Town of Windham,

New Hampshire

Hazard Mitigation Plan 2019

TOWN OF WINDHAM, NEW HAMPSHIRE

HAZARD MITIGATION PLAN

2019

Prepared for the Town of Windham, NH,
NH Homeland Security & Emergency Management
(NHHSEM) and Federal Emergency Management Agency (FEMA)
by
The Southern New Hampshire Planning Commission
with assistance from the Windham Hazard Mitigation Committee

September 2019

Final Plan

Acknowledgements

Southern NH Planning Commission and the Town of Windham wish to thank the following individuals for serving on the Town's Hazard Mitigation Committee and for their assistance in the development of this Plan

Acknowledgements

Appreciation is extended to the following people for contributing their time and effort to complete the Windham Hazard Mitigation Plan:

2019 Windham Hazard Mitigation Committee:

Thomas McPherson	Fire Chief, Emergency Management Director, Town of Windham
Edward Morgan	Assistant Fire Chief, Town of Windham
Stephen Brady	Deputy Fire Chief, Town of Windham
David Sullivan	Town Administrator, Town of Windham
Michael Caron	Police Captain, Town of Windham
Gerald Lewis	Police Chief, Town of Windham
Michael McGuire	Building Inspector, Town of Windham
Rex Norman	Economic Development Director, Town of Windham
Richard Gregory	Planning Director, Town of Windham
Jack McCartney	General Services Director, Town of Windham
Paula Carmichael	Human Resources Director, Town of Windham
Madeleine DiIonno	Southern NH Planning Commission
Cameron Prolman	Southern NH Planning Commission
Zachary Swick	Southern NH Planning Commission
Sylvia von Aulock	Southern NH Planning Commission

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

FEMA

Alexxandre Monastiero, State Hazard Mitigation Officer
New Hampshire Department of Safety, Homeland Security and Emergency Management
33 Hazen Drive
Concord, New Hampshire 03303

Dear Ms. Monastiero:

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. Our Agency has been notified that your office completed its review of the Town of Windham, New Hampshire Hazard Mitigation Plan 2019 and approved it effective **October 2, 2019** through **October 1, 2024** in accordance with the planning requirements of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended, the National Flood Insurance Act of 1968, as amended, and Title 44 Code of Federal Regulations (CFR) Part 201.

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

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

Thank you for your continued commitment and dedication to risk reduction demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please contact Melissa Surette at (617) 956-7559 or Melissa.Surette@fema.dhs.gov.

Sincerely,

8 OCT 19

Captain W. Russ Webster, USCG (Ret.), CEM
Regional Administrator
FEMA Region I

WRW:ms

cc: Fallon Reed, Chief of Planning, New Hampshire

Town of Windham, New Hampshire
Windham Board of Selectmen

A Resolution Approving the Windham Hazard Mitigation Plan Update
2019

WHEREAS, the Southern New Hampshire Planning Commission received funding from the New Hampshire Department of Safety – Homeland Security and Emergency Management under a Pre-Disaster Mitigation Grant to assist the Town of Windham in the preparation of the Windham Hazard Mitigation Plan Update; and

WHEREAS, several public planning meetings/hearings were held between November 2018 and September of 2019 regarding the development and review of the Windham Hazard Mitigation Plan Update; and

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

WHEREAS, a public meeting was held by the Windham Board of Selectmen on September 23, 2019 to formally approve and adopt the Windham Hazard Mitigation Plan Update.

NOW, THEREFORE BE IT RESOLVED that the Windham Board of Selectmen approve the Windham Hazard Mitigation Plan Update.

APPROVED and SIGNED this 23rd day of September 2019.

Board of Selectmen

ATTEST

NICOLE L. BOTTAI
MY COMMISSION EXPIRES OCT. 1, 2019
NOTARY PUBLIC
NEW HAMPSHIRE

Preface

Hazard mitigation planning is a relatively new field, spearheaded by the Federal Emergency Management Agency (FEMA) during the 1990s after Hurricane Andrew caused more than $20 billion in damage across several southern states. That event resulted in 54 fatalities and the disruption of millions of lives. The Disaster Mitigation Act of 2000, developed by FEMA, was intended to help both communities and states prepare for, and deal with, such disasters. While New England normally does not have hurricanes of Andrew's magnitude, this area does experience many types of natural disasters that cost both lives and money.

These disasters and other natural hazards occur during all four seasons in the Northeast: winter ice, snow, and nor'easters; spring flooding; summer downbursts and thunderstorms; and fall hurricanes. Planning to make a community disaster-resistant before these events occur can help save lives as well as homes and infrastructure. FEMA has several programs designed to strengthen the nation's disaster resistance by reducing risks and changing conditions and behaviors before a disaster in order to protect lives and prevent the loss of property.

FEMA has also raised its budget to upgrade the existing Flood Insurance Rate Maps through the Map Modernization project. Many communities have outdated maps that do not reflect the true extent of flooding potential.

A community's eligibility for hazard mitigation funding depends upon its having adopted a hazard mitigation plan that addresses these issues. Mitigation measures contained within the ***Windham Hazard Mitigation Plan*** may be sufficient to receive grant funding.

It is hoped that this document will be a good first step toward analyzing hazards in Windham, forecasting where potential disasters might occur, and reducing their impact on people and the community

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EXECUTIVE SUMMARY

The Windham Hazard Mitigation Plan was compiled to assist the Town of Windham in reducing and mitigating future losses from natural hazard events. The Plan was developed by the Southern New Hampshire Planning Commission and participants from the Town of Windham Emergency Management Team and contains the tools necessary to identify specific hazards, and aspects of existing and future mitigation efforts.

The following natural hazards are addressed:

- Flooding
- Hurricanes and High Wind Events
- Severe Winter Weather
- Wildfire
- Earthquake
- Extreme Temperatures

The Mitigation Committee identified critical facilities, areas at risk, commercial economic impact areas, hazardous materials facilities and populations and facilities to protect in the event of a disaster.

Critical Facilities

- Town Offices
- Federal Facilities
- Post Offices
- Police and Fire Stations
- Emergency Operations Centers
- Public Works Garages
- Emergency Fuel Facilities
- Emergency Shelters
- Wireless Communication Facilities and Radio Towers
- Public Water Systems, Pumps and Booster Stations
- Water Storage Tanks
- Sewer Systems and Pumps
- Electrical Power Substations
- Gas Pump Stations

Areas at Risk

- Solid Waste and Recycling Facilities
- Telephone Facilities
- Media Communications
- Major Roads and Bridges
- Historic Properties
- Schools
- Child Care Facilities
- Senior Housing and Nursing Homes
- High Density Neighborhoods
- Recreation Areas
- Commercial Resources
- Medical Facilities
- Religious Facilities

Existing Hazard Mitigation Strategies
The Mitigation Committee identified existing strategies related to hazard mitigation as follows:

- Emergency Operations Plan
- Zoning Ordinance
- Windham Building Codes
- NFIP/Floodplain Ordinance
- Elevation Certificates
- Emergency Warning System
- Site Plan and Subdivision Regulations
- Septic Code
- Road Design Standards
- Bridge Maintenance Program
- Drainage Requirements
- Wetlands Protection
- Hazardous Materials Regulations
- Public Education programs
- Master Plan
- Capital Improvement Plan
- Stormwater Management Plan

New Mitigation Programs and Policies
The Mitigation Committee identified 7 new hazard mitigation strategies as follows:

- Upgrade culverts on Golden Brook Road, Rock Pond Road and Moeckle Road.
- Identify aging infrastructure as part of the operations planning process.
- Coordinate with Southeastern NH Hazardous Materials Mutual Aid and regional emergency planning committee for hazardous materials and other regional hazards.
- Develop and implement a plan to address cyber threats to municipal resources.
- Work with neighboring communities to develop response trainings for mass casuality incidents.
- Continue to coordinate with regional space operations unit and provide terrorism/active shooter training for emergency response personnel in town and in schools.
- Develop a continuity operations plan for the town of Windham.

This plan is to be reviewed on an annual basis and updated every three to five years by the Windham Planning Department in coordination with the Windham Board of Selectmen.

SECTION I. INTRODUCTION

What Is Hazard Mitigation?

Hazard mitigation is the practice of reducing risks to people and property from natural hazards. FEMA's Federal Response Plan defines hazard mitigation as "activities designed to alleviate the effects of a major disaster or emergency or long-term activities to minimize the potentially adverse effects of future disaster in affected areas (A-5)." It includes both structural interventions, such as flood control devices, and nonstructural measures, such as avoiding construction in the most flood-prone areas. Mitigation includes not only avoiding the development of vulnerable sections of the community, but also making existing development in hazard-prone areas safer. For example, a community could identify areas that are susceptible to damage from natural disasters and take steps to make these areas less vulnerable. It could also steer growth to less risky areas. Keeping buildings and people out of harm's way is the essence of mitigation.

Mitigation should not be viewed as an impediment to growth and development. On the contrary, incorporating mitigation into development decisions can result in a safer, more resilient community, one that is more attractive to new families and businesses.

Why Develop a Hazard Mitigation Plan?

The full cost of the damage resulting from natural hazards—personal suffering, loss of lives, disruption of the economy, loss of tax base—is difficult to measure. New Hampshire is subject to many types of natural disasters: floods, hurricanes, nor'easters, winter storms, earthquakes, tornadoes, and wildfires, all of which can have significant economic and social impacts. Some, such as hurricanes, are seasonal and often strike in predictable locations. Others, such as floods, can occur any time of the year and almost anywhere in the state.

Benefits of Hazard Mitigation

Hazard mitigation offers many benefits for a community. It can:

- **Save lives and property.** A community can save lives and reduce property damage from natural hazards through identifying risks and acting, such as elevating structures in the floodplain.
- **Reduce vulnerability to future hazards.** By having a mitigation plan in place, a community is prepared to take steps that will permanently reduce the risk of future losses. This opportunity is often lost when communities are built without regard to natural hazards, or when they are rebuilt after a disaster "just like they were before." While it is natural to want to return things to the way they were, it is important to remember that, in many cases, the disaster would not have been as severe if a mitigation plan had been implemented.
- **Facilitate post-disaster funding.** By identifying and ranking recovery projects before the next disaster, a community will be in a better position to obtain post-

disaster funding because much of the background work necessary for applying for federal funding will already be done.

- **Speed recovery.** By developing a mitigation strategy, a community can identify post disaster mitigation opportunities in advance of a disaster and be ready to respond quickly after a disaster.

Background

The Federal Emergency Management Agency (FEMA) has recommended that all communities establish local hazard mitigation plans to reduce future losses from natural or man-made hazard events before they occur. Beginning November 1, 2004, FEMA has mandated an approved hazard mitigation plan be in place to receive specific disaster related grants. With a Pre-Disaster Mitigation Grant from FEMA, New Hampshire Homeland Security and Emergency Management (NH HSEM) provided funding to the Southern New Hampshire Planning Commission (SNHPC) to develop a local hazard mitigation plan for the Town of Windham, which was adopted September 23, 2019. SNHPC began working with Windham representatives in November 2018 to update this plan.

Purpose

The Windham Hazard Mitigation Plan serves as a strategic planning tool for use by the Town of Windham in its efforts to reduce future losses from natural or man-made hazard events before they occur. This Plan may constitute a new section of the Windham Master Plan, in accordance with RSA 674:2.

Authority

This Hazard Mitigation Plan was prepared in accordance with the Town of Windham's Emergency Operations Plan, and under the authority of the Planning Mandate of Section 409 of Public Law 93-288 as amended by Public Law 100-707, the Robert T. Stafford Act of 1988, and the Disaster Mitigation Act of 2000. The Windham Hazard Mitigation Plan will be referred to as the "Plan." After a public meeting was held at the Windham Town Offices, the Windham Board of Selectmen formally adopted this Plan on September 23, 2019.

Methodology

In November 2018, the Windham Hazard Mitigation Committee was formed to begin the planning stages of the Windham Hazard Mitigation Plan. The Committee developed the contents of the Plan using the 10-step planning process set forth in the *Hazard Mitigation Planning for New Hampshire Communities* handbook, along with the FEMA State and Local Mitigation Planning How-To Guides. The SNHPC assisted the Committee in the development of this Plan. The Committee consisted of representatives from various local agencies, including the Windham Planning and Zoning Department, Fire Department, Building Department, Board of Selectmen and Town Administration. The

Committee held three meetings beginning in November 2018 through February 2019 to collect information, compile, and review the Plan.

Tasks to complete the Plan Update were as follows:

Task 1: Determine the Planning Area & Resources: This task was conducted by town staff and the Regional Planning Commission. Information from the previous plan was reviewed and revised. The results of this research can be found in Section II, "Community Profile"**.**

Task 2: Building the Planning Team: This task was conducted by town staff and the Regional Planning Commission. Commission staff contacted department heads and land use board volunteers. Town staff made further inquiries and posted notices for residents and other stakeholders who might wish to volunteer their time and serve on a committee. The first committee meeting was held November 2nd, 2018 at the Windham Fire Department to introduce the mitigation planning process to the committee.

Task 3: Review Community Capabilities: The Committee reviewed each type of hazard and which sections or town were vulnerable to that type of hazard. The committee updated previous year's past and potential hazards maps using the Statewide Asset Data Exchange System data and FEMA flood zones maps. Furthermore, the Committee identified and catalogued all the critical facilities and areas at risk within the town, see Section IV and maps "Critical Facilities," and "Areas at Risk."

Task 4: Conduct a Risk Assessment: The Committee conducted several assessments to help determine the gaps in coverage. These include Assessing Probability, Severity, and Risk (Section IV) and Vulnerability Assessment.

Task 5: Develop a Mitigation Strategy: The Committee reviewed all hazards and the existing mitigation strategies meant to address those hazards in Section V. In addition, the Committee evaluated the effectiveness of the existing measures to identify where they can be improved. Section VI summarizes the Committees efforts in reviewing "complete", "completed and ongoing", "deferred" and "new" mitigation action items. They evaluated all mitigation actions and prioritized them. The results are also found in Section VI, which provides the Committee's rank, the projects STAPLEE score, problem statement, mitigation action, hazard addressed, responsible party, anticipated cost, potential funding source and timeframe.

Task 6: Keep the Plan Current: The Town of Windham understands the ramifications for ensuring that this plan be monitored and updated annually or after a presidentially declared disaster. Section IX addresses this issue.

Task 8: Review & Adopt the Plan: After acceptance by the Committee, the Plan was submitted to the New Hampshire Homeland Security and Emergency Management and

the Federal Emergency Agency Region 1 Office, for review. At a public meeting, the Board of Selectmen formally adopted the plan on September 23, 2019. The plan was then granted formal approval by FEMA on (date of FEMA approval).

Task 9: Create a Safe & Resilient Community: The committee discussed the mitigation actions in the Action Plan and the ways in which the implementation of the actions will be beneficial to the community. Annual reviews of the Action Plan by the committee are needed to maintain the timeframes identified for completion of activities. Incorporation of the plan into other land use plans and the Capital Improvement Plan help to ensure that the goals of the plan are met.

2018 and 2019 Public Committee Meetings

On the following dates, the Windham Hazard Mitigation Committee held committee meetings at the Windham Fire Department and the Community Development center: November 2nd, 2018, December 7th, 2018, and February 1st, 2019. Committee meetings were made public and posted in a minimum of two public places as required by New Hampshire state law for public meetings.

Minutes were kept for each meeting and each committee member received an e-mail that contained minutes of the previous meeting and an agenda. The minutes were available to the public. Copies of the meeting agendas, minutes, and attendance sheets are provided in Appendix F.

Coordination with Other Agencies and Individuals

The Hazard Mitigation Committee members and their respective town departments contributed to the contents and reviewed the Plan drafts. Departments represented were:

- Board of Selectmen
- Planning Board
- Building Department
- Fire Department
- Planning and Zoning Department
- Town Administration
- Police
- Windham public schools

Fire Chief, Thomas McPherson contacted neighboring communities, agencies, businesses, academia, nonprofits and other interested parties for their review and comment on the draft Plan during November 2018.

Public & Stakeholder Involvement

Public and stakeholder involvement was stressed throughout the process. A list of stakeholders consisting of various public officials and emergency response personnel was developed. This group was emailed all public meeting agendas and review materials with invitations to participate. Over the course of three meetings, a total of eleven people representing Windham participated in the review and development of the Plan.

The town of Windham posted agendas and announcements of the Windham Hazard Mitigation meetings on the town website as well as in the Town Offices.

Hazard Mitigation Goals and Objectives of the State of New Hampshire

The *State of New Hampshire Natural Hazards Mitigation Plan*, which was prepared and is maintained by the New Hampshire Homeland Security and Emergency Management (NH HSEM), sets forth the following related to overall hazard mitigation goals and objectives for the State of New Hampshire:

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

The Windham Hazard Mitigation Committee adopted these goals derived from the 2018 State of New Hampshire Hazard Mitigation Plan, for the Town of Windham, New Hampshire, at the November 2, 2018 hazard mitigation committee meeting

SECTION II. COMMUNITY PROFILE

Community Description

The Town of Windham is located in southern New Hampshire in Rockingham County. Windham is bordered by the towns of Derry, Londonderry, Salem, Hudson and Pelham, as seen below in Figure 1. The Town was incorporated in 1742 and had a recorded population of 13,592 in the 2010 US Census[1]. According to the American Community Survey, as of 2017, the population has grown to 14,562. The Town encompasses 27.9 square miles, which includes 1.1 square miles of water.

