016 Wellhead Protection	Specific areas of town	Code Enforcement Officer	Good	Regularly reviewed for use violations and compliance
2017 Wetlands Protection	Specific areas of town	Code Enforcement Officer	Good	Town has designated Prime Wetlands
2017 Shoreland Protection	Specific areas of town	Code Enforcement Officer and Building Inspector	Good	Town follows state and local regulations pertinent to the zoning district

Existing Protection	Description-Area Covered	Responsible Local Agent	Effectiveness (Poor, Average, Good)	Recommended Changes-Actions-Comments
2017 Aquifer Protection	Specific areas of town	Code Enforcement Officer	Good	Ordinance should be monitored to ensure latest BMP's are being utilized for development uses
2017 Stormwater Management Regulations	Town-wide	Code Enforcement Officer	Good	Designed to enable on-site infiltration of stormwater
2017 Sea Level Rise and Coastal Storm Surge Vulnerability Assessment	Exeter/ Squamscott River Watershed		Good	Identified land and infrastructure at risk from rising sea levels and storm surge
2011 Exeter River Corridor and Watershed Management Plan	Exeter/ Squamscott River watershed	Exeter River Local Advisory Committee and Exeter Conservation Commission	Good	Plan is reviewed annually
Exeter River Study	Exeter River watershed in Exeter	Exeter River Study Committee	Good	Conducting studies on use and management of the Exeter River and its tributaries
2017 Tree Inventory and Maintenance Program	Town-wide	Department of Public Works	Good	Street Tree Program completed 2017; Forest management plan needed

Existing Protection	Description-Area Covered	Responsible Local Agent	Effectiveness (Poor, Average, Good)	Recommended Changes-Actions-Comments
2011 Local Road Design Standards	Town-wide	Planning Board, Code Enforcement Officer, DPW	Good	Standards should be reviewed annually to ensure best practices are being utilized
Bridge Design and Inspection	Town-wide	State DOT and Town DPW	Good	Bi-annual engineering review
Storm Drain/Culvert Maintenance Program	Town-wide	DPW	Good	Annual engineering review
Water Supply Study	Town-wide	DPW	Good	In progress
Great Dam Study	NHDES/Town/ Private Owners	DPW	Good	Resulted in removal of Great Dam
Pickpocket Dam Study	Exeter River	DPW	Good	In progress
Stormwater Asset Management Plan	Town-wide	DPW	Good	Updated as needed
Emergency Backup Power	Exeter Safety Complex, Exeter Town Office, High School, DPW, portable generators	Emergency Management Director	Average	Elementary Schools need of back-up power
Hazard Mitigation Grants	Town-wide	EMD, DPW	Good	Reviewed as needed
Geographic Information Systems (GIS)	Town-wide	Planning and Building Department, Assessor's Office, DPW	Good	Updated as needed
Land Conservation Program	Town-wide	Planning Department, Conservation Commission, Board of Select Board	Good	On-going

CHAPTER VII – MITIGATION ACTIONS

The Action Plan was developed by analyzing the existing Town programs, the proposed improvements and changes to these programs. Additional programs were also identified as potential mitigation strategies. These potential mitigation strategies were ranked in five categories according to how they accomplished each item:

- Prevention
- Property Protection
- Structural Protection
- Emergency Services
- Public Information and Involvement

Table 9: List of Hazard Mitigation Strategies or Actions Developed by the Hazard Mitigation Committee

Mitigation Strategies or Action	Mitigation Category	Hazard(s) Mitigated	Status 2018: New/Completed/Deferred/ Removed
Radio Upgrade Repeater Interoperability	Emergency Services	All Hazards	Completed
Emergency Operations Center/Second Fire Station	Emergency Services	All Hazards	Emergency Operations Center completed, Second Fire Station Deferred
Public Outreach Program for Hazard Mitigation for all hazards identified in this Plan	Emergency Services	All Hazards	Completed and ongoing. Town uses social media (Facebook, Twitter), Town Website, Cable Access TV, Road Signs to educate and inform public.
Portable Lights (2)	Emergency Services	All Hazards	One purchased, one more needed
Modifications to Great Dam	Structural Project	Flooding	Completed
Modifications to Pickpocket Dam	Structural Project	Flooding	Deferred – study in progress
Modifications to Colcord Pond Dam	Structural Project	Flooding	Deferred- DPW and the town are still considering options for fixing this dam.
Exeter River Level Monitoring	Prevention	Flooding	Completed
Move and or Upgrade (Modified flood proofing) Exeter Surface Water Treatment Plant	Structural	Flooding	Deferred- The town is evaluating effective strategies for managing water treatment as it relates to EPA regulations, and future service needs.
Culvert Inventory/Capacity/ Condition Analysis	Prevention/Structural	Flooding	Completed
Study Use and Management of Exeter River	Prevention, Public Education, Property Protection	Flooding, Drought, Extreme Temperatures	Completed

Mitigation Strategies or Action	Mitigation Category	Hazard(s) Mitigated	Status 2018: New/Completed/Deferred/ Removed
Local routes evacuation/planning exercise	Emergency Services, Public Education	All Hazards	Completed
Powder Mill Road Flood Analysis/Capacity assessment	Prevention	Flooding	Deferred
Debris removal on rail line as identified on the past and future hazards map	Prevention	Wildfire	Completed and ongoing
Acquisition of development rights/conservation of Exeter Elms	Prevention/Property Protection	Flooding	Deferred
Reverse 911 for community outreach to inform of forecasted hazards	Prevention, Emergency Services, Public Outreach	All Hazards	Completed
Mobile Signage to inform residents of potential hazards identified in this Plan	Public Information	All Hazards	Completed
Wastewater Vacuum Truck	Emergency Services	Flooding	Completed
Replacement of undersized water lines	Property protection, Emergency Services	All Hazards	Downtown and Jady Hill Road completed, Lincoln Street is second phase and in process
Building Code change to require fuel system fastening in 100-500-year flood plain and seismic code	Prevention, Property Protection	Flooding, Earthquake	Completed
Develop a Low Impact Development (LID) incentive program for stormwater management	Property Protection, Prevention	Flooding	Completed
Evaluate sea level rise impact to current and future water treatment facilities	Property Protection, Prevention	Flooding	Completed
Acquire additional groundwater resources	Prevention, Management	Drought, Wildfire, Extreme Temperatures	New
Implement recommendations in Vulnerability Assessment and other climate change plans	Prevention, Property Protection	Sea Level Rise and Coastal Storm Surge, Hurricane	New