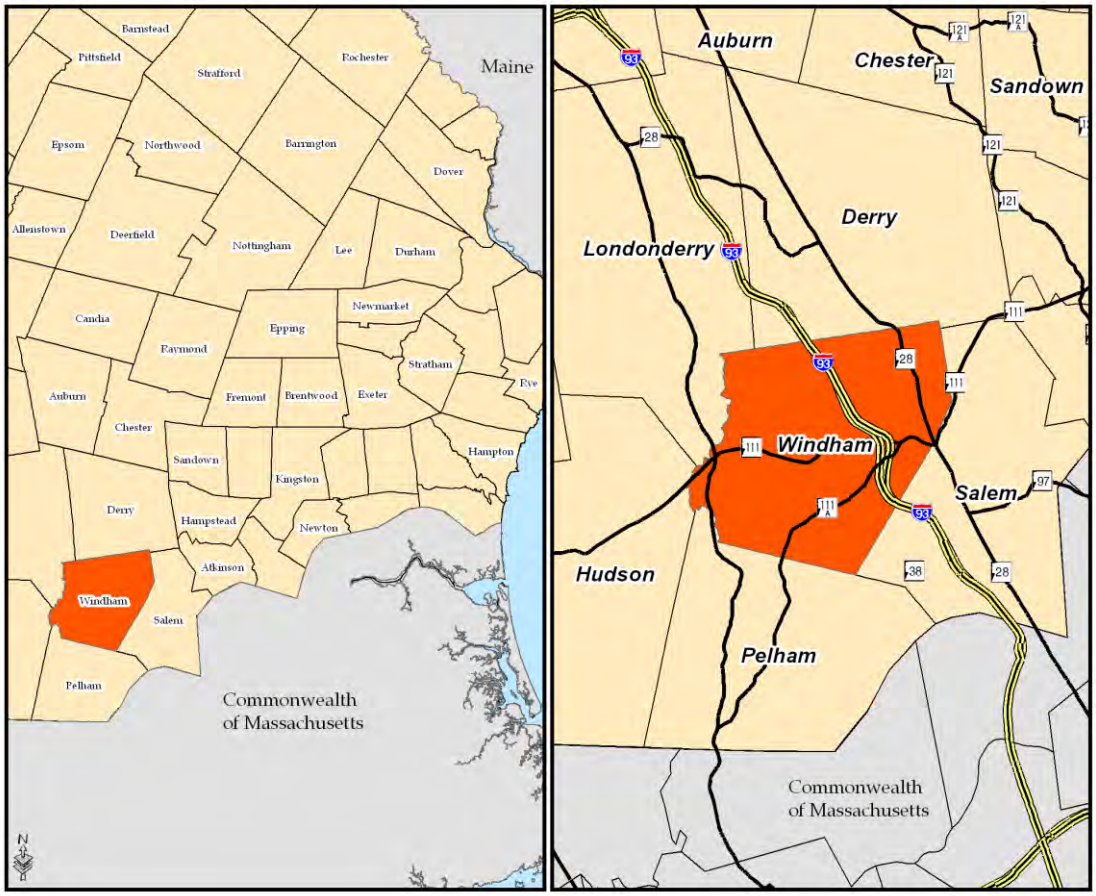


Figure 1: Map of Windham, NH

[1] Economic & Labor Market Information Bureau, NH Employment Security

Natural Features

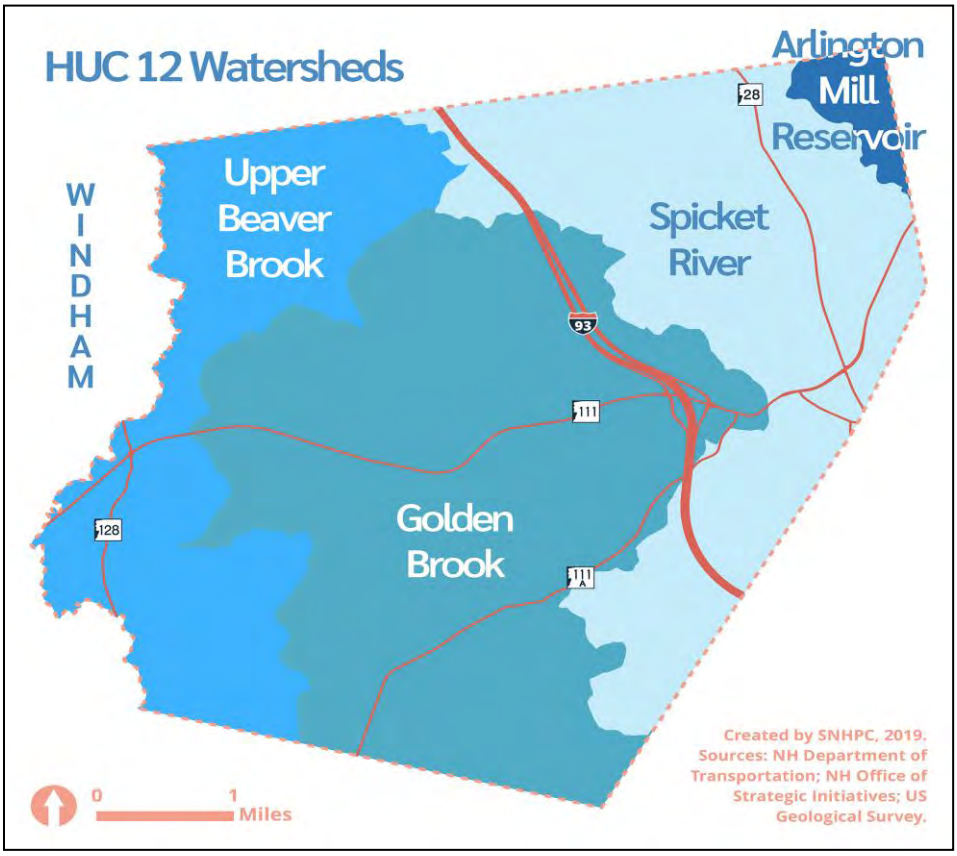


Figure 2: Watersheds in Windham, NH

Windham lies within two sub-watersheds, the Beaver Brook watershed and the Spickett River watershed. Both sub-watersheds are part of the Merrimack River Basin. Beaver Brook originates in the town of Chester and encompasses approximately 94.6 square miles. The Spickett River also originates in Chester and encompasses approximately 77.5 square miles. Within Windham, the Beaver Brook watershed encompasses approximately 9 square miles and the Spickett River watershed encompasses approximately 18.7 square miles. Figures 2 and 3 highlight watersheds and wetlands in Windham.

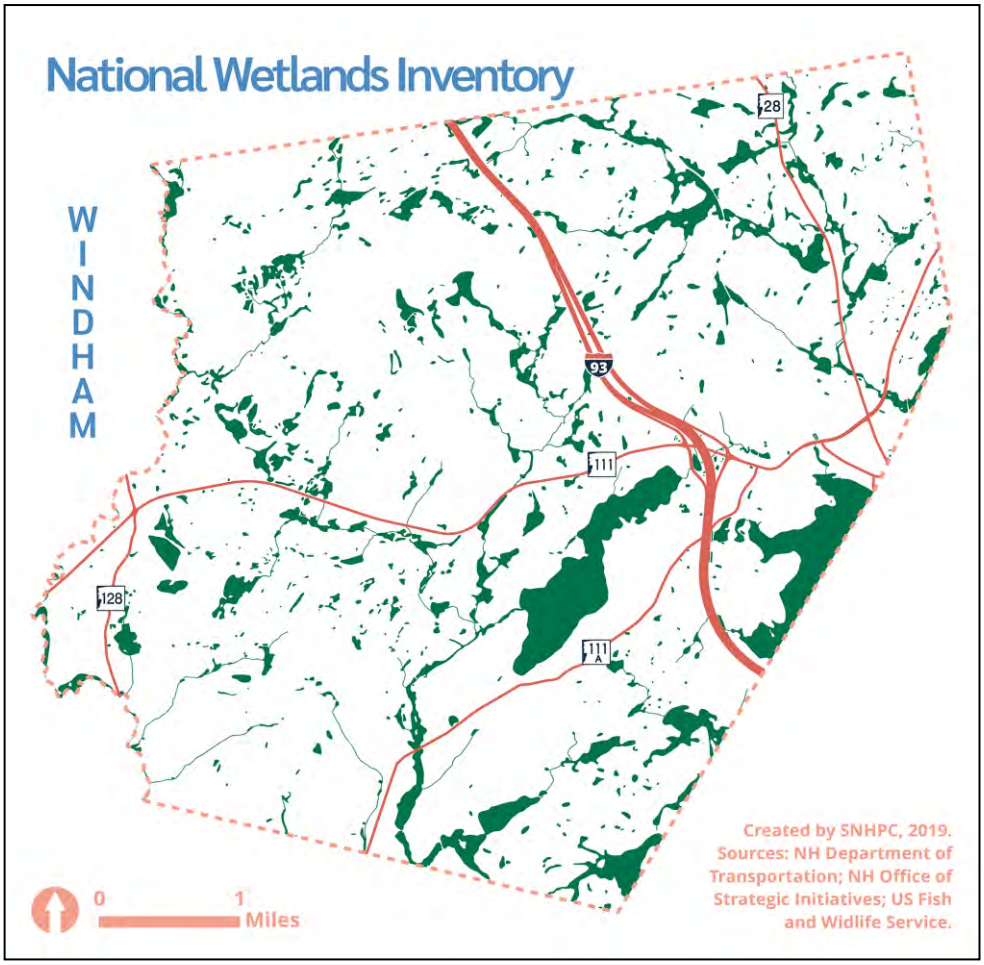


Figure 3: Wetlands Inventory, Windham, NH

For this Plan, Flood zones 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 Windham are shown below in Figure 4. Windham 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, regarding building within floodplains, contamination may result from flood damage to septic systems.

Windham has adopted several regulations to protect water resources, including a Floodplain Ordinance, an Aquifer Protection District Ordinance, a Wetlands and Watershed Protection Ordinance, and the Cobbetts Pond and Canobie Lake Watershed Protection Ordinance.

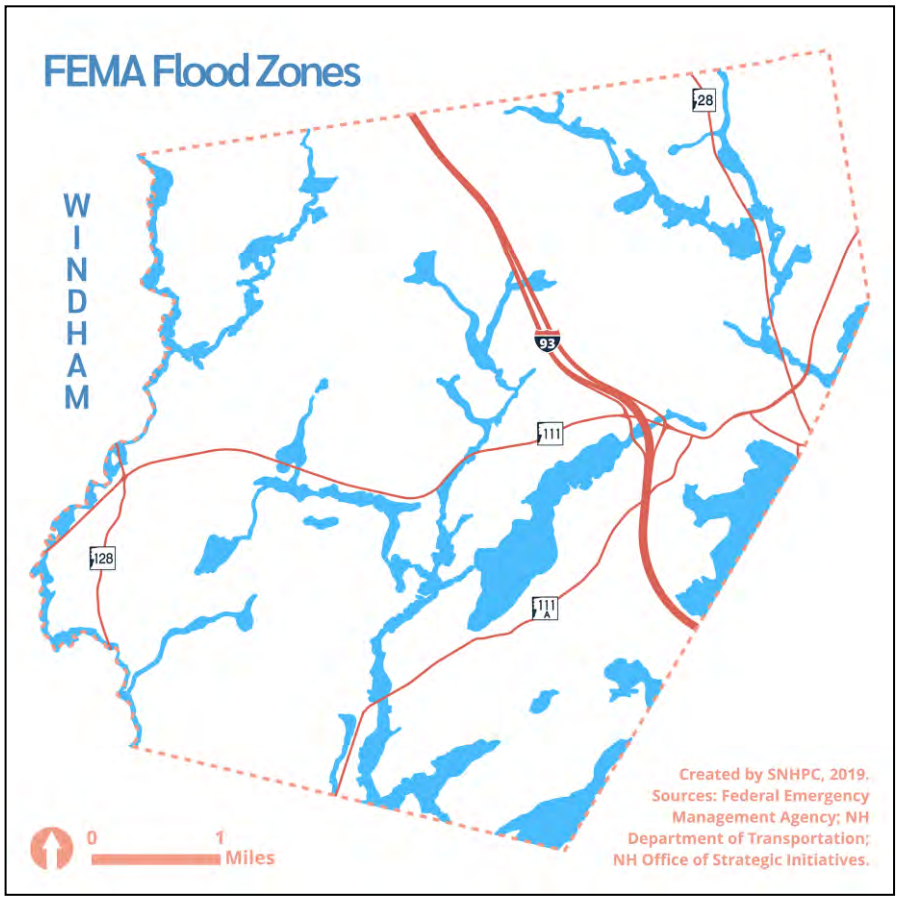


Figure 4: FEMA Flood Zones, Windham, NH

Current and Future Development Trends

Current Development is predicated on the Town of Windham Zoning Ordinance. The Town has adopted several distinct zoning districts to encourage residential and commercial growth and development in appropriate areas while protecting natural resources. Development trends in Windham include a predominance of residential development with a mix of commercial and industrial development. Since the Plan was last updated in 2013, Windham has experienced growth primarily in residential development. Since 2013, the town has issued 293 residential building permits. The town's development has had no impact on the degree to which it is vulnerable to hazards, and the vulnerability to hazards has largely remained the same.

SECTION III. HAZARD IDENTIFICATION

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 Windham is prone to several types of natural, technological and human-caused hazards, which can be broken down into the following:

Natural hazards:

- Flooding,
- Hurricanes or other high-wind events,
- Severe winter weather
- Wildfires
- Earthquakes
- Extreme temperatures

Technical hazards:

- Aging infrastructure
- Dam failure
- Hazardous materials
- Known and emerging contaminates
- Long-term utility outages

Human-caused hazards:

- Cyber events
- Mass casualty incidents
- Terrorism/violence incidents
- Transport accidents

Natural hazards that are included in the State's 2018 Hazard Mitigation Plan but are not included in this Plan include: coastal flooding, landslide, subsidence, radiological events, avalanches, solar storms/space weather, and conflagration. Because subsidence, avalanches and infectious disease are rated by the State as having low to no risk in Rockingham County, they were left out of the Plan but specific statewide events are listed in *table 4* if applicable. Windham has had no record of landslides or Radon-related events to the Committee's knowledge, so these hazards were also excluded. When the Plan is revised and updated in the future, possible inclusion of these hazards will be reevaluated. The 2013 Plan update excluded extreme temperatures, but the committee decided to include it in this 2019 update. The 2019 plan update review committee assessed the 2013 plan and decided that all hazards as defined within are still relevant for the 2019 update.

Hazard Definitions

Flooding

Inland flooding is generally defined as a high flow, overflow, or inundation by water, which causes or threatens damage.[2] Flooding results from the overflow of rivers, their tributaries, and streams throughout the State, primarily from high precipitation events. Flash flooding is defined as a flow with a rapid rise in water level and extreme velocities in a river or stream, beginning within six hours of the causative event (e.g., intense rainfall, dam failure, ice jam). Ongoing flooding can intensify to flash flooding in cases where intense rainfall results in a rapid surge of rising flood waters.[3] Because of New Hampshire's steep terrain in the headwaters of watersheds, particularly outside of the coastal plain, flash floods also lead to riverbank and bed erosion. Extreme precipitation events in recent years, such as Tropical Storm Irene, have led to buildings on the edges of streambanks becoming at risk to river erosion, or culvert failures.[4]

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. The flood hazard areas that are identified in Windham are defined as follows (according to FEMA's website: http://www.fema.gov/fhm/fq_term.shtm)

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no Base Flood Elevations or depths are shown within this zone. Mandatory flood insurance purchase requirements apply.

Zones AE and A1-A30 are the flood insurance rate zones that correspond to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. In most instances, Base Flood Elevations (BFEs) derived from the detailed hydraulic analyses are shown at selected intervals within this zone. Mandatory flood insurance purchase requirements apply.

Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. The depth should be averaged along the cross section and then along the direction of flow to determine the extent of the zone.

[2] http://w1.weather.gov/glossary/index.php?letter=f
[3] https://www.fema.gov/what-mitigation/federal-insurance-mitigation-administration
[4] State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018

Average flood depths derived from the detailed hydraulic analyses are shown within this zone. In addition, alluvial fan flood hazards are shown as Zone AO on the FIRM. Mandatory flood insurance purchase requirements apply.

Zone X is the flood insurance rate zones that correspond to areas outside the 100-year floodplains, areas of 100-year sheet flow flooding where average depths are less than 1 foot, areas of 100-year stream flooding where the contributing drainage area is less than 1 square mile, or areas protected from the 100-year flood by levees. No BFEs or depths are shown within this zone.

Erosion and Mudslides

The New Hampshire Department of Environmental Services (NHDES) defines erosion as "the process in which a material is worn away by a stream of liquid (water) or air, often due to the presence of abrasive particles in the stream (NHDES Watershed Management Bureau)." As it relates to this Plan, erosion is the gradual or rapid wearing away of stream banks or shores, due to prevailing winds, natural water movement, and more catastrophic events. Additional causes of erosion are removal of vegetation and soil disturbance. Riparian construction sites are one non-natural contributor (NHDES Shoreland Protection). Stream bank erosion may eventually result in mudslides.
In Windham, areas that are susceptible to Erosion and mudslides are Old Industrial Way, London Bridge (historical stone bridge) and Governor Dinsmore Road Bridge (RR trestle).

Rapid Snowpack Melt

The State's climate and mountainous terrain increases the susceptibility to flooding as a result of the seasonal melting of the snowpack. A warm and/or rainy spring can exacerbate this risk as the snow melts faster than it can be absorbed into the groundwater or evaporated. The snowmelt can also flow overland into receiving streams and rivers, causing them to rapidly rise, and in some cases, overflow their banks.[5] Streams, especially those located in the headwaters and watersheds, may experience erosion and scour. Sediment that is eroded and scoured from stream beds and banks can then be deposited at locations where the stream flow decreases, or upstream of undersized culverts,
enhancing future flood risks.[6]

Dam Breach and Failure

Dam Failure is defined as the sudden, rapid, and uncontrolled release of impounded water.[7]

[5] http://www.floodsafety.noaa.gov/states/nh-flood.shtml
[6] State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018
[7] National Oceanic and Atmospheric Administration (NOAA), Hydrological Terminology (2014)

Debris-Impacted Infrastructure & Ice Jams

A backup of water into areas adjacent floodplain can occur when a river or stream is blocked by the build-up of ice[8]. Ice in waterways form naturally from the freezing of water during the winter months melt and/or storm water may then encounter these ice formations causing them to break up and move down the river. Ice may apply lateral and/or vertical force on structures and infrastructure. Moving ice may scour abutments and riverbanks, and ice may also create temporary dams. These dams may create flood hazard conditions where no flood hazard previously existed.[9]

High Wind Events

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[10] is a tropical cyclone during 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.

Tornadoes

A tornado is a narrow, violently rotating column of air that extends from the base of a thunderstorm to the ground. Because wind is invisible, it is hard to see a tornado unless it forms a condensation funnel made up of water droplets, dust and debris. Tornadoes are the most violent of all atmospheric storms.[11]

Lightning

Lightning is a visible electric discharge produced by a thunderstorm. The discharge may occur within or between clouds, between a cloud and the air, between a cloud and the ground, or between the ground and a cloud[12].

Severe Winter Weather

Ice and snow events typically occur during the winter months and can cause loss of life, property damage and tree damage. The State of New Hampshire experiences four types of severe weather during the winter months, which usually bring snow, high winds, and/or rain depending on temperatures:

[8] FEMA (2016). Flood Risk Map: Rockingham County, New Hampshire:
[9] State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018
[10] The Saffir/Simpson Hurricane Scale can be viewed in Appendix C
[11] http://www.nssl.noaa.gov/education/svrwx101/tornadoes/
[12] http://www.lightningsafety.noaa.gov/science/science_thunder.htm

Heavy Snowstorms

In forecasts, the amount of snow that is expected to fall is expressed as a range of values, such as 10- 12". There can be considerable uncertainty regarding snowfall values during heavy snowstorms and phrases such as "…up to 20 inches" or "….12 inches or more" can be utilized. Heavy snow is generally defined as[13]:

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

Blizzard

A blizzard is a snowstorm with the following conditions that is expected to prevail for a period of 3 hours or longer[14]

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

Nor'Easter

A Nor'easter is a large cyclonic storm that tracks north/northeastward along the East Coast of North America. It is so named due to the northeasterly prevailing wind direction that occurs during the storm. While these storms may occur at any time of the year, they are most frequent and severe during the months of September through April. Nor'easters usually develop off the east coast between Georgia and New Jersey, travel northeastward, and intensify in the New England region. Nor'easters nearly always bring precipitation in the form of heavy rain and/or snow, as well as gale force winds, rough seas, and coastal flooding[15]

Ice Storms

Ice storms typically occur with warm frontal boundaries, where warm air rises and over a shallow mass of cold air near the earth's surface. When snow falls from clouds near just north of the warm frontal boundary, it will fall through the deep warm layer aloft first and melt completely into a liquid water droplet. As it passes through the shallow cold layer near the surface, the water droplet cools to the point of being supercooled (a liquid raindrop that remains a liquid at the freezing point). When these supercooled water droplets contact freezing surfaces on the ground, such as streets and walkways, they freeze on contact forming layers of ice. This process of freezing rain, when persistent over a long period of time, will form layers that may exceed over an inch thick in extreme cases.[16]

[13] http://forecast.weather.gov/glossary.php?word=HEAVY%20SNOW
[14] http://w1.weather.gov/glossary/index.php?letter=b
[15] http://www.nws.noaa.gov/om/winter/noreaster.shtml
[16] State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018, 127

Wildfire
A wildfire is any non-structural fire, other than prescribed fire, that occurs in the Wildland. Wildland here is defined as consisting of vegetation or natural fuels[17]. Wildfires can be referred to as brushfires, wildland fires, or grass fires depending on the location and what is burning.

Earthquakes
The United States Geological Survey (USGS) defines an earthquake as a sudden slip on a fault. Tectonic plates are always slowly moving but can get stuck on edges due to friction. When the stress on the plates overcomes the friction, there is an earthquake that releases an energy wave that travels through the earth's crust[18]. The earthquake hazard is anything associated with an earthquake that may affect the normal activities of people; such as, surface faulting, ground shaking, landslides, tsunamis, structural damage, etc.[19]

Extreme Temperatures:
Extreme temperatures are a period of prolonged and/or excessive hot or cold that presents a danger to human health and life.[20]

Aging Infrastructure:
The 2018 State of New Hampshire Hazard Mitigation Plan defines aging infrastructure as the continued regression of the State's physical systems including, but not limited to roads and bridges, culverts, utilities, water, and sewage. The State Plan ranks the entire State as vulnerable to aging infrastructure (2018 State Hazard Mitigation Plan).

Hazardous Materials:
A hazardous material is any item or agent (biological, chemical, radiological, and/or physical), which has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors.[21]

Known and Emerging Contaminates:
The 2018 State Hazard Mitigation Plan categorizes drinking water contaminates into the following categories:

- **Naturally occurring contaminates**:
  Contaminants associated with the geology in a given region such as arsenic, lead, manganese and uranium
- **Man-Made Contaminates**:
  Man-made chemicals that have been historically recognized to impact groundwater and surface water sources of drinking water including volatile organic compounds,

[17] https://www.nwcg.gov/glossary/a-z#letter_w
[18] https://www2.usgs.gov/faq/categories/9827/3343
[19] https://earthquake.usgs.gov/learn/glossary/?term=earthquake%20hazard
[20] State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018, 98
[21] https://www.ihmm.org/

pesticides, semi-volatile compounds, radionuclides, nitrates/nitrites, metals and radionuclides.

- **Emerging Contaminates**:
  chemicals that historically have not been monitored in drinking water due to the lack of laboratory capabilities to detect the compounds or a lack of knowledge about the use of certain compounds and their potential to cause human health impacts. Examples include poly and perfluoroalkyl substances, more commonly referred to as PFAS as well as Methyl Tertiary Butyl Ether (MtBE), which is a manufactured chemical used to increase the octane rating of gasoline (2018 State Hazard Mitigation Plan).

Long-Term Utility Outage:
A long-term utility outage is defined as a prolonged absence of any type of public utility that is caused by infrastructure failure, cyber-attack, supply depletion, distribution disruption, water source contamination, or a natural, human caused or technological disaster[22]

Cyber Event:
The Department of Homeland Security (DHS) defines a cyber incident as an event occurring on or conducted through a computer network that actually or imminently jeopardizes the confidentiality, integrity, or availability of computers, information or communications systems or networks, physical or virtual infrastructure controlled by computers or information systems, or information resident thereon.[23]

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

Terrorism/Violence:
The 2018 State Hazard Mitigation Plan defines terrorism as premeditated, politically motivated violence perpetrated against noncombatant targets by subnational groups or clandestine agents[24] which can be further subcategorized as either international or domestic terrorism.

[22] State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018, 165-174
[23] https://www.us-cert.gov/sites/default/files/ncirp/National_Cyber_Incident_Response_Plan.pdf
[24]Title 22 of the US Code, Section 2656f(d)

Transport Accident (Aviation, Rail, Tractor Trailer, etc.):
A transport accident is any accident that occurs during transportation. Specifically, for this Plan, it refers to an aviation, rail, shipping, tractor trailer, or vehicle accident.[25]

Profile of Past and Potential Hazards in Windham

As discussed above, the hazards that affect, or could potentially affect Windham, that were identified for designation in this Plan are broken down in to natural hazards (flooding, hurricanes-high wind events, severe winter weather, wildfire, earthquakes, extreme temperatures); technical hazards (aging infrastructure, dam failure, hazardous materials, known and emerging contaminates, long-term utility outage) and human-caused hazards (cyber events, mass casualty incidents, terrorism/violence, transport accidents). The hazard profiles below include:

1. A description of the of the hazard
2. The geographic location of each hazard (if applicable)
3. The extent of the hazard (e.g. magnitude or severity)
4. The probability of each hazard occurring in the Town of Windham,
5. Any past occurrences of the hazard in the Town (past occurrences of natural hazards were mapped if possible).

Some of the natural hazards have not occurred within the Town of Windham (within written memory), for these hazards, the Plan refers to a table of hazards that have occurred regionally and statewide (Table 4). Probability was defined as either high, medium, or low for a hazard event occurring in the Town of Windham, which can be defined as follows:

- **High probability**: An event occurring every 1-10 years
- **Medium probability**: An event occurring every 10-50 years
- **Low probability**: An event occurring every 50 years or greater

A. Natural Hazards

1. Inland Flooding

Description: Inland flooding events can be caused by hurricanes, 100-year floods, 500-year floods, debris-impacted infrastructure, erosion, mudslides, rapid snowpack melt, and dam breach and/or failure.

Location: Windham 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). Windham has several major flood zones: A, AE, AO, VE and X. These Zones are defined in the previous section. There are also several areas susceptible to flooding that are not

[25] State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018, 186

within these flood zones, these areas are described below and displayed on Map 2: FEMA Flood Zones with Building Footprints.

Extent: The extent of the flood zones can be seen in Maps 2 and 3: FEMA Flood Zones and Problem Flooding Areas. Map 2 utilizes FEMA flood zone data and Map 3 utilizes past problem flooding areas based on the New Hampshire Statewide Asset Data Exchange System (SADES).

Probability:
Medium to high probability for inland flooding to occur and cause damage in Windham.

Table 1: Probability of Flooding based on return interval

Flood Return Interval	Chance of Occurrence in Any Given Year
10-year	10%
50-year	2%
100-year	1%
500-year	0.2%

Past Occurrence: Flooding is a common hazard for the Town of Windham. Several locations were identified by the Committee as areas of chronic reoccurring flooding or high potential for future flooding. From 2006 to 2010 there have been four recorded floods in the region that fall between the 100-year – 500-year interval. For Rockingham County – specific flooding incidents, see table 4. There have been no significant inland flooding events in Windham since the last hazard mitigation plan update.

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 be able to buy, build or improve structures in the Special Flood Hazard areas, it is 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.

Flood damage is reduced by nearly $1 billion per year through partnerships with communities, the insurance industry, and the lending industry. Further, buildings constructed in compliance with NFIP building standards suffer approximately 80 percent less damage annually than those not built in compliance. Additionally, every $3 paid in flood insurance claims saves $1 in disaster assistance payments.

The NFIP is self-supporting for the average historical loss year, which means that operating expenses and flood insurance claims are not paid for by the taxpayer, but through premiums collected for flood insurance policies. The program has borrowing authority from the U.S. Treasury for times when losses are heavy; however, these loans are paid back with interest.

NFIP maps for the Town of Windham are available from FEMA's website:
https://msc.fema.gov/portal/home

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 2: Windham NFIP Policy and Loss Statistics

Policies in force	Insurance in Force	Number of Paid Losses (since 1978)	Total Losses Paid (Since 1978)
33	$7,927,200	3	$32,511.90

Source: FEMA Policy and claims database, as of September, 2018

Windham NFIP Repetitive Flooding Losses

Windham joined the Regular Program of the NFIP on April 1, 1980. As of September 2018, Windham has had no repetitive loss residential properties according to New Hampshire Office of Strategic Initiatives (NHOSI) 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.

Windham's Floodplain Management Program

Windham's Floodplain Management Program includes the following strategies as part of the Town's continued compliance with NFIP:

- The Town prepares and distributes informational news articles to local papers and on the Town's website on risks from flooding, preparing for floods, and floodplain rules and

regulations. The Town works with land development applicants through the Planning Board review process and the building permit process to ensure compliance with regulations. The Town also aids homeowners and property owners looking for floodplain information.

- The Town of Windham adopted a local Floodplain Development Ordinance, which includes regulations for new construction in Special Flood Hazard Areas (SFHA).
- The Town posts the community's current effective flood maps on the Town website and references the maps in the Zoning Ordinance. The date of the maps is May 17, 2005.
- Since 2013, the Town created a dedicated page on the Town's website to flooding and associated regulations and maps. The web page posts the regulations and maps to help property owners.

Potential Administrative Techniques to Minimize Flood Losses in Windham

A potential step in mitigating flood damage is participating in NFIP. Windham 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 Windham should review in order to ensure compliance 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.

2. Hurricanes-High Wind Events

Description: High wind events can include hurricanes, tornadoes, "Nor'-Easters," downbursts and lightning/thunderstorm events.

Location: For this Plan, high-wind events were considered to have an equal chance of affecting any part of the Town of Windham.

Extent:
Severe hurricanes reaching south-central New Hampshire in the late summer and early fall are the most dangerous of the coastal storms that pass through New England from the south. Tropical depressions are of hurricane force when winds reach 74 miles per hour according to the Saffir-Simpson Scale (Appendix B). Substantial damage may result from winds of this force. Potential effects of hurricane force winds include fallen trees, telephone poles, and power lines. Windham is located within Zone II hurricane-susceptible region (indicating a design wind speed of 160 mph)[26].

Tornadoes are measured based on the 3 second gust wind speed of the rotational winds using the Fujita Scale in coordination with what is now known as NOAA's Storm Prediction Center[27] (Appendix C). Between 1950 and 2010, there were ten known tornadoes in Rockingham County. Two of these were F0, two were F1, five were F2 (August 1951, July 1957, July 1961, May 2006 and July 2007), and one was a F3 (July 1953) (Tornado Project Online). These storms totaled approximately $358,000 in damages across the county[28]. 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[29].

Probability & Severity.
Medium to high probability for high-wind events to occur and cause damage in Windham.

Storm Event	Probability	Severity
Tornado/Downburst	Medium/High	Medium
Hurricane	Medium/High	High

Past Occurrence:

[26] "Understanding Your Risks, Identifying Hazards and Estimating Losses", FEMA
[27] http://www.spc.noaa.gov/efscale/
[28] NOAA National Climatic Data Center
[29] "Understanding Your Risks, Identifying Hazards and Estimating Losses", FEMA

Between the 1700's and 2012, 9 hurricanes have impacted the State of New Hampshire. The largest recorded hurricane to strike New Hampshire was the Great New England Hurricane of 1938, which caused $22 million (in 1938 dollars) in direct damage and killed 13 people. For a full list of high-wind events that have affected Rockingham County, see table 4. There have been no significant hurricane/high wind events in Windham since the last plan update.

3. Severe Winter Weather

Description:
The State of New Hampshire experiences four types of severe weather during the winter months: Heavy snow, blizzards, nor'easters and ice storms.

A heavy snowstorm is generally considered to be one that deposits four or more inches of snow (or 10 cm) in a twelve-hour period. A blizzard is a violent snowstorm with winds blowing at a minimum speed of 35 miles (56 kilometers) per hour and visibility of less than one-quarter mile (400 meters) for three hours. A nor'easter is a large weather system traveling from south to north, passing along the coast. As the storm's intensity increases, the resulting counterclockwise winds which impact the coast and inland areas in a Northeasterly direction. Winds from a Nor'easter can meet or exceed hurricane force winds[30]. Ice storms occur due to persistent freezing rain, which may form thick layers of ice on the Earth's surface.

For the intents of this Plan, heavy snowstorms include all storms with four or more inches of snow in a 12-hour period, including all blizzards and nor'easters with large snow accumulation.

Location: For this plan update, heavy snow, blizzards, nor'easters and ice storms were considered to have an equal chance of affecting any part of the Town of Windham.

Extent: NOAA has developed the Regional Snowfall Index (RSI) which is a snowfall scale that uses area of snowfall amount of snowfall, and population to attempt to quantify the societal impacts of a snowstorm.[31]

Category	RSI Value	Description	Approximate % of Storms
0	0-1	N/A	54%
1	1-3	Notable	25%
2	3-6	Significant	13%
3	6-10	Major	5%
4	10-18	Crippling	2%
5	18+	Extreme	1%

[30] 2013 New Hampshire State Hazard Mitigation Plan
[31] https://www.ncdc.noaa.gov/snow-and-ice/rsi/overview

Past occurrences.
Since 2000, the Federal Emergency Management Agency declared 11 snowstorm related Emergency Declarations for Rockingham County. The following is a table of all snowstorm related declared storms from 2000 to the present. A full list of severe winter weather events can be found in Table 4.

Disaster Type	Date	Declared County/Area
Severe winter storm and snowstorm (DR-4371)	3/13/2018	Rockingham
Severe winter storm and snowstorm (DR-4209)	1/26/2015	Rockingham
Severe winter storm and snowstorm (DR-4105)	2/8/2013	Rockingham
Severe winter storm and snowstorm (DR-4049)	10/29/2011	Rockingham
Severe winter storm (DR-1892)	2/23/2010	Rockingham
Severe winter storm (DR-1812)	12/11/2008	Rockingham
Severe winter storm (EM-3297)	12/11/2008	Rockingham
Record snowfall (EM-3211)	3/11/2005	Rockingham
Record and/or near record snowfall (EM-3207)	1/22/2005	Rockingham
Record snowfall (EM-3177)	2/17/2003	Rockingham
Record snowfall (EM-3166)	3/5/2001	Rockingham

Probability: High probability for heavy snowstorms, blizzards, and nor'easters to occur and cause damage in Windham.

4. Wildfires

The following identified hazards are related to fires:

A. Wild Land fires

Description:
New Hampshire is a heavily forested across much of State, leading to an increased risk of wildfires. This risk is exacerbated during times of drought and after natural disasters, which lead to an unusual fuel build up (such as numerous downed trees or buildup of slash and underbrush). The proximity of many populated areas to the State's forested lands exposes these areas and their population to the potential impact of wildfire. Areas that abut and are near wildlands are referred to as being within the Wildland Urban Interface (WUI). The WUI is a zone where structures and other human developments

meet or intermingle with undeveloped wildlands. The WUI is any point where the fuel feeding a wildfire changes from natural (wildland) fuel to manmade (urban) fuel.[32]

Location:
The Committee did not identify any specific areas of Town at-risk for wildfires. A wildfire in the Town of Windham is unlikely, but if a fire were to occur the impact could be very damaging to neighborhoods with higher density residential development. Higher density residential developments are scattered throughout Windham.

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

- Acreage of the fire (size)
- Topography and landscape
- Amount of time required to extinguish the fire
- Environmental factors (drought or wind)
- Damages to urban infrastructure along the WUI, damages to utility infrastructure, or other severe environmental damages[33]

The Table below shows the National Wildfire Coordinating Group (NWCG) Size Fire Classification.

National Wildfire Coordinating Group (NWCG) Size Fire Classification	
Class A	1/4 acre or less
Class B	More than 1/4 acre, but less than 10 acres
Class C	10 acres or more, but less than 100 acres
Class D	100 acres or more, but less than 300 acres
Class E	300 acres or more, but less than 1,000 acres
Class F	1,000 acres or more, but less than 5,000 acres
Class G	5,000 acres or more

Past Occurrence:
In Windham, the outer edge of Town and the surrounding communities have a large portion of forested land and therefore vulnerable to wildfire, particularly during periods of drought. Fire suppression is provided through the hydrant system, cisterns, dry hydrants and sprinklers. However, access to Cobbetts Pond and Canobie Lake make fire suppression difficult. Castle Hill had a 46-acre fire in 2006 with no structures impacted. The Deer Leap Conservation area had a 30+ acre fire in the 1990s. There have been no wildland fires since the 2013 plan update.

[32] State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018, 149
[33] State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018, 154

Probability:
Medium probability for wild land fires to occur and cause damage in Windham.

5. Lightning

Description:
Lightning is a visible electric discharge produced by a thunderstorm. The discharge may occur within or between clouds, between a cloud and the air, between a cloud and the ground, or between the ground and a cloud.[34]

Location:
All areas of Windham are susceptible to damage caused by lightning. Higher elevations have an increased probability, including the cell towers located on Jenny's Hill.

Extent:
Lightning can be measured to determine how likely it may be for starting fires. Using a Level system of 1 to 6 corresponding with storm development and the number of lightning strikes, the Lightning Activity level (LAL) measures the magnitude of lightning strikes as displayed in the below table Lightning Activity Level (LAL)[35]

Level	**LAL Cloud and Storm Development**	**Cloud to Ground Strikes per 5 Minutes**	**Cloud to Ground Strikes per 15 Minutes**
LAL 1	No thunderstorms	n/a	n/a
LAL 2	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud to ground strikes in a =5-minute period.	1 to 5	1 to 8
LAL 3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a 5-minute period.	6 to 10	9 to 15
LAL 4	Scattered thunderstorms. Moderate rain is commonly produced. Lightning is frequent, 11 to 15 cloud to ground strikes in a 5-minute period.	11 to 15	16 to 25
LAL 5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 cloud to ground strikes in a 5-minute period.	>15	>25
LAL 6	Dry lightning (same as LAL 3 but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag Warning.	6 to 10	9 to 15

[34] http://www.lightningsafety.noaa.gov/science/science_thunder.htm
[35] State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018, 124

Past Occurrence:
Lightning occurrence is an annual event in Windham. Utilities and communications have been disrupted 3 times in a 9-year period. Five homes were struck by lightning on May 10th, 2007, one of which caught fire and was destroyed. Since the 2013 plan update, a home was struck by lightning in October of 2018 causing fire and significant damage.

Probability:
Moderate probability for a lightning strike to occur and cause damage in Windham

6. Earthquakes

Description:
The United States Geological Survey (USGS) defines an earthquake as a sudden slip on a fault. Tectonic plates are always slowly moving but can get stuck on edges due to friction. When the stress on the plates overcomes the friction, there is an earthquake that releases an energy wave that travels through the earth's crust[36]. The earthquake hazard is anything associated with an earthquake that may affect the normal activities of people; such as, surface faulting, ground shaking, landslides, tsunamis, structural damage, etc.