Mitigation Strategies or Action	Mitigation Category	Hazard(s) Mitigated	Status 2018: New/Completed/Deferred/ Removed
Develop and implement a deliberate public outreach campaign using the Town social media platforms – website, Facebook, Twitter, cable access TV – to educate residents about hazards impacting Exeter and ways in which they can prepare for hazards and prevent/mitigate damage	Public Outreach, Prevention, Property Protection	All Hazards: Flooding, Hurricane-High Wind Event, Severe Winter Weather, Wildfire, Earthquake, Drought, Extreme Temperatures, Sea Level Rise, Coastal Storm Surge	New

CHAPTER VIII. FEASIBILITY AND PRIORITIZATION OF PROPOSED MITIGATION STRATEGIES

The goal of each strategy or action is reduction or prevention of damage from a hazard event. To determine their effectiveness in accomplishing this goal, a set of criteria was applied to each proposed strategy. A set of questions developed by the Committee that included the STAPLEE method was developed to rank the proposed mitigation actions. The STAPLEE method analyzes the Social, Technical, Administrative, Political, Legal, Economic and Environmental aspects of a project and is commonly used by public administration officials and planners for making planning decisions. The following questions were asked about the proposed mitigation strategies identified in Table 10 a – 10i:

- Does it reduce disaster damage?
- Does it contribute to other goals?
- Does it benefit the environment?
- Does it meet regulations?
- Will historic structures be saved or protected?
- Does it help achieve other community goals?
- Could it be implemented quickly?

STAPLEE criteria:

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

Each proposed mitigation strategy was evaluated using the above criteria and assigned a score (Good = 3, Average = 2, Poor = 1) based on the above criteria. An evaluation chart with total scores for each strategy can be found in the collection of individual tables under Table 10.

Table 10a: Second Fire Station

Criteria	Evaluation Rating (1-3)
Does it reduce disaster damage?	3
Does it contribute to other goals?	3
Does it benefit the environment?	2
Does it meet regulations?	2
Will historic structures be saved or protected?	2
Does it help achieve other community goals?	3
Could it be implemented quickly?	2
S: Is it Socially acceptable?	2
T: Is it Technically feasible and potentially successful?	3
A: Is it Administratively workable?	2
P: Is it Politically acceptable?	2
L: Is there Legal authority to implement?	3
E: Is it Economically beneficial?	2
E: Are other Environmental approvals required?	2
Score	**33**

Table 10b: Portable Light

Criteria	Evaluation Rating (1-3)
Does it reduce disaster damage?	2
Does it contribute to other goals?	3
Does it benefit the environment?	1
Does it meet regulations?	3
Will historic structures be saved or protected?	2
Does it help achieve other community goals?	3
Could it be implemented quickly?	3
S: Is it Socially acceptable?	3
T: Is it Technically feasible and potentially successful?	3
A: Is it Administratively workable?	3
P: Is it Politically acceptable?	3
L: Is there Legal authority to implement?	3
E: Is it Economically beneficial?	2
E: Are other Environmental approvals required?	3
Score	**37**

Table 10c: Modifications to Pickpocket Dam

Criteria	Evaluation Rating (1-3)
Does it reduce disaster damage?	3
Does it contribute to other goals?	3
Does it benefit the environment?	3
Does it meet regulations?	3
Will historic structures be saved or protected?	1
Does it help achieve other community goals?	2
Could it be implemented quickly?	1
S: Is it Socially acceptable?	1
T: Is it Technically feasible and potentially successful?	2
A: Is it Administratively workable?	2
P: Is it Politically acceptable?	1
L: Is there Legal authority to implement?	3
E: Is it Economically beneficial?	2
E: Are other Environmental approvals required?	1
Score	**28**

Table 10d: Modifications to Colcord Pond Dam

Criteria	Evaluation Rating (1-3)
Does it reduce disaster damage?	3
Does it contribute to other goals?	3
Does it benefit the environment?	3
Does it meet regulations?	3
Will historic structures be saved or protected?	2
Does it help achieve other community goals?	2
Could it be implemented quickly?	1
S: Is it Socially acceptable?	1
T: Is it Technically feasible and potentially successful?	2
A: Is it Administratively workable?	2
P: Is it Politically acceptable?	1
L: Is there Legal authority to implement?	2
E: Is it Economically beneficial?	1
E: Are other Environmental approvals required?	1
Score	**27**

Table 10e: Move or Upgrade Surface Water Treatment Plan

Criteria	Evaluation Rating (1-3)
Does it reduce disaster damage?	3
Does it contribute to other goals?	3
Does it benefit the environment?	3
Does it meet regulations?	3
Will historic structures be saved or protected?	3
Does it help achieve other community goals?	3
Could it be implemented quickly?	2
S: Is it Socially acceptable?	2
T: Is it Technically feasible and potentially successful?	3
A: Is it Administratively workable?	3
P: Is it Politically acceptable?	2
L: Is there Legal authority to implement?	3
E: Is it Economically beneficial?	2
E: Are other Environmental approvals required?	2
Score	**37**

Table 10f: Powder Mill Road Flood Analysis

Criteria	Evaluation Rating (1-3)
Does it reduce disaster damage?	1
Does it contribute to other goals?	2
Does it benefit the environment?	3
Does it meet regulations?	3
Will historic structures be saved or protected?	1
Does it help achieve other community goals?	3
Could it be implemented quickly?	3
S: Is it Socially acceptable?	3
T: Is it Technically feasible and potentially successful?	3
A: Is it Administratively workable?	3
P: Is it Politically acceptable?	3
L: Is there Legal authority to implement?	3
E: Is it Economically beneficial?	2
E: Are other Environmental approvals required?	3
Score	**36**

Table 10g: Acquisition of Development Rights at Exeter Elms

Criteria	Evaluation Rating (1-3)
Does it reduce disaster damage?	3
Does it contribute to other goals?	3
Does it benefit the environment?	3
Does it meet regulations?	3
Will historic structures be saved or protected?	2
Does it help achieve other community goals?	3
Could it be implemented quickly?	3
S: Is it Socially acceptable?	3
T: Is it Technically feasible and potentially successful?	3
A: Is it Administratively workable?	3
P: Is it Politically acceptable?	3
L: Is there Legal authority to implement?	3
E: Is it Economically beneficial?	3
E: Are other Environmental approvals required?	3
Score	**41**