New Hampshire is an area of moderate seismic hazard. This means that the State could experience large (6.5-7.0 magnitude) earthquakes, but they are not likely to occur as frequently as in a high hazard area like California. The State typically experiences one or two earthquakes per year registering magnitude 2.0 to 3.5 and numerous other smaller ones[37]

Location:
All areas of Windham are potentially at risk for property damage and loss of life due to earthquakes.

Extent:
There are two primary ways in which earthquakes are measured, magnitude (the size of the earthquake) and intensity (measure of the shaking and damage, which can vary from location to location). Magnitude is measured in the Moment Magnitude scale (based off the obsolete Richter scale). The Modified Mercalli Intensity (MMI) classifies the perceived feeling of the earthquake (Appendix D). One of New England's more notable seismic zones runs from the Ossipee Mountain area of New Hampshire, through the Auburn area, and continues south toward Boston, Massachusetts. This area has a mean return time of 408 years for a 6.0 Richter scale earthquake or a 39 percent

[36] https://www2.usgs.gov/faq/categories/9827/3343
[37] State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018, 90

probability of occurrence in 200 years. Additionally, for a 6.5 Richter scale quake, there is a mean return time of 1,060 years or a 17 percent probability of occurrence in 200 years (Pulli). When New England is generalized for earthquake probability estimation, the risk increases from the specific hazard zone noted above. For New England there is an estimated return time of every 10 years for an earthquake with a 4.6 Richter scale magnitude and 1000 years for 7.0 magnitude.[38]

Past Occurrences:
From 1728 to 1989, there were 270 earthquakes in New Hampshire. This is approximately one quake per year. There were six quakes over 4.0 on the Richter scale during the 1900s (Ibid 39-42). The most recent earthquake recorded in New Hampshire was on January 3, 2011, 20 miles NNW of Laconia, New Hampshire, with a magnitude of 2.5 on the Richter scale (USGS Earthquake Hazards Program). A list of earthquakes that have affected the region can be found in table 4. There have been no earthquakes in the town of Windham since the last plan update.

Probability:
The committee ranked earthquakes as having a Low probability to occur and cause damage in Windham.

7. Drought

Description:
A drought is the absence of water in a region that occurs slowly due to below-average precipitation over an extended period, resulting in low stream flows, low surface water, and low groundwater levels[39]

New Hampshire breaks the State into five Drought Management Areas: one in the north; one across the central region; and three along the southern portion of the State. Federal agencies have coordinated to develop the National Drought Monitor which classifies the duration and severity of the drought using precipitation, stream flow, and soil moisture data coupled with information provided on a weekly basis from local officials. The New Hampshire Drought Management Team, whose efforts are coordinated by the NH DES, utilizes these maps to help determine which areas are hit the hardest. NH DES also maintains a "Situation Summary" where precipitation, stream flow, groundwater level, lake level and fire danger data from all over the state can be accessed to assess if areas in New Hampshire are being impacted by drought.

[38] State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018, 43
[39] https://www.des.nh.gov/organization/divisions/water/dam/drought/index.htm

Location:
All areas of the town of Windham are at risk for damage caused by a drought.

Extent:
The severity of a drought is assessed using the US Drought Monitor's intensity scale.

	WATCH D0 Abnormally Dry	ALERT D1 Moderate	WARNING D2 Severe	EMERGENCY D3 Extreme	DISASTER D4 Exceptional
Conditions to be used by NH Drought Management Team as basis for recommendations to the US Drought Monitor					
PRECIPITATION 1-month SPI 3-month SPI 6-month SPI 12-month SPI	<0.0 Not Applicable Not Applicable Not Applicable	Not Applicable <0.0 Not Applicable Not Applicable	Not Applicable <-1.0 Not Applicable Not Applicable	Not Applicable Not Applicable <-1.0 Not Applicable	Not Applicable Not Applicable Not Applicable <-1.0
STREAMFLOW 28-day streamflow 65% normal	Up to 1 Month	1-3 Months	3-6 Months	6-9 Months	>9Months
PALMER INDEX PDSI	Not Applicable	<0.0	<-1.0	<-2.0	<-3.0
GROUNDWATER	Not Applicable	Monthly Levels Drop Below Mean	Monthly Levels Persist Below Monthly Mean		Not Quantified

Drought Management Parameters, NHDES Drought Management Plan

Past Occurrences:
Significant historical occurrences of drought and their associated impacts for the State of New Hampshire can be found in table 4. In 2016 an extreme drought was declared for the State of New Hampshire, which lasted 47 weeks and affected private wells and water systems in the Town of Windham.

Impacts: Droughts can have severe economic, environmental and social impacts on a community. Examples of potential impacts include:

- Destruction of crops
- Farmers spending more money on water and feed for animals
- Loss or destruction of fish and wildlife habitats
- More frequent wildfires
- Health problems associated with poor water quality, dust or pollen
- Loss of life

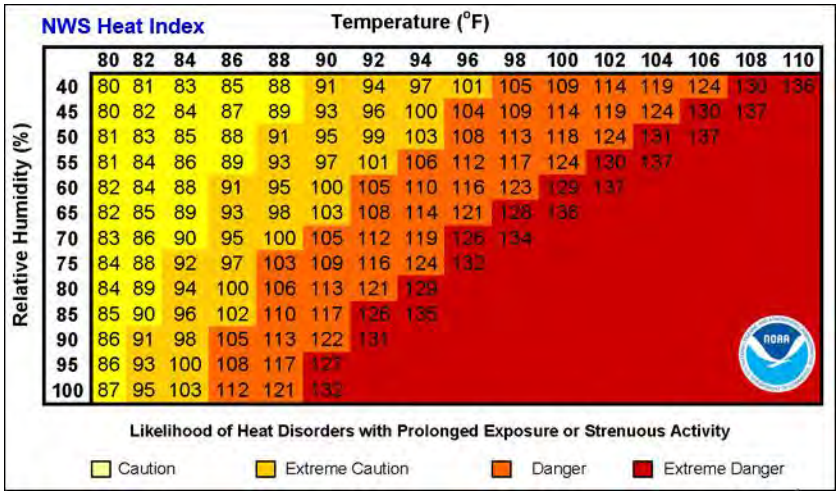
Probability:
Low probability for drought to occur and cause damage in Windham.

8. Extreme Temperatures

A. Extreme Heat

Description:

Extreme Heat events occur as a result of above normal temperatures, which often coincide with high relative humidity, that increase the likelihood of heat disorders with prolonged exposure or strenuous activity. This risk comes from the heat and humidity preventing the human body from adequately cooling itself using natural methods; this can result in heat disorders and, if untreated, unconsciousness and eventually death. Heat related disorders include heat cramps, heat exhaustion, and heat stroke.103 Populations at risk, such as the young and elderly, are more likely to experience a heat related disorder during a heat event.[40] NOAA's National Weather Service has prepared the following Heat Index identifying likelihood of heat disorders under prolonged exposure or strenuous activity.



Source: NOAA

Location:

All areas of Windham are at risk for damage caused by extreme heat.

Probability:

Medium probability for extreme heat to occur and cause damage in Windham.

Past Occurrences:

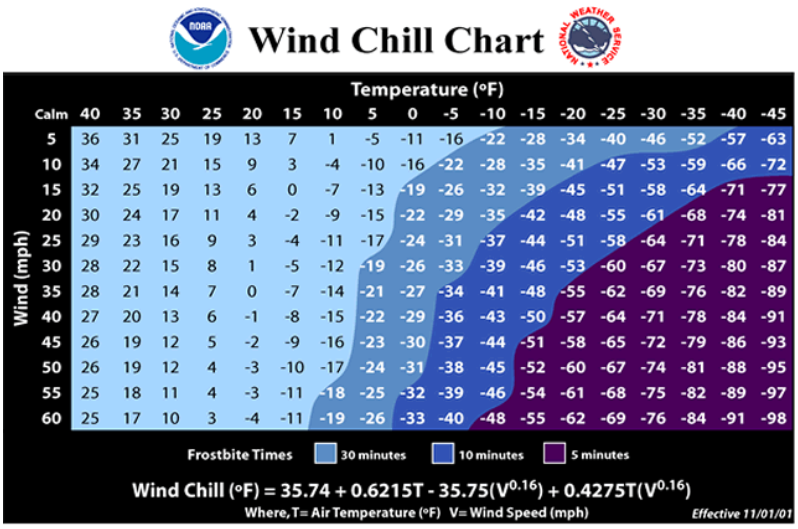
Significant occurrences of extreme heat in the State of New Hampshire and Rockingham County can be found in Table 4.

[40] State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018, 100

B. Extreme Cold

Description:

Extreme Cold events occur during meteorological cold waves, also known as cold snaps that are caused by the southern transport of arctic airmasses into the Northeast. These events are most common in winter months and increase the likelihood of cold disorders in humans and animals that have prolonged exposure to low ambient temperatures. This effect is exacerbated when there are winds present that effectively lower the temperature that is perceived by the human body, known as the wind chill. The risk comes from when the body is losing heat faster than it can produce it. Wind acts to carry heat away from the body, therefore amplifying the perceived temperature by the human body and reducing the body's core temperature. Cold disorders can include frostbite and hypothermia.[41] NOAA's National Weather Service has prepared the following windchill chart for calculating the dangers from winter winds and freezing temperature.



SOURCE: NOAA

Location:

All areas of Windham are at risk for caused by extreme cold.

Probability:

Medium probability for extreme cold to occur and cause damage in Windham.

[41] State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018

Past Occurrences:
Significant occurrences of extreme cold in the State of New Hampshire and Rockingham County can be found in Table 4.

B. Technical Hazards

1. Aging Infrastructure

Description:
Similar to states throughout the Nation, New Hampshire suffers from Aging Infrastructure. The American Society of Civil Engineers released it's 2017 report card bestowing the State with a C – rating overall[42]. 175 The report further identifies that the increase in annual number of vehicle miles traveled has led to more rapid deterioration of roads and bridges. The average lifespan for a bridge is around fifty years, and the current average age of state-owned bridges in New Hampshire is 52-56 years .[43]

The State's dams and wastewater infrastrucure are equally weakening. In 2015, a sinkhole on I-93 North caused major traffic delays in Concord, and in 2016, a water main break in Manchester left a huge hole and caused flooding on Bridge Street[44].

Probability:
Medium risk that aging infrastructure will cause damage in the Town of Windham

2. Dam Failure

Description:
The New Hampshire Department of Environmental Services (NHDES), through its Dam Bureau, is responsible for the regulation of the State's dams to ensure that they are constructed, maintained, and operated in a manner to promote public safety. This is accomplished through the review, approval, and permitting of plans, specifications for the construction and reconstruction of dams, as well as the regular inspection of all dams that pose a hazard to downstream lives or property.[45]

Location:
Areas at risk in Windham include those areas downstream of South Road Dam in Londonderry, and Golden Brook Dam, Kendall Pond Dam, Foster Pond, Anderson Road Dam and Seavey Pond Dam in Windham.

Extent:
Within the State of New Hampshire dams are categorized into one of four classifications, which are differentiated by the degree of potential damages that a

[42] https://www.infrastructurereportcard.org/state-item/new-hampshire/
[43] State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018, 156
[44] http://nhpr.org/post/series-new-hampshires-aging-underfunded-infrastructure#stream/0
[45] State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018, 159

failure of the dam is expected to cause. The classifications are designated as Non-Menace, Low Hazard, Significant Hazard, and High Hazard[46] (Appendix A). The South Road Dam is a dam that has significant hazard potential because it is in a location and of a size that failure or mismanagement of the dam would result in major economic loss to structures or property. Impacts could include structural damage to a Class I or Class II road which could render the road impassable or interrupt public safety services; damage to a public water system which takes longer than 48 hours to repair; the release of liquid industrial, agricultural, or commercial wastes, septic, sewage or contaminated sediments if the storage capacity is 2-acres or more.

Past Occurrence**:** There have been no occurrences of dam failure in the Town of Windham since the last plan update.
Privately owned Seavey Pond Dam collapsed in 2006 due to heavy rains and flooding and has since been repaired. Kendall Pond Dam also caused damage in the 2006 flood event. There have been no dam failures since the last plan update.

Probability:
Low probability that a dam will fail and cause damage in Windham.

3. Hazardous Materials

Description:
A hazardous material is any item or agent (biological, chemical, radiological, and/or physical), which has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors.[47]

Hazardous Materials continue to evolve as new chemical formulas are created. This requires constant oversight to ensure our first responders are educated on the new chemicals, their characteristics and how to respond to incidents involving them. With the continuing development of new alternative fuels, we have to adapt to new fire suppression methods for these hazardous materials due to existing fire suppression methods being ineffective. New methods for illegal drug production have increased the potential for fires caused by reactivity between the different hazardous materials involved in the process. Additionally, the current opioid crisis impacting the State has resulted in the creation and continual need for training emergency responders in the appropriate and safe handling of potentially lethal substances such as Fentanyl.[48]

Location:
Areas at risk in Windham include properties and natural resources surrounding major highways. The widening and expansion of Interstate 93 will increase traffic volumes and

[46] State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018, 160
[47] https://www.ihmm.org/
[48] State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018, 163

will potentially increase the number of traveling hazardous materials on the highway; potentially increasing the town's exposure to hazardous materials-related incidents.

Probability:
Medium probability for hazardous materials – related incidents to cause damage in the Town of Windham

Past Occurrences:
The committee is not aware of any previous hazardous materials-related incidents in the town of Windham.

4. **Known and Emerging Contaminates**

Description:
The NHDES estimates that more than 46 percent of New Hampshire residents rely on private wells for drinking water at home. While homes served by a public water supply benefit from federal regulations requiring regular testing for contaminants, it is the responsibility of private well owners to regularly test their water source and, if needed, treat their well water. Certain contaminants found in New Hampshire's groundwater occur naturally due to geologic or soil conditions, while others are associated with human activities. For example, arsenic and radon are common contaminants found in bedrock and, consequently, in well water. Potential human sources of contamination include leaking underground fuel tanks, chemical spills, closed landfills, road salt and other land uses.[49]

Emerging contaminates have been detected in surface and groundwater that are sources of drinking water in the State of New Hampshire, and citizen awareness of this issue has grown exponentially in recent years. The latest incidents in New Hampshire to garner widespread media and public attention were related to the discovery of poly and perfluoroalkyl substances, (PFAS), at unusually high levels in groundwater derived from one public water supply well at the Pease Tradeport in Newington, NH.

(PFAS) are a group of man-made chemicals that includes PFOA, PFOS, GenX, and many other chemicals. PFOA and PFOS have been the most extensively produced and studied of these chemicals. Both chemicals are very persistent in the environment and in the human body – meaning they don't break down and they can accumulate over time. There is evidence that exposure to PFAS can lead to adverse human health effects.[50]

[49] State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018, 165
[50] https://www.epa.gov/pfas/basic-information-pfas

Location:
The drinking water for the entire town of Windham is potentially at risk for natural and manmade contaminates.

Extent:
There is no universal standard for all types of emerging contaminates; however, environmental services agencies typically measure the presence of chemicals in water sources in parts per billion or trillion— ppb and ppt, respectively. Safe drinking water thresholds for many chemicals are set by either the EPA or NHDES to protect human health; however, new emerging contaminates will require scientific study to determine what level, if any, is safe for human consumption[51].

Past Occurrences:
There have been no known occurrences of contaminates found in drinking water in the town of Windham, but due to the increased prevalence of this hazard throughout the State, the committee decided to include the hazard in the 2019 plan update.

Probability:
High probability for known and emerging contaminates to adversely impact health and well-being in the Town of Windham

5. Long Term Utility Outage

Description:
Utility outages in the State of New Hampshire are often thought of as being power outages and typically are short lived. That said, the State has experienced and continues to be at risk for long-term utility outages. Types of public utilities that are common in the State can be broken down in four general categories, listed below:

- Power/Electricity: Bio gas, coal, hydroelectric, nuclear, solid waste, wind, geothermal and solar
- Heat/Fuel: Natural gas, propane, heating oil, kerosene, and wood
- Water Supply: Public water districts, private wells, lakes, ponds, rivers, and streams
- Communications: Internet, cable (fiber optic lines), land lines (both fiber optic and copper lines), and satellite.[52]

Location:
All areas of Windham are susceptible to long term utility outage.

[51] State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018
[52] State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018, 170

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

- Number of customers without power, services, fuel, cable/internet, etc.
- Size of the area experiencing an outage
- How long customers have been without a utility and how long they can expect to be without that resource
- Whether or not local and State resources were completely expended, requiring federal assistance
- Extent of cascading impacts

An event is typically referred to after the fact as the greatest extent experienced, i.e. the greatest number of customers without power throughout the incident (2018 New Hampshire Hazard Mitigation Plan).

Past Occurrences:
In 2014 there was a severe winter storm that caused 217,000 power outages across the state. It was the 5th Largest power outage event in New Hampshire history. There have been no power outages specific to the Town of Windham since the last plan update.

Probability:
Medium probability for a long-term utility outage to occur and cause damage in the Town of Windham

C. Human-Caused Hazards

1. Cyber Event:

Description:
With the State's increase in reliance on computers and the Internet comes the escalated risk for a cyber event to occur. Potential cyber event targets include but are not limited to critical infrastructure; the public and private sector; and New Hampshire citizens via cyberattacks such as security breaches, spear phishing, and social media fraud (2018 New Hampshire State Hazard Mitigation Plan).

Past Occurrences:
The Committee is not aware of any significant cyber events in the Town of Windham but due to Town's increased reliance on computers and the internet, the Committee decided to include the hazard in the 2018 plan update.

Probability:
High probability that a cyber event will occur and cause damage in the Town of Windham

2.**Mass Casuality Incident:**

Description:
According to FEMA's Fire/Emergency Medical Services Department Operational Considerations and Guide for Active Shooter and Mass Casualty Incidents, more than 250 people have been killed in the United States during what has been classified as Active Shooter and Mass Casualty Incidents (AS/MCIs) since the Columbine High School shooting in 1999 until 2013 when the document was published. Recent high-profile events that have garnered national attention have included the Inland Regional Center in San Bernardino, CA (2015)[53] and Stoneman Douglas High School in Parkland, FL (2018). These types of events may take place anywhere in the State of New Hampshire impacting fire and police departments, regardless of their size or capacity.[54]

Location:
All areas of Windham are vulnerable to a mass causality incident.

Past Occurrences:
There have been no mass casualty incidents in the town of Windham.

Probability:
Medium probability that a mass causality event will occur in the town of Windham.

3. Terrorism/Violence:

Description:
Terrorist or terrorist support activities that may occur throughout the world and New Hampshire include, but are not limited to: communicated threats, money laundering, narco-terrorism, fraud, espionage, assassinations, kidnappings, hijackings, bomb threats and bombings, cyber-attacks (computer-based), and the potential use of chemical, biological, nuclear, radiological and explosives (CBRNE) weapons of mass destruction (WMDs).[55]

Location:
All areas in the town of Windham is vulnerable to both terrorist attacks and violent crime.

Past Occurrences:
There have been no previous terrorist attacks or violent crime in the town of Windham that the committee is aware of.

Probability:

[53]https://www.fbi.gov/file-repository/activeshooter_incidents_2001-2016.pdf/view
[54] https://www.usfa.fema.gov/downloads/pdf/publications/active_shooter_guide.pdf
[55] State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018, 184

Low probability for a terrorist attack or violent crime to occur and cause death and damage in Windham.

4. Transport Accident:

Description:
Of the roads in the State, 225 miles (362 km) are Interstate highways (35 miles (56 km) of which are also on the New Hampshire Turnpike System); 52 miles (84 km) are non-interstate turnpike highways; and 505 miles (813 km) are non-interstate and non-turnpike highways. Based upon current transportation capabilities the State remains vulnerable to a potential transport accident. According to the New Hampshire Information and Analysis Center over the past twenty years New Hampshire has experienced an annual average of 117 fatal crashes (127 victims) due to vehicular transportation accidents.[56]

Probability:
Medium probability that a transport accident will occur and cause damage or loss of life in Windham.

Table 4: Historical Natural Hazard Events in Rockingham County and Statewide

Hazard	Date	Location	Critical Facility or Area Impacted	Remarks/Description
Flood	**March 11-21, 1936**	**Statewide**	**$133,000,000 in damage throughout New England, 77,000 homeless.**	**Double Flood; snowmelt/heavy rain.**
Flood	**September 21, 1938**	**Statewide**	**Unknown**	**Hurricane; stream stage similar to March 1936**
Severe Storms, Flooding	**April 16,1987**	**Carroll, Cheshire, Grafton, Hillsborough, Merrimack, Rockingham, and Sullivan**	**Unknown**	**FEMA DR- 789 $4,888,889 in assistance**
Severe Storms, Flooding	**August 29,1990**	**Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, and Sullivan**	**Road Network**	**FEMA DR-876 $2,297,777 in assistance**
Hurricane Bob, Severe Storms, Flooding	**September 9, 1991**	**Statewide**	**Road Network**	**FEMA DR-917 $2,293,449 in assistance**
Severe Storms/Flooding	**October 29, 1996**	**Grafton, Hillsborough, Merrimack, Rockingham, Strafford and Sullivan,**	**Unknown - Typically structures and infrastructure in the floodplain**	**FEMA DR-1144 $2,341,273 in assistance**
Severe Storms and Flooding	**July 2, 1998**	**Rockingham County**	**Heavy damage to secondary roads occurred**	**FEMA DR-1231 $3,420,120 in assistance**

[56] State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018, 186

Severe Storms and Flooding	**May 12-23, 2006**	**Belknap, Carroll, Grafton, Hillsborough, Merrimack, Rockingham, and Strafford**	**100 yr – 500 yr**	**FEMA-1643-DR $17,691,586 + in assistance**
Severe Storms and Flooding	**April 15 - 23, 2007**	**Statewide**	**100 yr – 500 yr**	**FEMA-1695-DR: $27,000,000+ in assistance**
Severe Storms, Tornado, and Flooding	**July 24 2008**	**Belknap, Carroll, Merrimack, Rockingham, and Strafford**	**100 yr – 500 yr**	**FEMA-1782-DR: $1,691,240 in assistance**
Severe Storms and Flooding	**March 14 – 31, 2010**	**Rockingham, Hillsborough Counties**	**100 yr – 500 yr**	**FEMA-1913-DR $3,057,473 in assistance**
Severe Storms and Flooding	**May 29-31, 2012**	**Cheshire County**	**Unknown**	**FEMA-4065-DR $3,057,473 in assistance**
Hurricane	**October 18,19 1778**	**Portions of State**	**Unknown**	**N/A**
Hurricane	**1804**	**Portions of State**	**Unknown**	**N/A**
Hurricane	**September 8, 1869**	**Portions of State**	**Unknown**	**N/A**
Great Hurricane Of 1938	**September 21, 1938**	**All of Southern New England**	**2 billion board feet of timber destroyed; electric and telephone disrupted, structures damaged, flooding; statewide 1,363 families received assistance.**	**Max. wind speed of 186 mph in MA and 138mph max. elsewhere 13 of 494 dead in NH; $12,337,643 total storm losses (1938 dollars), timber not included.**
Hurricane Carol	**August 31, 1954**	**Southern New England**	**Extensive tree and crop damage in state.**	**SAFFIR/SIMPSON HURRICANE SCALE57 - Category 3, winds 111-130 mph**
Hurricane Donna	**September 12, 1960**	**Southern and Central NH**	**Unknown**	**Category 3 Heavy Flooding**
Hurricane Belle	**August 10, 1976**	**Southern New England**	**Unknown**	**Category 1, winds 74-95 mph Rain and flooding in NH**
Hurricane Gloria	**September 27, 1985**	**Southern New England**	**Unknown**	**Category 2, winds 96-110 mph >70 mph winds; minor wind damage and**
New Hampshire Hurricane Sandy	**October 26 - November 08, 2012**	**Statewide**	**Heavy wind (40-70mph), widespread damage to powerlines and trees, approximately 200,000 statewide without power**	**FEMA- EM-3360, DR-4095 $1,664,140 in assistance**
Tropical Storm Floyd	**September 16-18 1999**	**Statewide**	**Heavy wind and rainfall, subsequent flooding**	**FEMA-DR-1305 $750,133 in assistance**
New Hampshire Tropical Storm Irene	**August 26- Septmeber 6 2011**	**Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, Sullivan, Hillsborough and Rockingham Counties**	**Extensive Flooding and power outages due to damaged powerlines and fallen trees**	**FEMA- 4026-DR $19,789,657 in assistance**
Ice Jam	**Feb 29, 2000**	**Brentwood, NH Exeter River**	**Unknown**	**Discharge 570 cfs**

[57] For a complete description of the Saffir/Simpson Hurricane Scale see Appendix D.

Ice Jam	**Mar 29, 1993**	**Epping, NH Lamprey River**	**Road flooding**	
Tornado	**May 21, 1814**	**Rockingham County**	**Unknown**	**F258**
Tornado	**May 16, 1890**	**Rockingham County**	**Unknown**	**F2**
Tornado	**August 21, 1951**	**Rockingham County**	**Unknown**	**F2**
Tornado	**June 9, 1953**	**Rockingham County**	**Unknown**	**F3**
Tornado	**June 19, 1957**	**Rockingham County**	**Unknown**	**F2**
Tornado	**July 2, 1961**	**Rockingham County**	**Unknown**	**F2**
Tornado	**June 9, 1963**	**Rockingham County**	**Unknown**	**F2**
Tornado	**May 21, 2006**	**Rockingham County**	**Unknown**	**F2**
Tornado	**July 24, 2008**	**Rockingham, Merrimack, Belknap, Strafford, Carrol**	**Unknown**	**F2**
Ice Storm	**December 17-20 1929**	**Statewide**	**Unknown**	**N/A**
Ice Storm	**December 29-30 1942**	**Statewide**	**Unknown**	**N/A**
Ice Storm	**December 22 1969**	**Parts of NH**	**Unknown**	**N/A**
Ice Storm	**January 17, 1970**	**Parts of NH**	**Power disruption**	**N/A**
Ice Storm	**January 8-25 1979**	**Statewide**	**Major disruption to Power and transportation**	**N/A**
Ice Storm	**March 3-6 1991**	**Southern NH**	**Numerous power outages in southern NH**	**Numerous in Southern NH**
Ice Storm	**January 15, 1998**	**Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, Strafford, Sullivan counties**	**Power and phone disrupted; communication tower collapsed. $17,000,000 in damages to PSNH equipment.**	**FEMA DR - 1199 $12,446,202 in assistance**
Ice Storm	**January 2, 2009**	**Statewide**	**Severe damage to private and public utilities. PSNH states cost of restoration effort Estimated at $75 million**	**FEMA DR-1812 $19,789,657 in assistance**
Snowstorm	**February 4-7 1920**	**New England**	**Transportation disrupted**	**N/A**
Snowstorm	**February 15, 1940**	**New England**	**Paralyzed New England**	**30cm of snow with high wind.**
Snowstorm	**February 14-17 1958**	**Southern NH**	**Unknown**	**20-33" of snow**
Snowstorm	**March 18-21 1958**	**South central NH**	**Unknown**	**22-24" of snow**

[58] For a complete description of the Fujita Tornado Damage Scale see Appendix D

Snowstorm	**March 2-5 1950**	**Southern NH**	**Unknown**	**25" of snow**
Snowstorm	**January 18-20 1961**	**Southern NH**	**Unknown**	**Blizzard Conditions; 50cm of snow**
Snowstorm	**February 8-10 1969**	**Southeastern NH**	**Paralyzing snow**	**27" of snow and high winds**
Snowstorm	**February 22-28 1969**	**Central NH**	**Unknown**	**34-98" of snow; very slow moving**
Snowstorm "Blizzard of'78"	**February 5-7 1978**	**Statewide**	**Trapped commuters on highways, businesses closed**	**Hurricane force winds; 25-33" of snow. People disregard warnings due to a series of missed forecasts**
Snowstorm	**April 5-7 1982**	**Southern NH**	**Unknown**	**Late season with thunderstorms and 18-22" of snow**
Snow Emergency	**March 2001**	**Cheshire, Coos, Grafton, Hillsborough, Merrimack, Rockingham, and Strafford**	**Unknown**	**FEMA-3166-EM $4,500,000 in assistance**
Snow Emergency	**March 11, 2003**	**Cheshire, Hillsborough, Merrimack, Rockingham and Strafford**	**Unknown**	**FEMA-3177-EM $3,000,000 in assistance**
Snow Emergency	**March 30, 2005**	**Belknap, Carroll, Cheshire, Grafton, Hillsboro, Merrimack, Rockingham, Strafford and Sullivan**	**Unknown**	**FEMA-3207-EM $4,654,738 in assistance**
Snow Emergency	**April 28, 2005**	**Carroll, Cheshire, Hillsboro, Rockingham and Sullivan**	**Unknown**	**FEMA-3211-EM $2,677,536 in assistance**
Severe Winter Storm	**December 11, 2008**	**Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan**	**Unknown**	**FEMA-1812-DR $19,789,657 in assistance**
Severe Winter Storm	**March 29, 2010**	**Merrimack, Rockingham, Strafford, and Sullivan**	**Unknown**	**FEMA-1892-DR $9,103,138 in assistance**
Severe Winter Storm	**March 14, 2010**	**Rockingham and Hillsborough Counties**	**Unknown**	**FEMA-1913-DR $3,057,473 in assistance**
Sever Winter Storm	**October 29-30, 2011**	**Merrimack, Rockingham, Strafford, and Sullivan counties**	**Unknown**	**FEMA-4049-DR $9,103,138 in assistance**
Severe Winter Storm	**February 08-10, 2013**	**Belknap, Cheshire, Carroll, Hillsborough, Merrimack, Rockingham, Strafford, Sullivan Counties**	**Extensive damage caused by debris**	**FEMA DR-4105 $19,789,657 in assistance**
Severe Winter Storm	**January 26-28, 2015**	**Hillsborough, Rockingham, Strafford Counties**	**Extensive damage caused by debris**	**FEMA-DR-4209 $4,939,214 in assistance**
Severe Winter Storm	**March 13-14, 2018**	**Carroll, Rockingham, Strafford Counties**	**Extensive damage caused by debris**	**FEMA-DR-4371 $5,001,009 in assistance**

Earthquake	**November 18, 1929**	**Grand Banks Newfoundland**	**No damage**	**Richter Magnitude Scale: 7.259**
Earthquake	**December 20, 1940**	**Ossipee**	**Ground Cracks and damage over a broad area**	**Richter Magnitude Scale: 5.5; Felt over 341 miles away.**
Earthquake	**December 24, 1940**	**Ossipee**	**Ground Cracks and damage over a broad area**	**Richter Magnitude Scale: 5.5; Felt over 550 KM away.**
Earthquake	**June 15, 1973**	**Quebec/NH border**	**Minor damage**	**Richter Magnitude Scale: 4.8**
Earthquake	**June 19, 1982**	**West of Laconia**	**Little damage**	**Richter Magnitude Scale: 4.5**
Drought	**1929-36**	**Statewide**	**Unknown**	**Regional**
Drought	**1939-44**	**Statewide**	**Unknown**	**Severe in southeast NH**
Drought	**1947-50**	**Statewide**	**Unknown**	**Moderate**
Drought	**1960-69**	**Statewide**	**Unknown**	**Longest recorded continuous period of below normal precipitation**
Drought Warning	**June 6, 1999**	**Most of State**	**Unknown**	**Governor's office declaration; Palmer Drought Survey Index indicate "moderate drought" for most of state.**
Drought	**2001-2002**	**Statewide**	**Unknown**	**Third worst drought on record, exceeded only by the drought of 1956-1966 and 1941-1942**
Extreme Drought	**2016-2017**	**Statewide**	**Impacts to water systems, private wells and agricultural crops**	**This was the first time that an Extreme drought was declared for New Hampshire since the National Drought Monitor became operational in 2000.**
Heat Wave	**July 1911**	**Statewide**	**Unknown**	**Extreme heat was recorded from July 3rd through July 5th, with high temperatures ranging from 101- 102°F in Concord**
Heat Wave	**March, 2012**	**Statewide**	**Unknown**	**High temperature records in Concord, New Hampshire were broken for 5 consecutive days, with the hottest day being 84°F.**
Heat Wave	**September 2017**	**Statewide**	**Unknown**	**High temperature records set across New Hampshire**
Cold Wave	**December 2017**	**Statewide**	**Unknown**	**Record low temperatures set across New Hampshire**
One Day Winter Heat Wave	**February 2018**	**Statewide**	**Unknown**	**Record high temperatures were broken across the State**

[59] For a complete description of the Richter Magnitude Scale see Appendix E.

SECTION IV. ASSESSING PROBABILITY, SEVERITY, AND RISK

Critical Facilities

The Critical Facilities List for the Town of Windham has been identified by Windham's Emergency Management Committee. The list is divided into three categories:

- **Category 1**: Emergency response facilities and services ranked highest priority regarding needing protection form natural and manmade hazards (hospital, fire station, PowerStation, schools etc.)
- **Category 2:** Non-emergency facilities but still essential for everyday operation (public water system, transfer station, post office etc.)
- **Category 3**: People and facilities to protect in the event of a disaster (annual events, schools, daycares, historic buildings, gathering places, religious facilities, major employers etc.)

In addition, the inventory of Critical Facilities table assesses the values of these structures.

Windham, NH Critical Facilities							
Facility	**Name/Location**	**Owner**	**Category 1**	**Category 2**	**Category 3**	**Assessed Value**	**Hazard Vulnerability**
Bartley House	Administrative office	Municipal	✓			1,362,320	Flooding, Drought, Lightning, Severe Wind, Human Caused, Technical Hazards
EOC Primary	Windham Fire Department	Municipal	✓			2,439,896	Flooding, Drought, Lightning, Severe Wind, Human Caused, Technical Hazards
Secondary	Windham Police Department	Municipal	✓			3,277,332	Flooding, Drought, Lightning, Severe Wind, Human Caused, Technical Hazards
Police Station	Windham Police Department	Municipal	✓			3,277,332	Flooding, Drought, Lightning, Severe Wind, Human Caused, Technical Hazards
Fire Station	Windham Fire Department	Municipal	✓			2,439,896	Flooding, Drought, Lightning, Severe Wind, Human Caused, Technical Hazards
Hospital	None	n/a				n/a	-
Shelters (with American Red Cross Agreements)	Searles School and Chapel	Municipal	✓			1,666,095	Earthquake, Lightning, Severe Wind, Technical Hazards
	Golden Brook School (grades K - 2)	SAU	✓			50,000,000	Flooding, Extreme Heat, Earthquake, Lightning, Severe Wind, Winter Weather, Human Caused Hazards, Technical Hazards
	Castleton Function Hall	Private	✓			3,207,400	Flooding, Lightning, Severe Wind, Winter Weather, Human Caused Hazards, Technical Hazards
	Center School (grades 3-5)	SAU	✓			20,000,000	Flooding, Extreme Heat, Earthquake, Lightning, Severe Wind, Winter Weather, Human Caused Hazards, Technical Hazards
	Middle School (grades 6-8)	SAU	✓			Inc w/Golden Brook	Flooding, Extreme Heat, Earthquake, Lightning, Severe Wind, Winter Weather, Human Caused Hazards,

							Technical Hazards
	Windham High School (grades 9-12)	SAU	✓			n/a	Flooding, Extreme Heat, Earthquake, Lightning, Severe Wind, Winter Weather, Human Caused Hazards, Technical Hazards
Highway Garage and Transfer Facility	Ledge Road	Municipal	✓			n/a	Flooding, Earthquake, Hurricane, Human Caused Hazards, Technical Hazards
Public Utilities	Tennessee Gas Pipeline (Mammoth Road)	Private		✓		1,235,000	Flooding, Earthquake, Human Caused Hazards, Technical Hazards
	Public Utilities / high tension wires.	Mixed		✓		5,000,000,000	Flooding, Earthquake, Human Caused Hazards, Technical Hazards
	Pennichuck Water Works	Private		✓		2,692,800	Flooding, Drought, Earthquake, Human Caused Hazards, Technical Hazards
	Comcast – local cable	Private		✓			Hurricane, Severe Wind
	Armstrong – local cable studio	Municipal		✓		790,433	Hurricane, Severe Wind
	Liberty Utilities - electric	Private		✓		n/a	Hurricane, Severe Wind
	Eversource	Private		✓		5,000,000,000	Hurricane, Severe Wind
	AT&T – fiber optic line	Private		✓		n/a	Hurricane, Severe Wind
Transportation	Student Transportation of America	Private		✓		n/a	Flooding, Winter Weather, Human Caused, Technical Hazards
Emergency Fuel	Possibly the state shed in Derry south of Exit 4a Shadow Lake Rd.	State		✓		n/a	-
Water Supply	Pennichuck Water Works	Private		✓		2,692,800	Drought, Earthquake, Human Caused Hazards, Technical Hazards
	Cisterns	Municipal/Private		✓		n/a	Drought, Technical Hazards
	Private Wells	Private		✓		n/a	Drought, Technical Hazards
Sewer Treatment	None - private			✓		-	-