Table 10h: Replacement of Undersized Water Lines Phase II, Lincoln Street

Criteria	Evaluation Rating (1-3)
Does it reduce disaster damage?	3
Does it contribute to other goals?	3
Does it benefit the environment?	3
Does it meet regulations?	3
Will historic structures be saved or protected?	3
Does it help achieve other community goals?	3
Could it be implemented quickly?	2
S: Is it Socially acceptable?	3
T: Is it Technically feasible and potentially successful?	3
A: Is it Administratively workable?	3
P: Is it Politically acceptable?	3
L: Is there Legal authority to implement?	3
E: Is it Economically beneficial?	3
E: Are other Environmental approvals required?	3
Score	**41**

Table 10i: Acquire Additional Groundwater Resources

Criteria	Evaluation Rating (1-3)
Does it reduce disaster damage?	3
Does it contribute to other goals?	3
Does it benefit the environment?	2
Does it meet regulations?	3
Will historic structures be saved or protected?	1
Does it help achieve other community goals?	3
Could it be implemented quickly?	2
S: Is it Socially acceptable?	3
T: Is it Technically feasible and potentially successful?	3
A: Is it Administratively workable?	3
P: Is it Politically acceptable?	3
L: Is there Legal authority to implement?	3
E: Is it Economically beneficial?	3
E: Are other Environmental approvals required?	2
Score	**37**

Table 10j: Implement Recommendations in Vulnerability Assessment

Criteria	Score
Does it reduce disaster damage?	1
Does it contribute to other goals?	2
Does it benefit the environment?	3
Does it meet regulations?	3
Will historic structures be saved or protected?	1
Does it help achieve other community goals?	3
Could it be implemented quickly?	3
S: Is it Socially acceptable?	3
T: Is it Technically feasible and potentially successful?	3
A: Is it Administratively workable?	3
P: Is it Politically acceptable?	3
L: Is there Legal authority to implement?	3
E: Is it Economically beneficial?	2
E: Are other Environmental approvals required?	3
Score	**36**

Table 10k: Develop and Implement a public outreach campaign using social media to Inform and Educate Public about Hazards

Criteria	Score
Does it reduce disaster damage?	2
Does it contribute to other goals?	3
Does it benefit the environment?	3
Does it meet regulations?	1
Will historic structures be saved or protected?	2
Does it help achieve other community goals?	3
Could it be implemented quickly?	3
S: Is it Socially acceptable?	3
T: Is it Technically feasible and potentially successful?	3
A: Is it Administratively workable?	3
P: Is it Politically acceptable?	3
L: Is there Legal authority to implement?	3
E: Is it Economically beneficial?	3
E: Are other Environmental approvals required?	3
Score	**38**

CHAPTER IX - IMPLEMENTATION SCHEDULE FOR PRIORITY MITIGATION STRATEGIES

This step involves developing an action plan that outlines who is responsible for implementing each of the prioritized strategies determined in the previous step, as well as when and how the actions will be implemented. The following questions were asked to develop an implementation schedule for the identified priority mitigation strategies:

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

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

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

Table 12 is the Action Plan. In addition to the prioritized mitigation projects, Table 11 includes the responsible party (WHO), how the project will be supported (HOW), and what the timeframe is for implementation of the project (WHEN). Also included is a cost estimate for each project if available.

Table 11: Action Plan for Proposed Mitigation Actions

STAPLEE Score	Project	Responsibility/ Oversight	Funding/ Support	Estimated Cost	Time frame
41	Replacement of undersized water lines	DPW	Town	$1M	Long-term 3-5 years
41	Acquire Development Rights to Exeter Elms	Town Manager/Select Board/ EMD	Town, HMPG	Unknown	Long -term 3-5 years
38	Public Outreach Campaign using social media to inform residents of hazards	Town Manager/Fire Department	Town	$1,000	Short-term 1 year or less
37	Move or upgrade surface water treatment plant	DPW	Town, HMPG	$3M	Medium-term 2-3 years
37	Portable light	Fire Department	Town, HMPG	$25K	Short-term 1 year or less
37	Acquire additional groundwater resources	DPW/BOS	Town, HMPG	Unknown	Medium-term 2-3years
36	Powder Mill Road Flood Analysis	DPW	Town, HMPG	$1-3M	Long-term 3-5 years

STAPLEE Score	Project	Responsibility/ Oversight	Funding/ Support	Estimated Cost	Time frame
36	Implement recommendations in Vulnerability Assessment	Planning Board/Select Board	Town	Unknown	Long-term 3-5 years
33	Second Fire Station	Fire Department	Town, HMPG	$4.5M	Medium-term 2-3 years
28	Modifications to Pickpocket Dam	DPW	Town, HMPG	$2M	Long-term 3-5 years
27	Modifications to Colcord Pond Dam	DPW	Town, HMPG	$500,000	Long-term 3-5 years

CHAPTER X - MONITORING, EVALUATING AND UPDATING THE PLAN

Incorporating the Plan into Existing Planning Mechanisms

Upon review and approval by FEMA and the State of New Hampshire, the Plan will be adopted as a standalone document of the Town and as an appendix of the Town's Emergency Operations Plan (EOP). The Plan will also be consulted when the Town updates its Capital Improvement Program (CIP). The Planning Board is responsible for updating the CIP annually, and will review the Action Plan during each update. The Planning Board in conjunction with Emergency Management Director will determine what items can and should be added to the CIP based on the Town's annual budget and possible sources of other funding. Considerations about future land use and proximity to current and potential hazard areas need to be inherently part of the planning process. NH RSA 674:2 III (e) gives cities the authority to include a natural hazards section, which documents the physical characteristics, severity, and extent of any potential natural hazards to the community, within the framework of a Master Plan.

Monitoring, Evaluating and Updating the Plan

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

To track progress and update the Mitigation Strategies identified in the Action Plan, it is recommended that the Town revisit the Plan annually, or after a hazard event. If it is not realistic or appropriate to revise the Plan every year, then the Plan will be revisited no less then every five years. The Emergency Management Director is responsible for initiating this review with members of the Town that are appropriate including members of the public. In keeping with the process of adopting the 2018 Plan Update, a public hearing to receive public comment on Plan maintenance and updating will be held during any review of the Plan. This publicly noticed meeting will allow for members of the community not involved in developing the Plan to provide input and comments each time the Plan is revised. The final revised Plan will be adopted by the Select Board appropriately, at a second publicly noticed meeting.

Changes should be made to the Plan to accommodate for projects that have failed or are not considered feasible after a review for their consistency with STAPLEE, the timeframe, the community's priorities, and funding resources. Priorities that were not ranked high, but identified as potential mitigation strategies, should be reviewed as well during the monitoring and update of this Plan to determine feasibility of future implementation.

APPENDIX A:
SUMMARY OF 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 officials 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. 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 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.

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 flood plain, 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, which either stand-alone or are contained within a zoning ordinance.

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.

Building Codes: Standards can be incorporated into building codes that address flood proofing for all new and improved or repaired buildings.

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 watercourses 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 their yard without concern for runoff patterns.

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. 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. Flood proofing can be accomplished through barriers to flooding, or by treatment to the structure itself.

Barriers: Levees, floodwalls and berms can keep floodwaters from reaching a building. These are useful, however, only in areas subject to shallow flooding.

Dry Flood proofing: This method seals a building against the water by coating the walls with waterproofing compounds or plastic sheeting. Openings, such doors, windows, etc. are closed either permanently with removable shields or with sandbags.

Wet Flood proofing: 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:

- Floor drain plugs and floor drain standpipe, which keep water from flowing out of the lowest opening in the house.

- Overhead sewer - keeps water in the sewer line during a backup.

- 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.

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.

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 improve 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. And, 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, however, since it takes many years for a new wetland to achieve the same level of quality as an existing one.

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. And, 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. Practices to reduce erosion and sedimentation have two principal components: (1) minimize erosion with vegetation and; (2) capture sediment before it leaves the site. Slowing the runoff increases infiltration into the soil, thereby controlling the loss of topsoil from erosion and the resulting sedimentation. Runoff can be slowed by vegetation, terraces, contour strip farming, no-till farm practices, and impoundments (such as sediment basins, farm ponds, and wetlands).

3. Best Management Practices - Best Management Practices (BMPs) are measures that reduce nonpoint source pollutants that enter waterways. Nonpoint 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:

- activating the emergency operations center (emergency director)
- sandbagging designated areas (public works department)
- closing streets and bridges (police department)
- shutting off power to threatened areas (public service)
- releasing children from school (school district)
- ordering an evacuation (Select Board/city council/emergency director)
- 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 City. Buildings or locations vital to the flood response effort:

- emergency operations centers
- police and fire stations
- hospitals
- highway garages
- selected roads and bridges
- evacuation routes
- buildings or locations that, if flooded, would create secondary disasters
- hazardous materials facilities
- water/wastewater treatment plants
- schools
- nursing homes

All such facilities should have their own flood response plan that is coordinated with the community's plan. Nursing homes, other public health facilities, and 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:

- patrolling evacuated areas to prevent looting
- providing safe drinking water
- vaccinating residents for tetanus
- clearing streets
- 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.

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 of discussed below. The shortcomings of structural approaches are that:

- they can be very expensive
- they disturb the land, disrupt natural water flows, and destroy natural habitats
- they are built to an anticipated flood event, and may be exceeded by a greater-than-expected flood
- they can create a false sense of security

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:

- are expensive
- occupy a lot of land
- require periodic maintenance
- may fail to prevent damage from floods that exceed their design levels
- may eliminate the natural and beneficial functions of the floodplain

Reservoirs should only be used after a thorough watershed analysis that identifies the most appropriate location and ensures that they would not cause flooding somewhere else. Because they are so expensive and usually involve more than one community, they are typically implemented with the help of state or federal agencies, such as the Army Corps of Engineers.

Levees/Floodwalls - Probably the best know 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.

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.

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.

Dredging: Dredging is often cost-prohibitive because the dredged material must be disposed of somewhere else, and 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.

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.

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.

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 Office of Emergency Management, the NH Office of State Planning, or your regional planning commission.

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:

- Mass mailings or newsletters and e-newsletters to all residents
- Posting resource information on City website and social media accounts
- Notices directed to floodplain residents
- Displays in public buildings, malls, etc.
- Newspaper articles and special sections
- Radio and TV news releases and interview shows
- A local flood proofing video for cable TV programs and to loan to organizations
- A detailed property owner handbook tailored for local conditions
- Presentations at meetings of neighborhood groups

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.

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.

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.

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.

Environmental Education - Education can be a great mitigating tool, if people can learn what not to do before damage occurs. And 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. And decision-makers, armed with this knowledge, can make a difference in their communities.

II. EARTHQUAKES

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

B. PROPERTY PROTECTION:
Acquire and clear hazard areas.
Retrofitting to add braces, remove overhangs.
Apply mylar to windows and glass surfaces to protect from shattering glass.
Tie down major appliances, provide flexible utility connections.
Earthquake insurance riders.

C. EMERGENCY SERVICES - Earthquake response plans to account for secondary problems, such as fires and hazardous materials spills.

D. EMERGENCY SERVICES - Slope stabilization.

III. DAM FAILURE

A. PREVENTIVE:
Dam failure inundation maps.
Planning/zoning/open space preservation to keep area clear.
Building codes with flood elevation based on dam failure.
Dam safety inspections.
Draining the reservoir when conditions appear unsafe.

B. PROPERTY PROTECTION - Acquisition of buildings in the path of a dam breach flood. Flood insurance.

C. EMERGENCY SERVICES - Dam conditioning monitoring; warning and evacuation plans based on dam failure.

D. EMERGENCY SERVICES - Dam improvements, spillway enlargements. Remove unsafe dams.

IV. WILDFIRES

A. PREVENTIVE:
Zoning districts to reflect fire risk zones.
Planning and zoning to restrict development in areas near fire protection and water resources.
Requiring new subdivisions to space buildings, provide firebreaks, on-site water storage, wide roads multiple accesses.

Building code standards for roof materials, spark arrestors.
Maintenance programs to clear dead and dry bush, trees.
Regulation on open fires.

B. PROPERTY PROTECTION:

Retrofitting of roofs and adding spark arrestors.
Landscaping to keep bushes and trees away from structures.
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. PREVENTIVE - Building code standards for light frame construction, especially for wind-resistant roofs.