Schools/Daycares	Golden Brook School (grades K-2)	SAU			✓	50,000,000	Flooding, Extreme Heat, Earthquake, Lightning, Severe Wind, Winter Weather, Human Caused Hazards, Technical Hazards
	Middle School (grades 6-8)	SAU			✓	Inc w/ Golden Brk	Flooding, Extreme Heat, Earthquake, Lightning, Severe Wind, Winter Weather, Human Caused Hazards, Technical Hazards
	Center School (grades 3-5)	SAU			✓	20,000,000	Flooding, Extreme Heat, Earthquake, Lightning, Severe Wind, Winter Weather, Human Caused Hazards, Technical Hazards
	Windham Cooperative Kindergarten, Industrial Drive	Private			✓	n/a	Flooding, Severe Wind, Winter Weather, Human Caused Hazards, Technical Hazards
	JP Kids, 33 Indian Rock Road	Private			✓	n/a	Flooding, Severe Wind, Winter Weather, Human Caused Hazards, Technical Hazards
	Kiddie Academy, Haverhill Road (Rt. 111)	Private			✓	1,428,200	Flooding, Severe Wind, Winter Weather, Human Caused Hazards, Technical Hazards
	Windham Academy	Private			✓	1,729,600	Flooding, Severe Wind, Winter Weather, Human Caused Hazards, Technical Hazards
	Windham Woods School	Private			✓	7,243,300	Flooding, Severe Wind, Winter Weather, Human Caused Hazards, Technical Hazards
	Windham Learning Tree Academy	Private			✓	2,910,200	Flooding, Severe Wind, Winter Weather, Human Caused Hazards, Technical Hazards
	We Care Learning Center	Private			✓	1,651,600	Flooding, Severe Wind, Winter Weather, Human Caused Hazards, Technical Hazards
	Green Sprouts LLC	Private			✓	1,541,200	Flooding, Severe Wind, Winter Weather, Human Caused Hazards, Technical Hazards

	Windham High School, 64 Londonbridge Road	SAU			✓	n/a	Flooding, Extreme Heat, Earthquake, Lightning, Severe Wind, Winter Weather, Human Caused Hazards, Technical Hazards
	SAU Office	SAU			✓	7,381,900	Flooding, Extreme Heat, Earthquake, Lightning, Severe Wind, Winter Weather, Human Caused Hazards, Technical Hazards
High Density Neighborhoods	Whispering Winds (age restricted Housing)	Private			✓	19,489,000	Flooding, Extreme Heat, Winter Weather, Human Caused Hazards, Technical Hazards
	Windham Meadows (age restricted housing)	Private			✓	15,689,000	Flooding, Extreme Heat, Winter Weather, Human Caused Hazards
	Windham Terrace (assisted living facility)	Private			✓	6,263,000	Extreme Heat, Winter Weather, Human Caused Hazards, Technical Hazards
	The Grace House, Mammoth Road (assisted living facility)	Private			✓	n/a	Flooding, Extreme Heat, Winter Weather, Human Caused Hazards, Technical Hazards
	Pine Hill Estates (nursing home)	Private			✓	632,500	Flooding, Extreme Heat, Winter Weather, Human Caused Hazards, Technical Hazards
	Hadleigh Woods (age restricted housing)	Private			✓	17,386,000	Flooding, Extreme Heat, Winter Weather, Human Caused Hazards, Technical Hazards
	Warde Health Center (nursing home)	Private			✓	3,500,000	Flooding, Extreme Heat, Winter Weather, Human Caused Hazards, Technical Hazards
	McCauley Commons	Private			✓	2,426,500	Flooding, Extreme heat, Technical Hazards, Winter Weather, Human Caused Hazards
	Lamplighter (condominium association)	Private			✓	20,212,000	Flooding, Extreme Heat, Winter Weather, Human Caused Hazards, Technical Hazards
	Gordon Mountain (condominium association)	Private			✓	17,120,000	Flooding, Extreme Heat, Winter Weather, Human Caused Hazards, Technical Hazards

	Braemar Woods (condominium association)	Private			✓	5,732,600	Flooding, Extreme Heat, Winter Weather, Human Caused Hazards, Technical Hazards
	Wyndridge	Private			✓	11,010,600	Flooding, Extreme Heat, Winter Weather, Human Caused Hazards, Technical Hazards
	Stacey Circle (condominium association)	Private			✓	20,963,200	Flooding, Extreme Heat, Winter Weather, Human Caused Hazards, Technical Hazards
	Birch Hill	Private			✓	7,891,400	Flooding, Extreme Heat, Winter Weather, Human Caused Hazards, Technical Hazards
	Lakeview Farm (age restricted housing)	Private			✓	n/a	Flooding, Extreme Heat, Winter Weather, Human Caused Hazards, Technical Hazards
	Cobbett's Pond Neighborhood				✓	9,215,700	Flooding, Extreme Heat, Winter Weather, Human Caused Hazards, Technical Hazards
	Canobie Lake Neighborhood				✓	82,631,000	Flooding, Extreme Heat, Winter Weather, Human Caused Hazards, Technical Hazards
	Settler's Ridge Road neighborhood				✓	11,668,500	Flooding, Extreme Heat, Winter Weather, Human Caused Hazards, Technical Hazards
Health Care Facilities	Pine Hill Estates	Private			✓	632,500	Flooding, Extreme Heat, Winter Weather, Human Caused Hazards, Technical Hazards
	Warde Health Center	Private			✓	3,500,000	Flooding, Extreme Heat, Winter Weather, Human Caused Hazards, Technical Hazards
	Elliot Peak Internal Medicine	Private			✓	1,645,900	Flooding, Extreme Heat, Winter Weather, Human Caused Hazards, Technical Hazards
	LabCorp	Private			✓	3,197,100	Flooding, Extreme Heat, Winter Weather, Human Caused Hazards, Technical Hazards
	Whispering Winds	Private			✓	19,489,000	Flooding, Extreme Heat, Winter Weather, Human Caused Hazards,

							Technical Hazards
Age Restricted Housing	Windham Meadows	Private			✓	15,689,000	Flooding, Extreme Heat, Winter Weather, Human Caused Hazards, Technical Hazards
	Windham Terrace (assisted living)	Private			✓	6,263,000	Flooding, Extreme Heat, Winter Weather, Human Caused Hazards, Technical Hazards
	Hadleigh Woods	Private			✓	17,386,000	Flooding, Extreme Heat, Winter Weather, Human Caused Hazards, Technical Hazards
	Chadwick Place	Private			✓	N/A	-
	Del Ray Place	Private			✓	31,539,060	Flooding, Lightning, Severe Wind, Human Caused Hazards, Technical Hazards
	Griffin Park Complex, Range Road	Municipal			✓	439,096	Flooding, Lightning, Severe Wind, Human Caused Hazards, Technical Hazards
Recreation areas	Town Beach, Cobbetts Pond Road	Municipal			✓	Land only	Flooding, Lightning, Severe Wind, Human Caused Hazards, Technical Hazards
	Nashua Road Fields	Municipal			✓	Land only	Flooding, Lightning, Severe Wind, Human Caused Hazards, Technical Hazards
	Tokanel Field, Meadow Road	Municipal			✓	Land only	Flooding, Lightning, Severe Wind, Human Caused Hazards, Technical Hazards
	Rogers Field, Cobbetts Pond Road	Municipal			✓	Land only	Flooding, Lightning, Severe Wind, Human Caused Hazards, Technical Hazards
	Wonderland Playground, Esty Road	Municipal			✓	Land only	Flooding, Lightning, Severe Wind, Human Caused Hazards, Technical Hazards
	Searles Field, Range Road	Municipal			✓	Land only	Flooding, Lightning, Severe Wind, Human Caused Hazards, Technical Hazards
	Rail Trail, Windham Depot Road				✓		Flooding, Lightning, Severe Wind, Human Caused Hazards, Technical

							Hazards
	Spruce Pond Recreational Area				✓	Land only	Flooding, Lightning, Severe Wind, Human Caused Hazards, Technical Hazards
Historic	Union Hall, Anderson Road	Private			✓	n/a	Flooding, Earthquake, Human Caused Hazards, Technical Hazards
	Town Center Complex	Municipal			✓	1,043,300	Flooding, Earthquake, Human Caused Hazards, Technical Hazards
	Searles School and Chapel	Municipal			✓	1,666,095	Flooding, Earthquake, Human Caused Hazards, Technical Hazards
	Windham Depot	State/ Municipal			✓	381,900	Flooding, Earthquake, Human Caused Hazards, Technical Hazards

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 as a percentage of the facility's structural value. The Federal Emergency Management Agency (FEMA) has developed a process in which replacement values for structures located in the 100 and 500-year floodplains can be calculated according to the amount of damage suffered[60]. In Windham, the assessed values were determined for every structure identified in the floodplain. The potential loss was then calculated by multiplying the assessed value of the structure by the percent of damage expected from a hazard event (i.e., 100-year, 4-foot flood, etc.). The following discussion summarizes the potential loss estimates to structures (residential and non-residential) due to natural hazard events.

Flooding

Flooding is often associated with hurricanes, ice jams, rapid snow melt in the spring and heavy rains.

The average replacement value was calculated by adding up the assessed values of all structures in the 100- and 500-year floodplains. These structures were identified by overlaying digital versions of FEMA's FIRM maps on digital aerial photography of the town of Windham. 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 and are based on 2018 assessed values. The percentage of structural damage and contents

[60] "Understanding Your Risks, Identifying Hazards and Estimating Losses", FEMA, page 4-13.

damage that could be expected for each flood depth is shown in Table 8, along with estimates of functional downtime (how long a business/residence would be down before relocating) and displacement time (how long a business/residence would be displaced from its flooded location).

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 1,110 structures assessed at $250,916,900 = $ 122,949,281 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 1,110 structures assessed at $250,916,900 = $70,256,732 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 1,110 structures assessed at $250,916,900 = $50,183,380 potential damage

Table 7: Percentages of structural and content damage, 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 feet**	**Four feet**
% Structural Damage: Buildings	15%	20%	28%
% Structural Damage: Manufactured Homes	44%	63%	78%
% Contents Damage: Buildings	22.5%	30%	42%
% Contents Damage: Manufactured Homes	30%	90%	90%

Flood Functional Downtime: Buildings	15 days	20 days	28 days
Flood Functional Downtime: Manufactured Homes	30 days	30 days	30 days
Flood Displacement Time: Buildings	70 days	110 days	174 days
Flood Displacement Time: Manufactured Homes	302 days	365 days	365 days

Dam Breach and Failure

Dam breach and failure could impact Windham through flooding. Potential losses will depend on the extent of the breach and could include both residential and non-residential damage, including town owned facilities. Areas identified by the Emergency Management Committee as at risk to flooding from dam breach and failure include those areas downstream of South Road Dam (Class B) in Londonderry and Golden Brook Dam, Kendall Pond Dam, Foster Pond Dam, Anderson Road Dam, and Seavey Pond Dam in Windham.

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. Even degraded hurricanes or tropical storms could still cause significant damage to the structures and infrastructure of the Town of Windham. The 2018 assessed value of all residential and commercial structures in the Town of Windham, including exempt structures such as schools and churches, is $2,474,033,000 (Windham Assessor). Assuming 1% to 5% damage, a hurricane could result in $24,740,330 to $123,701,650 of structure damage.

Tornado

Tornadoes are relatively uncommon natural hazards in New Hampshire. On average, about six touch down each year. Damage largely depends on where the tornado strikes. If is strikes an inhabited area, the impact could be severe. In the State of New Hampshire, the total cost of tornadoes between 1950 and 1995 was $9,071,389 (The Disaster Center). The 2018 assessed value of all residential and commercial structures in the Town of Windham, including exempt structures such as schools and churches, is $2,474,033,000 (Windham Assessor). Assuming 1% to 5% damage, a tornado could result in $24,740,330 to $123,701,650 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 are no records of monetary damages inflicted in the Town of Windham 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 snowstorms 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 Windham in the past. All these impacts are a risk to the community, including isolation, especially of the elderly, and increased traffic accidents. Damage caused as a result of this type of hazard varies according to wind velocity, snow accumulation and duration. The 2018 assessed value of all residential and commercial structures in the Town of Windham, including exempt structures such as schools and churches, is $2,474,033,000 (Windham Assessor). Assuming 1% to 5% damage, a snowstorm could result in $24,740,330 to $123,701,650 of structure damage.

Ice Storms

Ice storms often cause widespread power outages by downing power lines, making power lines at risk in Windham. They can also cause severe damage to trees. In 1998, an ice storm inflicted $12,466,202 worth of damage to New Hampshire as a whole. Ice storms in Windham could be expected to cause damage ranging from a few thousand dollars to several million, 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 by the Hazard Mitigation Committee is in the northern section of Town and includes the Town Forest. The 2018 assessed value of all residential and commercial structures in the Town of Windham, including exempt structures such as schools and churches, is $2,474,033,000 (Windham Assessor). Assuming 1% to 5% damage, a wildfire could result in $24,740,330 to $123,701,650 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 Windham, underground lines would be susceptible. In addition, buildings that are not built to a high seismic design level would be susceptible to

structural damage. The 2018 assessed value of all residential and commercial structures in the Town of Windham, including exempt structures such as schools and churches, is $2,474,033,000 (Windham Assessor). Assuming 1% to 5% damage, an earthquake could result in $24,740,330 to $123,701,650 of structure damage. Based on Table 9 below, an earthquake could cause a range of damage depending on the construction and materials used to build the structures.

FEMA has a model to predict damage to buildings based on their construction materials and seismic design level. It is not in the scope of this Plan to estimate the damages for each assessed structure for the Town of Windham. What is possible for this Plan is to display the potential damage to several types of structures of varying construction materials, as a percentage of their total value. Table 8 provides two damage estimates for each building type, one from a small earthquake and one from a larger earthquake (PGA of 0.07 and 0.20 respectively). The damage estimates are shown as Building Damage (bold) and as a Loss of Function in days. Building Damage is an estimate of structural damage as a percentage of the building value. Contents of the buildings can also be assumed to be damaged to a value of half that of the structure. For example, a building predicted to receive $100,000 in structural damage could expect $50,000 in additional damage to the contents of that building.

		Wood Frame Construction				Reinforced Masonry				Unreinforced Masonry	
PGA (g)		High	Mod.	Low	Precode	High	Mod.	Low	Precode	Low	Precode
0.07	**Single Family**	**0.1**	**0.2**	**0.3**	**0.4**	**0.1**	**0.2**	**0.4**	**0.5**	**0.6**	**1.0**
0.20		**1.3**	**1.7**	**2.8**	**3.3**	**1.3**	**2.5**	**6.1**	**9.0**	**6.5**	**9.4**
0.07		0	0	1	1	0	1	2	7	6	12
0.20		2	3	9	15	4	16	58	106	64	114
0.07	**Apartment**	**0.1**	**0.2**	**0.3**	**0.3**	**0.1**	**0.2**	**0.4**	**0.5**	**0.6**	**0.8**
0.20		**1.5**	**1.9**	**3.0**	**3.2**	**1.5**	**2.6**	**5.4**	**6.9**	**5.5**	**7.5**
0.07		0	0	1	1	0	1	2	8	7	13
0.20		2	3	10	16	4	19	72	129	76	147
		Steel Frame (Braced)				**Reinforced Masonry**				**Unreinforced Masonry**	
		High	Mod.	Low	Precode	High	Mod.	Low	Precode	Low	Precode
0.7	**Retail Trade**	**0.2**	**0.3**	**0.4**	**0.5**	**0.1**	**0.2**	**0.4**	**0.6**	**0.7**	**1.0**
0.20		**2.4**	**2.8**	**3.8**	**5.6**	**1.5**	**2.7**	**5.9**	**8.3**	**6.1**	**8.7**
0.07		0	0	0	0	0	0	0	1	1	2
0.20		2	3	6	12	1	3	12	22	14	24
		Pre-Cast Concrete Tilt-up				**Light Metal Building**					
		High	Mod.	Low	Precode	High	Mod.	Low	Precode		
0.07	**Wholesale Trade**	**0.2**	**0.4**	**0.5**	**0.6**	**0.4**	**0.7**	**1.0**	**1.6**		
0.20		**2.6**	**4.1**	**8.3**	**10.8**	**3.8**	**5.4**	**10.3**	**14.8**		
0.07		0	1	1	2	1	2	3	6		
0.20		4	8	22	36	6	13	28	43		
0.07	**Office Building**	**0.2**	**0.3**	**0.4**	**0.6**	**0.2**	**0.3**	**0.4**	**0.5**		
0.20		**2.0**	**2.9**	**5.6**	**8.1**	**2.5**	**2.9**	**3.7**	**5.2**		
0.07		0	0	0	1	0	0	0	1		
0.20		1	3	11	21	2	3	5	11		
		Pre-cast Concrete Tilt-up									
		High	Mod.	Low	Precode						
0.07	**Light Industrial**	**0.1**	**0.4**	**0.4**	**0.5**						
0.20		**2.6**	**3.9**	**6.0**	**7.4**						
0.07		0	1	1	2						
0.20		4	7	21	34						

2.0	Building Damage = % of damage based on value
2	Loss of Function (# of Days)
	No Information

Table 8: Earthquake Damage and Loss of Function Table. Building Damage and Functional Loss are based on the type of Structure and the PGA (g). Two PGA (Peak Ground Acceleration) were chosen for this Table, 0.07 and 0.20 which represent a low and high example of potential earthquake in Windham, NH.

SECTION V: EXISTING MITIGATION STRATEGIES AND PROPOSED IMPROVEMENTS

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.

The following table is a list of current policies and regulations adopted by the Town of Windham that protect people and property from natural and man-made hazards. This matrix includes the existing protection program, a description of the existing protection, the enforcing department or agency, the effectiveness of the protection program and the identified improvements or changes needed.

Integration of Mitigation Priorities into Planning and Regulatory Tools

Many of the existing regulations as noted above should be regularly reviewed. This review process can lead to revisions that will incorporate mechanisms to assist in the implementation of the hazard mitigation priorities as defined in this Plan. This review will continue to be a priority of the Windham Emergency Management Director and will likely include annual requests in the annual budget process. Moreover, as suggested in the onset of this document, this Plan is a planning tool to be used by the Town of Windham, as well as other local, state, and federal governments, in the effort to reduce future losses from natural and/or man-made hazardous events before they occur. Under the Prioritized Mitigation Projects Action Plan (section VII) all parties listed under the responsibility/oversight category shall also review this listing annually and consider the listed (and updated) mitigation projects within their annual budget requests. The Town should utilize this Action Plan, for appropriate projects, when updating the Capital Improvement Plan.

Windham, NH Existing Protection Strategies Matrix					
Existing Protection	**Project Description**	**Responsible Agent**	**Effectiveness** *Poor/Average/Exc.*	**Recommended Changes**	**Comments**
Emergency Operations Plan	The Town maintains an EOP that meets the recommendations by the NH Bureau of Emergency Management. This plan identifies the response procedures and capabilities of the Town of Windham in the event of a natural or man-made disaster.	Emergency Management Director	Excellent	N/A	Plan is reviewed annually and updated as needed
Zoning Ordinance	Windham has enacted a zoning ordinance and map to protect the health, safety and welfare of the residents of the town from the effects of ill-considered and indiscriminate use of land.	Planning Board	Average	N/A	Town reviews and amends the zoning ordinance annually
Windham Building Code	The town complies with the State of New Hampshire Building Code which incorporates the IBC, IPC and NFPA. Building codes set minimum safety standards for occupants utilizing structural, fire and life safety provisions, wind loads and design, seismic design, flood proofing, and egress design.	Planning Board/Building Inspector	Excellent	N/A	Annual review, Town adopted most recent State Building Code in 2014
NFIP/Floodplain Ordinance	The minimum National Flood Insurance Program (NFIP) requirements have been adopted as part of the Town's Zoning Ordinance. This regulates all new and substantially improved structures located in the 100-year floodplain, as identified on the FEMA Flood Maps.	Planning Board	Excellent	N/A	Reviewed as needed to correspond with federal guidelines and town priorities
Elevation Certificates	An Elevation Certificate is required when a structure is built or substantially improved within a known flood zone, or if the flood map shows a part of the lot within the flood zone and the certified foundation plan shows the house is located within the flood zone. The land surveyor must supply the footing elevation.	Building Inspector/Code Enforcement Administrator	Excellent	N/A	Reviewed annually and updated as needed
Community Rating System	The town is currently not participating in the CRS. The CRS provides Flood Insurance Premium reductions based on the reduced flood risk resulting from community activities	Code Enforcement Administrator	n/a	Work with OSI to make application to CRS	To be completed.