B. PROPERTY PROTECTION:

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

C. NATURAL RESOURCE PROTECTION - Maintenance program for trimming tree and shrubs

D. EMERGENCY SERVICES - Early warning systems/NOAA Weather Radio Evacuation Plans

APPENDIX B:
TECHNICAL AND FINANCIAL ASSISTANCE FOR HAZARD MITIGATION

Local Municipalities must have a FEMA-approved Hazard Mitigation Plan in order to be eligible for Hazard Mitigation Assistance Grants. Information on these grants may be found at: http://www.fema.gov/media-library-data/1424983165449-38f5dfc69c0bd4ea8a161e8bb7b79553/HMA_Guidance_022715_508.pdf

HAZARD MITIGATION GRANT PROGRAM (HMGP) - Authorized under Section 404 of the Stafford Act, the Hazard Mitigation Grant Program (HMGP) provides grants to States and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. The purpose of the program is to reduce the loss of life and property due to natural disasters

and to enable mitigation measures to be implemented during the immediate recovery from a disaster.
Hazard Mitigation Grant Program funding is only available in States following a Presidential disaster declaration. Eligible applicants are:

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

Individual homeowners and businesses may not apply directly to the program; however, a community may apply on their behalf. HMGP funds may be used to fund projects that will reduce or eliminate the losses from future disasters. Projects must provide a long-term solution to a problem, for example, elevation of a home to reduce the risk of flood damages as opposed to buying sandbags and pumps to fight the flood. In addition, a project's potential savings must be more than the cost of implementing the project. Funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage.

PRE-DISASTER MITIGATION GRANTS PROGRAM - The Pre-Disaster Mitigation (PDM) program provides technical and financial assistance to States and local governments for cost-effective pre-disaster hazard mitigation activities that complement a comprehensive mitigation program, and reduce injuries, loss of life, and damage and destruction of property. FEMA provides grants to States and Federally recognized Indian tribal governments that, in turn, provide sub-grants to local governments (to include Indian Tribal governments) for mitigation activities such as planning, and the implementation of projects identified through the evaluation of natural hazards.

FLOOD MITIGATION ASSISTANCE (FMA) PROGRAM - FEMA provides funding to assist States and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the National Flood Insurance Program (NFIP). There are three types of grants available under FMA: Planning, Project, and Technical Assistance Grants. FMA Planning Grants are available to States and communities to prepare Flood Mitigation Plans. NFIP-participating communities with approved Flood Mitigation Plans can apply for FMA Project Grants. FMA Project Grants are available to States and NFIP participating communities to implement measures to reduce flood losses. Ten percent of the Project Grant is made available to States as a Technical Assistance Grant. These funds may be used by the State to help administer the program. Communities receiving FMA Planning and Project Grants must be participating in the NFIP.

EMERGENCY MANAGEMENT PERFORMANCE GRANT
GUIDELINES - Emergency Management Performance Grant (EMPG Program) funding is available to local communities and eligible Agencies for projects that fall in FOUR general areas of Emergency Management: Planning activities; Training activities; Drills and Exercises; and Emergency Management Administration. Contact Heather Dunkerley at NHHSEM, heather.dunkerley@dos.nh.gov, 603-223-3614 for assistance.

The following list of possible projects and activities is meant to guide you in selecting projects for an EMA Grant Submission. This list of suggested projects is not intended to be all-inclusive. Local communities or agencies may have other specific projects and activities that reflect local needs based on local capability assessments and local hazards.

Planning Activities may include:

- Develop a Hazard Mitigation Plan for your community.
- Prepare a hazard mitigation project proposal for submission to NHHSEM.
- Create, revise, or update Dam Emergency Action plans.
- Update your local Emergency Operations Plan (EOP). Consider updating a number of specific annexes each year to ensure that the entire plan is updated at least every four years.
- If applicable, develop or incorporate a regional HazMat Team Annex into your EOP.
- Develop an Anti-Terrorism Annex into your EOP.
- Develop a local/regional Debris Management Annex into your EOP.
- Develop and maintain pre-scripted requests for additional assistance (from local area public works, regional mutual aid, State resources, etc.) and local declarations of emergency.
- Develop and maintain written duties and responsibilities for EOC staff positions and agency representatives.
- Develop and maintain a list of private non-profit organizations within your local jurisdiction to ensure that these organizations are included in requests for public assistance funds.
- Prepare a submission for nomination as a “Project Impact” Community.

Training Activities may include:

- Staff members attend training courses at the Emergency Management Institute.
- Staff members attend a “field delivered” training course conducted by NHHSEM.
- Staff members attend other local, State, or nationally sponsored training event, which provides skills or knowledge relevant to emergency management.
- Staff members complete one or more FEMA Independent Study Courses.
- Identify and train a pre-identified local damage assessment team.

Drills and Exercises might include:

- Conduct multi-agency EOC Exercise (Tabletop or Functional) and forward an Exercise Evaluation Report, including after action reports, to NHHSEM (external evaluation of exercises is strongly encouraged). Drills or Exercises might involve any of the following scenarios:
    - Hurricane Exercise
    - Terrorism Exercise
    - Severe Storm Exercise
    - Communications Exercise
    - Mass Causality Exercise involving air, rail, or ship transportation accident
- Participate in multi-State or multi-Jurisdictional Exercise and forward Exercise Report to NHHSEM.
- HazMat Exercise with Regional HazMat Teams

- NHHSEM Communications Exercises
- Observe or evaluate State or local exercise outside your local jurisdiction.
- Assist local agencies and commercial enterprises (nursing homes, dams, prisons, schools, etc.) in developing, executing, and evaluating their exercise.
- Assist local hospitals in developing, executing and evaluating Mass Care, HazMat, Terrorism, and Special Events Exercises.
- Administrative Projects and Activities may include:
- Maintain an Emergency Operations Center (EOC) and alternate EOC capable of accommodating staff to respond to local emergencies.
- Establish and maintain a Call-Down List for EOC staff.
- Establish and maintain Emergency Response/Recovery Resource Lists.
- Develop or Update Emergency Management Mutual Aid Agreements with a focus on Damage Assessment, Debris Removal, and Resource Management.
- Develop and maintain written duties and responsibilities for EOC staff positions and agency representatives.
- Develop or Update Procedures for tracking of disaster-related expenses by local agencies.

FLOOD MITIGATION ASSISTANCE (FMA) PROGRAM - FMA 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). FMA regulations can be found in 44 CFR Part 78. Funding for the program is provided through the National Flood Insurance Fund. FMA is funded at $20 million nationally. FMA provides funding to assist States and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the National Flood Insurance Program (NFIP).

There are three types of grants available under FMA: Planning, Project, and Technical Assistance Grants. FMA Planning Grants are available to States and communities to prepare Flood Mitigation Plans. NFIP-participating communities with approved Flood Mitigation Plans can apply for FMA Project Grants. FMA Project Grants are available to States and NFIP participating communities to implement measures to reduce flood losses. Ten percent of the Project Grant is made available to States as a Technical Assistance Grant. These funds may be used by the State to help administer the program. Communities receiving FMA Planning and Project Grants must be participating in the NFIP. A few examples of eligible FMA projects include: the elevation, acquisition, and relocation of NFIP-insured structures.