Emergency Warning System	The Town has an official public warning/alert protocol outlined in the EOP. Supplementing the EOP are PA systems in all Fire & Police vehicles. The town utilizes portable electronic message boards	Fire Chief	Average	N/A	Updated as needed.
Subdivision and site plan Regulations	The purpose of Windham's subdivision regulations is to provide for the orderly present and future development of the town by promoting the public health, safety, convenience and welfare of the town's residents.	Planning Board	Excellent	N/A	Reviewed annually and updated as needed
Septic Code	The purpose of Windham's septic code is to regulate private solid waste disposal systems.	Board of Health / Selectmen	Excellent	N/A	Reviewed annually and updated as needed
Road Design Standards (subdivision regulation)	This subdivision establishes construction standards to ensure the safe flow of travel on all new roads and improvements to existing roads.	Planning Board	Excellent	N/A	Reviewed annually and updated as needed
Bridge Maintenance Program	Bridge #172-045 (Castle Hill Road Culvert) is on the state Red List. Inspection and clean-up occur annually. The state inspects all bridges every other year and maintain their bridges.	Highway Agent / Selectmen	Excellent	Implement recommendations outlined in the States Report (mainly signage)	State/Local funding available for repairs and have state approval.
Drainage Requirements (subdivision regulation)	Windham's Subdivision Regulations set engineering design standards to minimize any adverse impacts from stormwater drainage. Culverts are repaired as needed.	Planning Board	Excellent	N/A	Reviewed annually and work completed as needed
State Dam Program	The Department of Environmental Services (DES) has a Dam Maintenance and Safety Inspection program. Seavey Pond	NH DES	Poor	N/A	Still Active
Wetlands Protection	The Zoning Ordinance contains wetland buffer regulations.	Planning Board	Excellent	N/A	Reviewed annually and revised as needed

Hazardous Materials Regulations	Windham's hazardous materials ordinance is provided to control and contain hazardous materials after accidents or discharge.	Fire Chief	Average	Implement annual inspection program of commercial, industrial and assembly facilities.	Annual household hazardous waste events in Nashua
Public Education Programs	The Fire Department has an annual fire prevention open house / annual fire drill and inspections of all schools. The Police Department conducts periodic safety program and audits for security assessment if requested / Storm water Flyers and bulletins on how to protect water resources.	Multiple Departments	Average	PSAs on cable station / self-preparedness brochures at town hall & schools / community awareness information event (maybe at Castleton). (fire/police/ems/safety brochures)	To be completed.
Master Plan	The Master Plan serves as the guiding document for future development in Windham. It is used to update the Town Zoning Ordinance, Subdivision and Site Plan Review Regulations.	Planning Board	Excellent	N/A	Updated 2015
Capital Improvement Program	A tool used to plan and schedule town improvements over a six-year period. The CIP provides a suggested timeline for budgeting and implementing needed capital improvements.	Planning Board	Excellent	N/A	Reviewed and updated annually
Windham Storm Water Management Program	This Ordinance mandates a storm water management program to reduce the discharge of pollutants from municipal storm water collection systems within the urbanized area of the Town of Windham	Board of Selectmen	Average	N/A	Reviewed as needed.

Table 9: Existing Hazard Mitigation Programs and Policies for the Town of Windham

SECTION VI: NEWLY IDENTIFIED MITIGATION STRATEGIES AND CRITICAL EVALUATION

Potential Mitigation Strategies

The Action Plan was developed by analyzing existing town programs and proposed improvements 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

The following describes the process undertaken by the Committee to identify and prioritize mitigation projects:

Project Identification

The Committee identified mitigation projects for each hazard identified in this Plan. Specific objectives (mitigation alternatives) included: Prevention, Property Protection, Public Education, Natural Resource Protection, Emergency Services and Structural Projects. In total, there were nineteen projects identified.

This process resulted in the *Mitigation Project Identification Matrix*. In this *Matrix*, the committee was able to determine a basic benefit/cost by using the STAPLEE method. For each project identified, the committee considered the STAPLEE Criteria (Social, Technical, Administrative, Political, Legal, Economic and Environmental) to guide their decision in prioritizing the projects.

Prioritized Mitigation Projects

After careful review and evaluation, the committee ranked the 19 projects unanimously based on their relative pertinence to the community, property, and natural resources. Factors considered upon ranking the proposed projects included timing, cost, safety

and the wellbeing of the community and its natural resources. The prioritized projects are identified in the Mitigation Action Plan below.

Windham, NH Mitigation Action Plan						
Project and Project Description	**Responsibility/ Oversight**	**Funding/ Support**	**TIMEFRAME**	**Hazard(s) Addressed**	**Priority** (High/Med/Low)	**Status Since 2013 Plan**
1. Develop a Continuity of Operations Plan for the Town	Town Administrator	Staff Time / HSEM for Technical Assistance	Short	All Hazards	High	Completed but ongoing for continued development
2. Coordinate with state and town officials to monitor groundwater for known and emerging contaminates	Town Administrator	Town Operating Budget, Grant, Dept. of Environmental Services	Short	Human Caused	High	NEW: Ongoing coordination with town and state officials
3. Develop and implement a plan to address cyber threats to municipal resources	Information Technology Director	Town Operating Budget, Grant,	Short	Human Caused	High	NEW: Hazard Mitigation Committee added this action to the 2019 Plan
4. Work with neighboring communities to develop response and trainings for mass casualty incidents	Fire Chief	Town Operating Budget, Grant, Fire Standards and Training	Short	Human Caused	High	NEW: Completed and ongoing annually, continue regional coordination
5. Continue to coordinate with Regional Special Operations Unit, and provide terrorism/active shooter training for emergency response personnel and in town schools	Police Chief	Town Operating Budget	Short	Human Caused	High	NEW: Ongoing regional coordination and training, mutual aid agreement, continued education in schools for active shooter incidents

Windham, NH Mitigation Action Plan						
Project and Project Description	**Responsibility/ Oversight**	**Funding/ Support**	**TIMEFRAME**	**Hazard(s) Addressed**	**Priority** (High/Med/Low)	**Status Since 2013 Plan**
6. Coordinate with Southeastern New Hampshire Hazardous Material Mutual Aid and Regional Emergency Planning Committee for hazardous materials and other regional hazards	Fire Chief	Fire Standards and Training / Joint Loss Management Committee	Short	Human Caused (Hazardous Materials)	High	NEW: Continue monthly trainings and regional coordination with the Southeastern Regional Hazmat Team
7. Utilize electronic message boards, brochures, and public cable announcements for severe winter storms and other hazard events	EMD	Grant / Town Budget	Short	All Hazards	High	Completed but ongoing for continued development
8. Upgrade culverts on Golden Brook Rd, Rock Pond Rd, and Moeckel Rd.	Highway Agent	PDM Grant / State Bridge Aid / Town Budget, HSEM Grant	Long	Flood, Hurricane	High	NEW: Not started yet but ongoing with preliminary designs
9. Identify Aging infrastructure to reduce the potential impact of natural and human-caused disasters on the Town's facilities and properties	All Town Dept. Heads	Town Operating Budget, Grants, State Bridge Aid,	Medium	All Hazards	Medium	NEW: Partially completed but ongoing for continued development
10. Implement key card entry for all schools to address potential human-caused threats to student and faculty populations	SAU Superintendent	School Budget	Short	Human Caused	Medium	Currently being installed
11. Conduct emergency preparedness and mitigation technique PSAs as well as public education campaigns for special and vulnerable populations	Public Relations Committee	Town Budget / HSEM / American Red Cross	Short	All Hazards	Low	Completed but ongoing for continued development

Windham, NH Mitigation Action Plan						
Project and Project Description	**Responsibility/ Oversight**	**Funding/ Support**	**TIMEFRAME**	**Hazard(s) Addressed**	**Priority** (High/Med/Low)	**Status Since 2013 Plan**
12. Work with the Health Region to conduct a public education campaign for public health emergencies.	Fire Chief / Health Officer	DHHS	Short	Human Caused	Low	Completed but Ongoing for continued development
13. Public Education/outreach: Emergency Brochures at town hall and Public Service Announcements (PSA) on local cable for all potential hazard events; including mitigation techniques	EMD / Public Relations Committee	Town Budget / HSEM / American Red Cross	Short	All Hazards	Low	Completed but Ongoing for continued development
14. Work with a private tree service to assess critical facilities and trim trees to prevent utility and structural damage.	Highway Agent	Town Budget	Short	Hurricane, Severe Wind	Low	Completed but Ongoing for continued development
15. Provide/Construct a secondary egress for the Town Safety Complex	Highway Agent	Grant / Town Budget	Medium	Flood & Human Caused	Low	Deferred due to lack of town resources
16. Provide collapsed building training for Fire Department in the event of an earthquake or wildfire	Fire Chief	Fire Standards and Training	Short	Earthquake, Wildfire, Human Caused	Low	Completed and Ongoing for continued development
17. Develop a PSA for winter weather hazards	Public Safety Committee	Staff Time	Short	Winter Weather	Low	Completed and Ongoing for continued development
18. Purchase a woodchipper for downed trees and debris after large storm events	Highway Agent	Town Budget	Long	Severe Wind, Hurricane, Winter Weather	Low	Deferred due to lack of town resources
19. Develop PSA promoting limited water use during droughts.	Health Officer	Staff Time	Short	Drought	Low	Completed but Ongoing for continued development

The Committee decided to eliminate the following 2013 action items from the 2019 action plan due to completion or no foreseeable plans to implement:

1. **Purchase and distribute emergency kits for residents that identify alternate communication methods**
    - **Status since 2013 plan update – never completed; committee has no plan of implementing this action item**
2. **Upgrade culvers on Doiron Road, Rowe Road, Roulston Road, East Nashua Road, Lowell Road and Castle Hill Road**
    - **Status since 2013 plan update – completed**
3. **Retrofit buildings and purchase generators to power the municipal buildings during power outages**
    - **Originally deferred due to lack of town resources, committee has since not moved forward with action item, decided to eliminate it from action plan as it would be deferred again.**

MITIGATION STRATEGY EVALUATION PROCESS

Using a similar methodology as the previous plan update, the HMP Committee identified new actions based on the updated risk assessment and capability assessment. The new actions were prioritized in combination with the actions carried forward from the previous plan. 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 the table below:

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

Each new mitigation strategy was evaluated and assigned a score (Good = 3, Average = 2, Poor = 1) based on the above criteria by the Committee. An evaluation chart with total scores for each new strategy can be found in the table below. The new strategies were evaluated, and each score was considered when prioritizing mitigation actions. The Committee decided to keep the scores of all previously scored action items from previous plans (See Appendix G for past STAPLEE processes). For the purposes of this Plan, the committee found that not all criteria applied to each action. Those criteria that do not apply to the action item were assigned a score of “NA” by the committee. A lower score does not indicate that an action item is less important.

Staplee Chart Mitigation Strategy	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Total Score
Upgrade culverts on Golden Brook Rd, Rock Pond Rd, and Moeckel Rd.	3	3	3	3	3	3	3	21
Coordinate with Southeastern New Hampshire Hazardous Material Mutual Aid and Regional Emergency Planning Committee for Hazardous materials and other regional hazards	3	3	3	3	3	2	3	20
Coordinate with state and town officials to monitor groundwater for known and emerging contaminates	3	3	3	3	3	3	3	21
Develop and implement a plan to address cyber threats to municipal resources	NA	3	3	NA	NA	3	NA	9
Work with neighboring communities to develop response and trainings for mass casualty incidents	3	3	3	3	3	3	3	21
Continue to coordinate with Regional Special Operations Unit, and provide terrorism/active shooter training for emergency response personnel and in town schools	3	3	3	3	3	3	3	21
Develop a Continuity of Operations Plan for the Town.	3	2	2	3	3	3	3	19
Utilize electronic message boards, brochures, and public cable announcements for severe winter storms and other hazard events	3	3	3	3	3	2	3	20
Provide/Construct a Secondary Egress for the Town Safety Complex	1	2	2	1	3	2	3	14
Purchase a woodchipper for downed trees and debris after large storm events	3	3	3	3	3	3	3	21
Identify aging infrastructure to reduce the potential impact of natural and Human-caused disasters on the Town's facilities and properties	3	3	3	1	3	2	3	18
Implement key card entry for all schools to address potential human-caused threats to student and faculty populations	+	+	+	+	+	+	+	NA
Conduct emergency preparedness and mitigation technique PSA's as well as public education campaigns for special populations.	+	+	+	+	+	+	+	NA
Work with the Health Region to conduct a public education campaign for public health emergencies.	+	+	+	+	+	+	+	NA
Public Education/outreach: Emergency Brochures at town hall and Public Service Announcements (PSA) on local cable for all potential hazard events; including mitigation techniques	+	+	+	+	+	+	+	NA
Work with a private tree service to assess critical facilities and trim trees to prevent utility and structural damage.	+	+	+	+	+	+	+	NA
Provide collapsed building training for fire department	+	+	+	+	+	+	+	NA
Develop a PSA for winter weather hazards	+	+	+	+	+	+	+	NA
Develop PSA promoting limited water use during droughts	+	+	+	+	+	+	+	NA

Table 2:STAPLEE Chart

Note: *It was the decision of the 2019 Hazard Mitigation Committee to continue forward with several of the same mitigation action items as well as their associated STAPLEE scores from the 2013 and 2008 hazard mitigation plans. The action items from the 2008 Plan were scored using a "+" and "– "system; "+" indicating that the action item meets the STAPLEE criteria and "-" indicating it does not. The full 2008 STAPLEE table can be found in Appendix G.*

SECTION VIII: PRIORITIZED IMPLEMENTATION SCHEDULE AND FUNDING SOURCES

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. Each strategy was evaluated and prioritized according to the STAPLEE score and level of importance within the community. Projects that might have gotten a low STAPLEE score because of criteria, such as but not limited to, environmental permitting or costs associated with the project were still a high priority to the committee due to the associated risks and hazards avoided or mitigated from the action if implemented. Priority for each strategy was grouped on a 1-4 sliding scale in which strategies that received a 1 were considered high priority and those that received a score of 4, though important, were of lower priority. This form of prioritization was used as a basis for developing the Action Plan.

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 12 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. The actual project budgets may exceed or be lower than the estimated range. Nonetheless, these figures are assumed to represent a generic project of its type. These estimates are to serve as a comparative tool for project selection and planning purposes. Costs were derived from personal knowledge of the Windham Hazard Mitigation Committee.

Table 12: Newly Added (2019) Mitigation Action Items and Estimated Costs

STAPLEE Score (Priority)	Project	Responsibility/ Oversight	Funding/ Support/Cost	Timeframe	Estimated Cost
20	Coordinate with Southeastern New Hampshire Hazardous Material Mutual Aid and Regional Emergency Planning Committee for hazardous materials and other regional hazards	Fire chief	Town Budget	Short	$10,000
21	Work with neighboring communities to develop response and trainings for mass casualty Incidents	Fire Chief	Town Operating Budget, Grant, Fire Standards and Training	Short	$5,000 - $10,000
21	Upgrade culverts on Golden Brook Rd, Rock Pond Rd, and Moeckel Rd.	Highway Agent	PDM grant/State Bridge Aid/Town Budget	Long	>$1.5M
18	Identify Aging infrastructure to reduce the potential impact of natural and human-caused disasters on the Town's facilities and properties	All Town Dept. Heads	Town Operating Budget, Grants, State Bridge Aid,	Medium	>$1M
21	Coordinate with state and town officials to monitor groundwater for known and emerging contaminates	Town Administrator	Town Operating Budget, Grant, Dept. of Environmental Services	Short	Unknown until completed

STAPLEE Score (Priority)	Project	Responsibility/ Oversight	Funding/ Support/Cost	Timeframe	Estimated Cost
21	Continue to coordinate with Regional Special Operations Unit, and provide terrorism/active shooter training for emergency response personnel and in town schools	Police Chief	Town Operating Budget	Short	$5,000
9	Develop and implement a plan to address cyber threats to municipal resources	Information Technology Director	Town Operating Budget, Grant,	Short	Unknown until completed

SECTION IX: ADMINISTRATIVE PROCEDURES REGARDING ADOPTION, EVALUATION AND MONITORING OF THE PLAN

Incorporating the Plan into Existing Planning Mechanisms

Upon completion 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). An update of the EOP is continuing; future updates to the EOP will incorporate the Plan as a referenced appendix, but the two plans will always be printed as separated documents. The EOP is subject to annual review.

The Town has utilized the Hazard Mitigation Plan in the past in several ways, including by citing emergency operations requests within the Capital Improvement Program (CIP) specifically as it relates to mitigation strategies within the Plan, annual updates of the Emergency Operations Plan, and budget requests by Town departments such as highways, police, fire, and community development. The Plan will continue to be consulted when town departments submit their request for inclusion in the CIP. The Capital Improvements Committee is responsible for updating the CIP annually, presenting the document to the Planning Board for adoption, and then forwarding it to the Board of Selectmen for inclusion in their annual budget process. The Board of Selectmen, in conjunction with Windham Emergency Management will determine what items can and should be added to the annual budget based on the inclusion in the CIP, the Town's annual budget and possible sources of other funding. Portions of this Plan should be referred to when updates to the Town's Master Plan takes place. 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 (d) gives towns 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

Adoption

Upon notification that FEMA has conditionally approved this Plan, a public hearing will be held, and the Windham Board of Selectmen will formally adopt the Windham Hazard Mitigation Plan as an official statement of town policy. In the future, this Plan may constitute a new section of the Windham Master Plan, in accordance with RSA 674:2. The public hearing shall be properly posted and advertised by the Town in accordance with New Hampshire state law. Documentation that the Windham Board of Selectmen have formally adopted the Plan will be included in the Appendix J.

Adoption of the Windham Hazard Mitigation Plan demonstrates the Town's commitment to hazard mitigation. It also qualifies the municipality for federal, state,

and local funding and prepares the public for what the community can be expected to do both before and after a natural hazard disaster occurs.

Following adoption, the Hazard Mitigation Committee and the Board of Selectmen shall seek to incorporate the mitigation actions identified in the Prioritized Implementation Schedule of Section VIII of the Plan into other planning mechanisms, including the Town's Master Plan.