States are encouraged to prioritize FMA project grant applications that include repetitive loss properties. The FY 2001 FMA emphasis encourages States and communities to address target repetitive loss properties identified in the Agency's Repetitive Loss Strategy. These include structures with four or more losses, and structures with 2 or more losses where cumulative payments have exceeded the property value. State and communities are also encouraged to develop Plans that address the mitigation of these target repetitive loss properties.

APPENDIX C:
SAFFIR/SIMPSON HURRICANE SCALE

Category	Definition	Effects
One	Winds 74-95 mph	No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Also, some coastal road flooding and minor pier damage
Two	Winds 96-110 mph	Some roofing material, door, and window damage to buildings. Considerable damage to vegetation, mobile homes, and piers. Coastal and low-lying escape routes flood 2-4 hours before arrival of center. Small craft in unprotected anchorages break moorings.
Three	Winds 111-130 mph	Some structural damage to small residences and utility buildings with a minor amount of curtainwall failures. Mobile homes are destroyed. Flooding near the coast destroys smaller structures with larger structures damaged by floating debris. Terrain continuously lower than 5 feet ASL may be flooded inland 8 miles or more.
Four	Winds 131-155 mph	More extensive curtainwall failures with some complete roof structure failure on small residences. Major erosion of beach. Major damage to lower floors of structures near the shore. Terrain continuously lower than 10 feet ASL may be flooded requiring massive evacuation of residential areas inland as far as 6 miles.
Five	Winds greater than 155 mph	Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. Major damage to lower floors of all structures located less than 15 feet ASL and within 500 yards of the shoreline. Massive evacuation of residential areas on low ground within 5 to 10 miles of the shoreline may be required.

Additional information: http://www.nhc.noaa.gov/aboutsshws.php

APPENDIX D:
ENHANCED FUJITA TORNADO DAMAGE SCALE

The Enhanced Fujita Scale			
F-Scale Number	Potential Damage	Wind Speed	Type of Damage
F0	Light	65 – 85 mph	Little to no damage to man-made structures. Breaks branches off trees; pushes over shallow-rooted trees; damages signs
F1	Moderate	86 – 110 mph	Beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off roads; Moderate damage.
F2	Considerable	111 – 135 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars from trains pushed over; large trees snapped or uprooted; light object missiles generated.
F3	Severe	136 – 165 mph	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cards lifted and thrown.
F4	Devastating	166 – 200 mph	Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.
F5	Incredible	Over 200 mph	Strong frame houses leveled off foundations and carried considerable distances; automobile-sized missiles fly through the air in excess of 109 yards; trees debarked; steel reinforced concrete structures badly damaged. Complete devastation.

Additional Information:
http://www.spc.noaa.gov/faq/tornado/ef-scale.html

APPENDIX E:
THE RICHTER MAGNITUDE SCALE

Earthquake Severity

Magnitudes	Earthquake Effects
Less than 3.5	Generally not felt, but recorded.
3.5-5.4	Often felt, but rarely causes damage.
Under 6.0	At most slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions.
6.1-6.9	Can be destructive in areas up to about 100 kilometers across where people live.
7.0-7.9	Major earthquake. Can cause serious damage over larger areas.
8 or greater	Great earthquake. Can cause serious damage in areas several hundred kilometers across.

Additional information: https://earthquake.usgs.gov/learn/topics/mercalli.php
https://earthquake.usgs.gov/learn/topics/measure.php
https://earthquake.usgs.gov/data/shakemap/

The Richter Magnitude Scale - Seismic waves are the vibrations from earthquakes that travel through the Earth; they are recorded on instruments called seismographs. Seismographs record a zig-zag trace that shows the varying amplitude of ground oscillations beneath the instrument. Sensitive seismographs, which greatly magnify these ground motions, can detect strong earthquakes from sources anywhere in the world. The time, locations, and magnitude of an earthquake can be determined from the data recorded by seismograph stations.

Earthquakes with magnitude of about 2.0 or less are usually call microearthquakes; they are not commonly felt by people and are generally recorded only on local seismographs. Events with magnitudes of about 4.5 or greater - there are several thousand such shocks annually - are strong enough to be recorded by sensitive seismographs all over the world. Great earthquakes, such as the 1964 Good Friday earthquake in Alaska, have magnitudes of 8.0 or higher. On the average, one earthquake of such size occurs somewhere in the world each year. The Richter Scale has no upper limit. Recently, another scale called the moment magnitude scale has been devised for more precise study of great earthquakes. The Richter Scale is not used to express damage. An earthquake in a densely populated area which results in many deaths and considerable damage may have the same magnitude as a shock in a remote area that does nothing more than frightens wildlife. Large-magnitude earthquakes that occur beneath the oceans may not even be felt by humans.

Appendix F

Extreme Weather Madness
Thunderstorm Criteria

THUNDERSTORM TYPES	Rainfall Rate/hr	MAX WIND GUST	HAIL SIZE	PEAK TORNADO Possibility	LIGHTNING FREQUENCY (5 min Intervals)	Darkness Factor	STORM IMPACT
T-1 – Weak thunderstorms or Thundershowers	.03-.10	< 25 MPH	None	None	Only a few strikes during the storm.	Slightly Dark. Sunlight may be seen under the storm.	1. No damage. 2. Gusty winds at times.
T-2 – Moderate Thunderstorms.	.10"-.25"	25-40 MPH	None	None	Occasional 1-10	Moderately Dark. Heavy downpours may cause the need for car lights.	1. Heavy downpours. 2. Occasional lightning. 3. Gusty winds. 4. Very little damage. 5. Small tree branches may break 6. Lawn furniture moved around
T-3 – Heavy Thunderstorms 1. Singular or lines of storms.	.25"-.55"	40-57 MPH	1/4 " to ¾"	EF0	Occasional to Frequent 10-20	Dark. Car lights used. Visibility low in heavy rains. Cars may pull off the road.	1. Minor Damage. 2. Downpours that produce some flooding on streets. 3. Frequent lightning could cause house fires. 4. Hail occurs within the downpours. 5. Small branches are broken. 6. Shingles are blown off roofs.
T-4 – Intense Thunderstorms 1. Weaker supercells 2. Bow Echos or lines of Storms	.55" – 1.25"	58 to 70 MPH	1" to 1.5"	EF0 to EF2	Frequent 20-30	Very Dark. Car lights used. Some street lights come on..	1. Moderate Damage. 2. Heavy rains can cause flooding to streams and creeks. Roadway flooding. 3. Hail can cause dents on cars and cause crop damage. 3. Wind damage to trees and buildings. 4. Tornado damage. 5. Power outages
T-5 – Extreme Thunderstorms 1. Supercells with familty of tornadoes. 2. Derecho Windstorms	1.25" – 4"	Over 70 Mph	Over 1.5" to 4"	EF3 to EF5	Frequent to Continuous. > 30	Pitch Black, Street Lights come on. House lights maybe used	1. Severe Damage to Trees and Property. Damage is widespread. 2. Flooding rains. 3. Damaging hail. 4. Damaging wind gusts to trees and buildings. 5. Tornadoes F3-F5 or family of tornadoes can occur. Tornadoes can cause total devastation. 6. Widespread power outages.

Appendix G
Lightning Risk Definitions

Lightning Risk Definitions	
Low Risk	Thunderstorms are only expected to be isolated or widely scattered in coverage (20 Percent Chance). Atmospheric conditions do not support frequent cloud-to-ground lightning strikes.
Moderate Risk	Thunderstorms are forecast to be scattered in coverage (30-50 Percent Chance). Atmospheric conditions support frequent cloud-to-ground lightning strikes.
High Risk	Thunderstorms are forecast to be numerous or widespread in coverage (60-100 Percent Chance). Atmospheric conditions support continuous and intense cloud-to-ground lightning strikes.

Appendix H

Hail Size Description Chart

Hail Size Description Chart

Hailstone size	Measurement	
	in.	cm.
bb	< 1/4	< 0.64
pea	1/4	0.64
dime	7/10	1.8
penny	3/4	1.9
nickel	7/8	2.2
quarter	1	2.5
half dollar	1 1/4	3.2
golf ball	1 3/4	4.4
billiard ball	2 1/8	5.4
tennis ball	2 1/2	6.4
baseball	2 3/4	7.0
softball	3.8	9.7
Compact disc / DVD	4 3/4	12.1

Note: Hail size refers to the diameter of the hailstone.

Appendix I

Sperry-Pitz Ice Accumulation Index

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

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

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

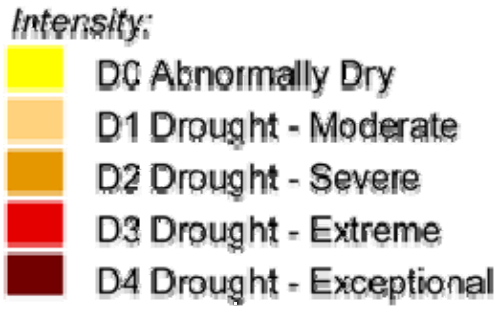
Appendix J

Wildland Urban Interface (WUI) Exposure Zones – NIST Technical Note 1748, January 2013
Source: National Institute of Standards and Technology (NIST), US Dept. of Commerce

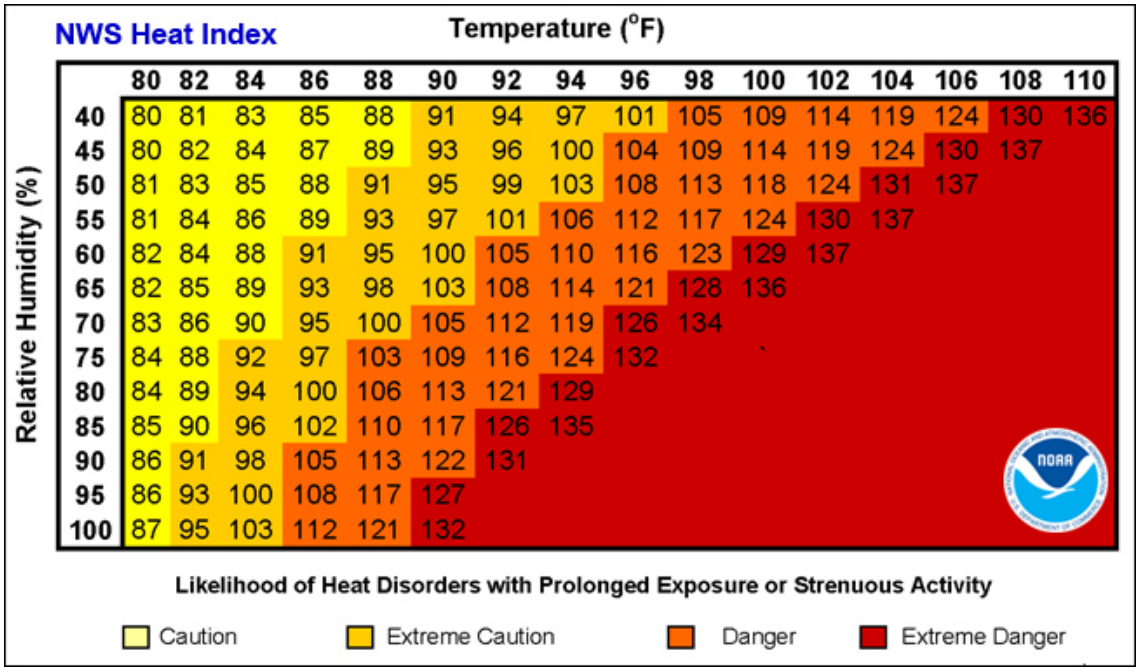
Table 4: E-Scale Building Construction Classes and Attributes

WUI scale	Building Construction Class	Ignition Vulnerabilities from Embers and Fire	Building Construction and Landscaping Attributes for Protection against Embers
E1 or F1	WUI 1	None	Normal Construction Requirements: - Maintained Landscaping - Local AHJ-Approved Access for firefighting equipment
E2 or F2	WUI 2	In this area, highly volatile fuels could be ignited by embers. Weathered, dry combustibles with large surface areas can become targets for ignition fro m embers.	Low Construction Hardening Requirements: - Treated combustibles allowed on structure - Attached treated combustibles allowed - Treated combustibles allowed around structure - Low flammability plants - Irrigated and well maintained Landscaping - Local AHJ-Approved Access for firefighting equipment
E3 or F3	WUI 3	Exposed combustibles are likely to ignite in this area from high ember flux or high heat flux	Intermediate Construction Hardening Requirements: - No exposed combustibles on structure - Combustibles placed well away from structure - Low flammability plants - Irrigated and well maintained landscaping - Local AHJ-Approved Access for firefighting equipment
E4 or F4	WUI 4	Ignition of combustibles from direct flame contact is likely.	High Construction Hardening Requirements: - No exposed combustibles - All vents, opening must be closed - Windows and doors must be covered with insulated non-combustible coverings. - Irrigated and well maintained low flammability landscaping - Local AHJ-Approved Access for firefighting equipment

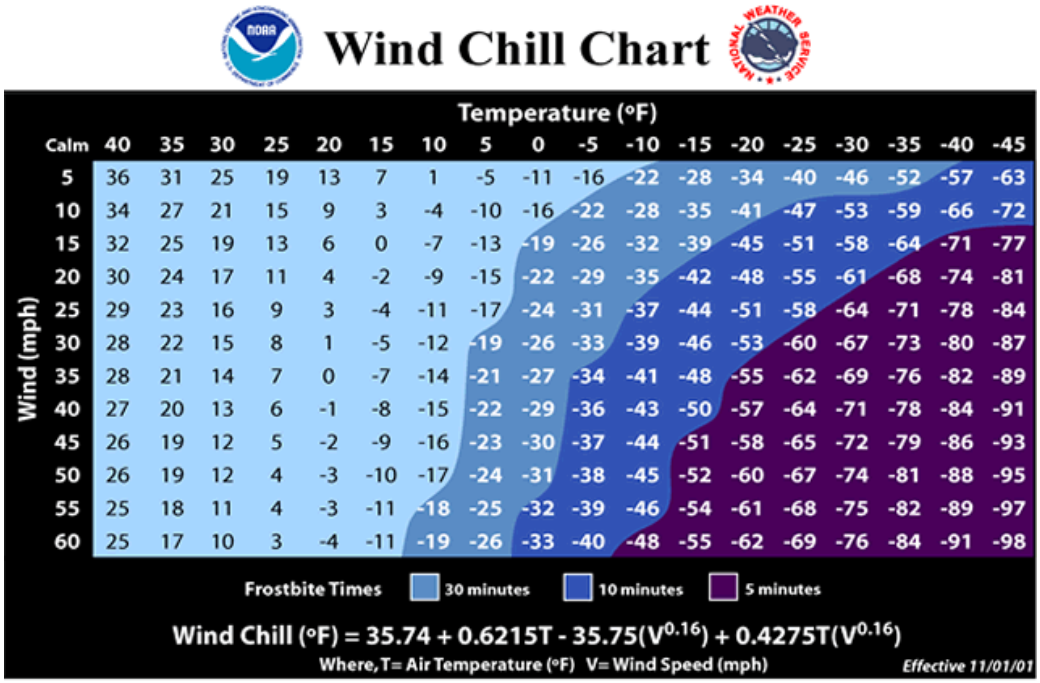
Appendix K
NOAA U.S. Drought Monitor Scale



Appendix L
National Weather Service Heat Index



Appendix M
National Wind Chill Chart



Appendix N
Documentation of Planning Process
Notice of Public Hearing on Draft Plan

Select Board Meeting
Monday, May2nd, 2018, 6:30 p.m.
Nowak Room, Town Office Building
10 Front Street, Exeter NH

1.Call Meeting to Order
2.Board Interviews –
Recreation Advisory Board
3.Bid Openings –Engine 4 Replacement

4.Public Comment
5.Minutes & Proclamations
a. Proclamations/Recognitions– Municipal Clerks Week, Police Week
6.Approval of Minutes
a. April 23rd, 2018
b. April 30th, 2018
c. May 3rd, 2018 (site walk)
7.Appointments
8.Discussion/Action Items
a. Assessors Discussion: Revaluation
b. Public Hearing: E911 Street Name Changes
c. Public Hearing: Hazard Mitigation Plan 2018 Update (RPC)
d. Town Planner: MTAG Letter of Support
e. Swasey Parkway Turnaround Updates
f. Sewer Agreement Update –Town of Hampton
g. Property Use/Alcohol Policy Updates
9.Regular Business
a. Tax, Water/Sewer Abatements & Exemptions
b. Permits & Approvals
c. Town Manager's Report
d. Select Board Committee Reports
e. Correspondence
10.Review Board Calendar
11.Non-Public Session
12.Adjournment
Julie Gilman, Chairwoman Select Board
Posted: 5/18/18Town Office, Town Website
Persons may request an accommodation for a disabling condition in order to attend this meeting. It is asked that such requests be made with 72 hours notice. If you do not make such a request, you may do so with the Town Manager prior to the start of the meeting. No requests will be considered once the meeting has begun.
AGENDA SUBJECT TO CHANGE

Appendix O
Approval Letters from FEMA

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

FEMA

JAN 0 7 2019

Whitney Welch
State Hazard Mitigation Officer
NH Department of Safety
Homeland Security and Emergency Management
33 Hazen Drive
Concord, NH 03303

Dear Ms. Welch:

We would like to acknowledge the Town of Exeter and the State of New Hampshire for their dedication and commitment to mitigation planning.

As outlined in the FEMA-State Agreement for FEMA-DR-4316 your office has been delegated the authority to review and approve local mitigation plans under the Program Administration by States Pilot Program. On **October 25, 2018** our Agency was notified that your office completed its review of the Town of Exeter, NH Natural Hazard Mitigation Plan Update 2018 and determined it meets the requirements of 44 C.F.R. Pt. 201.

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

Approved mitigation plans are eligible for points under the National Flood Insurance Program's Community Rating System (CRS). Complete information regarding the CRS can be found at http://www.fema.gov/national-flood-insurance-program-community-rating-system, or through your local floodplain administrator.

The Town of Exeter, NH Natural Hazard Mitigation Plan Update 2018 must be reviewed, revised as appropriate, and resubmitted to New Hampshire Homeland Security and Emergency Management for approval within **five years of the plan approval date of October 25, 2018** in order to maintain eligibility for mitigation grant funding. We encourage the Town to continually update the plan's assessment of vulnerability, adhere to its maintenance schedule, and implement, when possible, the mitigation actions proposed in the plan.

JAN 0 7 2019

Once again, thank you for your continued dedication to public service demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please do not hesitate to contact Melissa Surette at (617) 956-7559 or Melissa.Surette@fema.dhs.gov.

Sincerely,

Paul F. Ford
Acting Regional Administrator

PFF: ms

cc: Fallon Reed, Chief of Planning, New Hampshire
Kayla Henderson, Hazard Mitigation Planner, New Hampshire
Jennifer Gilbert, New Hampshire State NFIP Coordinator