Monitoring, Evaluating and Updates

The Windham Hazard Mitigation Plan shall be monitored and evaluated annually to track progress in implementing the mitigation strategies and actions as well as updating the goals and objectives of the Plan. The Windham Board of Selectmen's administrative assistant shall be responsible for initiating this review and scheduling an annual meeting of the Hazard Mitigation Committee. The Windham Emergency Management Director shall be responsible for ensuring that the Plan is updated for FEMA approval at least every 5 years. In addition to reviewing Hazard Mitigation Committee members' progress on projects, the strategy for the following year will be reviewed and new projects will be selected for implementation at the annual meeting.

The Windham Board of Selectmen's administrative assistant will conduct updates in coordination with the Hazard Mitigation Committee and Windham Board of Selectmen. Updates should be made to the Plan every three to five years[61] to accommodate actions 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. Also, at that time any other items identified during the annual meetings will be updated in the Plan, including, but not limited to, goals, objectives, identification of past hazard events, and the inventory of town assets vulnerable to hazards.

Keeping with the process of adopting the Windham Hazard Mitigation Plan, a public hearing to receive comment on the Plan maintenance and updating shall be held during the review period, and the Board of Selectmen will adopt the final product.

During the budget process each year, department heads shall be responsible for considering hazard mitigation actions that need to be implemented as well as forwarding new actions that might be necessary to the Board of Selectmen's administrative assistant for inclusion in the annual plan review. The plan will be

[61] FEMA Disaster Mitigation Act of 2000 44 CFR Part 201.6(d)(3) mandates "Plans must be reviewed, revised if appropriate, and resubmitted for approval within five years to continue to be eligible for HMGP project grant funding." (Federal Register Vol. 36, No. 38, Feb 26, 2002, Rules and Regulations, p8852)

considered for incorporation into the community's Town Operating Budget, capital improvement plan considerations, and/or other planning mechanisms.

Continued Public Involvement

The public will continue to be invited and encouraged to be involved during this process at monitoring, evaluation and update meetings. All meetings involving implementation or updates of the Plan shall be open to the public as is required by RSA 91-A and notices of the meetings will be posted at least 24 hours in advance in a minimum of two locations, such as the town offices and library. The meetings may also be publicized in the local newspaper. To gain additional public involvement, draft copies of the amended Hazard Mitigation Plan will be made available at two public locations for review and comment. The document should be left for a minimum of two weeks and then all comments will be considered in drafting final revisions.

APPENDIX A
DAM CLASSIFICATION SCHEDULE

Non-Menace (NM) 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 (L) 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 (S) 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 (H) 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 471-A:2 VI.
- Any other circumstance that would more likely than not cause one or more deaths.

APPENDIX B:
SAFFIR/SIMPSON HURRICANE SCALE

Courtesy of National Hurricane Center

This can be used to give an estimate of the potential property damage and flooding expected along the coast with a hurricane[62].

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

[62] http://www.fema.gov/hazards/hurricanes/saffir.shtm

APPENDIX C:
FUJITA TORNADO DAMAGE SCALE

Tornadoes are measured based on the 3 second gust wind speed of the rotational winds. The Fujita Scale was developed at the University of Chicago in 1971 by Tetsuya Theodore Fujita in coordination with what is now known as NOAA's Storm Prediction Center to categorize each tornado by its intensity and estimated wind speeds. This scale is based off the Beaufort scale and Mach Numbers. The Fujita scale was updated in 1973 and continued to be used for several more decades. Over the years the following weaknesses were identified in the Fujita Scale:

- Subjective based solely on the damage caused by tornado
- No recognition of different [building] construction
- Difficult to apply with no damage indicators (if ¾ mile wide tornado does not hit a structure, what F-Scale should be assigned?)
- Subject to bias
- Based on worst damage (even if only one building)
- Overestimates wind speeds greater than F3
- Based on these weaknesses, the scale was updated in 2007 to what is now known as the Enhanced Fujita Scale (EF-Scale). The EF-Scale is now the standard scale for measuring tornadoes in the United States and in Canada[63].

FUJITA SCALE			DERIVED EF SCALE		**OPERATIONAL EF SCALE**	
F Number	Fastest 1/4-mile (mph)	3 Second Gust (mph)	EF Number	3 Second Gust (mph)	**EF Number**	**3 Second Gust (mph)**
0	40-72	45-78	0	65-85	**0**	**65-85**
1	73-112	79-117	1	86-109	**1**	**86-110**
2	113-157	118-161	2	110-137	**2**	**111-135**
3	158-207	162-209	3	138-167	**3**	**136-165**
4	208-260	210-261	4	168-199	**4**	**166-200**
5	261-318	262-317	5	200-234	**5**	**Over 200**

[63] https://www.spc.noaa.gov/faq/tornado/f-scale.html

APPENDIX D:
THE RICHTER MAGNITUDE SCALE

In the mid-1930s the Richter Scale, which measures earthquake magnitude, was developed and adopted as a logarithmic scale based on the amplitude of the seismic waves as measured on a seismograph at a standard distance. In the 1970s the Richter Scale was replaced by the Moment Magnitude Scale which captures all different seismic waves from an earthquake which allows for more precise measurement. An increase of 1 on the magnitude scale represents an earthquake that has 10x the energy than an earthquake of the previous magnitude[64].

Modified Mercalli Intensity Scale		
Magnitude	**Value**	**Description**
1.0 – 3.0	I	Not felt except by a very few under especially favorable conditions.
3.0-3.9	II	Felt only by a few persons at rest, especially on upper floors of buildings.
3.0-3.9	III	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
4.0-4.9	IV	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
4.0-4.9	V	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
5.0-5.9	VI	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
5.0-5.9	VII	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
6.0 and higher	VIII	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
6.0 and higher	IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
7.0 and higher	X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
7.0 and higher	XI	Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
7.0 and higher	XII	Damage total. Lines of sight and level are distorted. Objects thrown into the air.

[64] https://www.des.nh.gov/organization/commissioner/pip/factsheets/geo/documents/geo-3.pdf

APPENDIX E.
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New Hampshire Homeland Security and Emergency Management		(603) 271-2231
Federal Emergency Management Agency		1-877-336-2734
NH Regional Planning Commissions:		
	Central NH Regional Planning Commission	226-6020
	Lakes Region Planning Commission	279-8171
	Nashua Regional Planning Commission	424-2240
	North Country Council	444-6303
	Rockingham Planning Commission	778-0885
	Southern New Hampshire Planning Commission	669-4664
	Southwest Region Planning Commission	357-0557
	Strafford Regional Planning Commission	742-2523
	Upper Valley Lake Sunapee Regional Planning Commission	448-1680
NH Executive Department:		
	New Hampshire Office of Energy and Planning	(603) 271-2155
NH Department of Cultural Resources		(603) 271-2392
	Division of Historical Resources	603-271-3483
NH Department of Environmental Services		(603) 271-3503
	Air Resources	271-1386
	Waste Management	271-2925
	Water Conservation	271-0659
	Dam Safety & Maintenance	271-3406
NH Fish and Game Department		(603) 271-3421
NH Department of Resources and Economic Development		(603) 271-2411
	Division of Economic Development	(603) 271-2591
	Division of Forests and Lands	(603) 271-2214
	Division of Parks and Recreation	(603) 271-3556
NH Department of Transportation		(603) 271-3734
U.S. Department of Commerce		(202) 482-2000
	National Oceanic and Atmospheric Administration	1-301-713-1208
	National Weather Service; Gray, Maine	207-688-3216
U.S. Department of the Interior		
	U.S. Fish and Wildlife Service	1-800-344-9453
	U.S. Geological Survey	1-888-275-8747
U.S. Department of Agriculture		
	Natural Resource Conservation Service	888-526-3227

APPENDIX F.

Technical and Financial Assistance for Hazard Mitigation

This matrix provides information about key all-hazards grant programs from the Departments of Homeland Security, Justice, Transportation, Health and Human Services, and Education, under which state, local, and tribal governments, first responders, and the public are eligible to receive preparedness, response, recovery, mitigation, and prevention assistance.

Agency	Office/ Directorate	Program	Purpose	Funding Beneficiaries
Programs to prepare the Nation to address the consequences of natural and man-made disasters and emergencies.				
Department of Homeland Security	*Border and Transportation Security Directorate*	State Homeland Security Grant Program www.ojp.usdoj.gov	This core assistance program provides funds to build capabilities at the state and local levels and to implement the goals and objectives included in state homeland security strategies and initiatives in the State Preparedness Report.	State governments
	Emergency Preparedness and Response Directorate	Emergency Management Performance Grants www.fema.gov http://www.fema.gov/government/grant/index.shtm	To assist State and local governments in enhancing and sustaining all-hazards emergency management capabilities.	States with pass through to local emergency management organizations
	Emergency Preparedness and Response Directorate	Assistance to Firefighters Grant Program www.usfa.fema.gov/grants http://www.firegrantsupport.com/afg/	The primary goal of the Assistance to Firefighters Grants (AFG) is to meet the firefighting and emergency response needs of fire departments and nonaffiliated emergency medical services organizations.	Local, State, and Regional Fire Departments and agencies.
	Emergency Preparedness and Response Directorate	State and Local Emergency Operation Centers (EOCs) www.fema.gov http://www.fema.gov/government/grant/index.shtm	To improve emergency management and preparedness capabilities by supporting flexible, sustainable, secure, and interoperable Emergency Operations Centers (EOCs) with a focus on addressing identified deficiencies and needs.	States; local governments may be sub-grantees of the State
	Emergency Preparedness and Response Directorate	Citizen Corps www.citizencorps.gov	To bring community and government leaders together to coordinate community involvement in emergency preparedness, planning, mitigation, response and recovery.	States with a pass through to local governments

Agency	Office/ Directorate	Program	Purpose	Funding Beneficiaries
Department of Homeland Security	*Emergency Preparedness and Response Directorate*	National Fire Academy Training Grants www.fema.gov	To provide financial assistance to State Fire Training Systems for the delivery of a variety of National Fire Academy courses/programs.	State fire training organizations
	Emergency Preparedness and Response Directorate	Emergency Management Institute Training Assistance www.fema.gov	To defray travel and per diem expenses of State, local and tribal emergency management personnel who attend training courses conducted by the Emergency Management Institute, at the Emmitsburg, Maryland facility; Bluemont, Virginia facility; and selected off-site locations. Its purpose is to improve emergency management practices among State, local and tribal government managers, in response to emergencies and disasters. Programs embody the Comprehensive Emergency Management System by unifying the elements of management common to all emergencies: planning, preparedness, mitigation, response, and recovery.	State, local, and tribal emergency managers
	Emergency Preparedness and Response Directorate	Hazardous Materials Assistance Program (CERCLA Implementation)	Provide technical and financial assistance through the States to support State, local and tribal governments in oil and hazardous materials emergency planning and exercising. To support the Comprehensive Hazardous Materials (HAZMAT) Emergency Response – Capability Assessment Program (CHER-CAP) activities.	State, local, and tribal governments, state emergency response committees, local emergency planning commissions
	Emergency Preparedness and Response Directorate	Interoperable Communications Equipment Grant http://www.fema.gov/government/grant/index.shtm	To provide governance, planning, training and exercise, and equipment funding to States, Territories, and local and tribal governments to carry out initiatives to improve interoperable emergency communications, including communications in collective response to natural disasters, acts of terrorism, and other man-made disasters.	N/A

Agency	Office/ Directorate	Program	Purpose	Funding Beneficiaries
Department of Homeland Security	*Emergency Preparedness and Response Directorate*	Chemical Stockpile Emergency Preparedness Program www.fema.gov	A cooperative agreement to enhance emergency preparedness capabilities of the States and local communities at each of the eight chemical agent stockpile storage facilities. The purpose of the program is to assist States and local communities in efforts to improve their capacity to plan for and respond to accidents associated with the storage of chemical warfare materials.	State and local governments and the general public in the vicinity of the eight chemical agent stockpile storage facilities.
	National Preparedness Directorate	**Metropolitan Medical Response System** http://www.fema.gov/mmrs	To provide contractual funding to the 124 largest metropolitan jurisdictions to sustain and enhance the integrated medical response plans to a WMD terrorist attack.	Local governments
Department of Justice	*Office of Domestic Preparedness*	State Domestic Preparedness Equipment Support Program http://www.ojp.usdoj.gov/odp/equipment.htm	Funding will be provided to enhance first responder capabilities, and to provide for equipment purchases and exercise planning activities for response to Weapons of Mass Destruction (WMD) domestic terrorist incidents.	State and local governments
	Office of Community Oriented Police Services (COPS)	COPS Interoperable Communications Technology Program www.cops.usdoj.gov	To facilitate communications interoperability public safety responders at the state and local level.	Tribal, State, and local law enforcement agencies
Department of Health and Human Services		Public Health and Social Services Emergency Fund www.hhs.gov	To continue to prepare our nation's public health system and hospitals for possible mass casualty events, and to accelerate research into new treatments and diagnostic tools to cope with possible bioterrorism incidents.	Individuals, families, Federal, State, and local government agencies and emergency health care providers

Agency	Office/ Directorate	Program	Purpose	Funding Beneficiaries
	Health Resources and Services Administration	State Rural Hospital Flexibility Program www.ruralhealth.hrsa.gov	To help States work with rural communities and hospitals to develop and implement a rural health plan, designate critical access hospitals (CAHs), develop integrated networks of care, improve emergency medical services and improve quality, service and organizational performance.	States with at least one hospital in a non-metropolitan region
Department of Health and Human Services	*Health Resources and Services Administration*	EMS for Children www.hrsa.gov	To support demonstration projects for the expansion and improvement of emergency medical services for children who need treatment for trauma or critical care. It is expected that maximum distribution of projects among the States will be made and that priority will be given to projects targeted toward populations with special needs, including Native Americans, minorities, and the disabled.	State governments and schools of medicine
	National Institute of Health	Superfund Hazardous Substances Basic Research and Education www.nih.gov	To establish and support an innovative program of basic research and training consisting of multi-project, interdisciplinary efforts that may include each of the following: (1) Methods and technologies to detect hazardous substances in the environment; (2) advance techniques for the detection, assessment, and evaluation of the effects of hazardous substances on humans; (3) methods to assess the risks to human health presented by hazardous substances; and (4) and basic biological, chemical, and physical methods to reduce the amount and toxicity of hazardous substances.	Any public or private entity involved in the detection, assessment, evaluation, and treatment of hazardous substances; and State and local governments
	Centers for Disease Control	Immunization Research, Demonstration, Public Information and Education www.cdc.gov	To assist States, political subdivisions of States, and other public and private nonprofit entities to conduct research, demonstrations, projects, and provide public information on vaccine-preventable diseases and conditions.	States and nonprofits organizations

Agency	Office/ Directorate	Program	Purpose	Funding Beneficiaries
	Centers for Disease Control	Surveillance of Hazardous Substance Emergency Events www.atsdr.cdc.gov	To assist State health departments in developing a State-based surveillance system for monitoring hazardous substance emergency events. This surveillance system will allow the State health department to better understand the public health impact of hazardous substance emergencies by developing, implementing, and evaluating a State-based surveillance system.	State, local, territorial, and tribal public health departments
Department of Health and Human Services	*Centers for Disease Control*	Human Health Studies, Applied Research and Development www.atsdr.cdc.gov	To solicit scientific proposals designed to answer public health questions arising from situations commonly encountered at hazardous waste sites. The objective of this research program is to fill gaps in knowledge regarding human health effects of hazardous substances identified during the conduct of ATSDR's health assessments, consultations, toxicological profiles, and health studies, including but not limited to those health conditions prioritized by ATSDR.	State health departments
Department of Education	Office of Safe and Drug free Schools (OSDFS)	Readiness and Emergency Management for Schools http://www.ed.gov/programs/dvpemergencyresponse/index.html/	This grant program supports efforts by LEAs to improve and strengthen their school emergency management plans, including training school personnel and students in emergency management procedures; communicating with parents about emergency plans and procedures; and coordinating with local law enforcement, public safety, public health, and mental health agencies.	School Districts

Agency	Office/ Directorate	Program	Purpose	Funding Beneficiaries
Department of Transportation	*Pipeline and Hazardous Materials Safety Administration (PHMSA)*	Hazardous Materials Emergency Preparedness Training and Planning Grants http://phmsa.dot.gov/hazmat/grants	Increase state, local, territorial, and Native American tribal effectiveness to safely and efficiently handle HazMat accidents and incidents; enhance implementation of the Emergency Planning and Community Right-to-Know Act of 1986; and encourage a comprehensive approach to emergency planning and training by incorporating response to transportation standards.	States, local, territorial, tribal governments.
Programs to coordinate Federal response efforts and to assists states, localities, and tribes in responding to disasters and emergencies.				
Department of Homeland Security	*Emergency Preparedness and Response Directorate*	Urban Search and Rescue www.fema.gov	To expand the capabilities of existing Urban Search and Rescue Task Forces.	28 existing US&R Task Forces
Programs to provide assistance to States, localities, tribes, and the public to alleviate suffering and hardship resulting from Presidentially declared disasters and emergencies caused by all types of hazards.				
Department of Homeland Security	*Emergency Preparedness and Response Directorate*	Individuals and Households Program http://www.fema.gov/assistance/process/guide.shtm	**To provide assistance to individuals and families who have been affected by natural or man-made Presidentially declared disasters. Funding provided from the Disaster Relief Fund.**	Individuals and Families
	Emergency Preparedness and Response Directorate	Public Assistance http://www.fema.gov/government/grant/pa/index.shtm	**To provide assistance to states, localities, tribes, and certain non-profit organizations affected by natural or man-made Presidentially declared disasters. Funding provided from the Disaster Relief Fund**	State, local and tribal governments; private non-profit organizations

Agency	Office/ Directorate	Program	Purpose	Funding Beneficiaries
	Emergency Preparedness and Response Directorate	Fire Management Assistance Grant Program http://www.fema.gov/government/grant/fmagp/index.shtm	**Provide funds to States, local, and tribal governments for the mitigation, management, and control of wildland fires posing serious threats to improved property.**	State, local and tribal governments
Small Business Administration	*Office of Disaster Assistance*	Disaster Loan Program http://www.sba.gov/services/disasterassistance/	**To offer financial assistance to those who are trying to rebuild their homes and businesses in the aftermath of a disaster.**	Individuals, families, private sector
Department of Justice	*Office for Victims of Crime*	Antiterrorism and Emergency Assistance Program http://www.ojp.usdoj.gov/ovc/publications/infores/terrorism/	**To provide assistance programs for victims of mass violence and terrorism occurring within and outside the United States and a compensation program for victims of international terrorism.**	Public and private nonprofit victim assistance agencies
Programs to reduce or eliminate future risk to lives and property from disasters.				
Department of Homeland Security	*Emergency Preparedness and Response Directorate*	Hazard Mitigation Grant Program http://www.fema.gov/government/grant/hmgp/index.shtm	**To provide assistance to states, localities, and tribes to fund projects that will reduce the loss of lives and property in future disasters. Funding is provided from the Disaster Relief Fund and administered by the states according to their own priorities.**	State, local, and tribal governments
	Emergency Preparedness and Response Directorate	Pre-Disaster Mitigation Program http://www.fema.gov/government/grant/pdm/index.shtm	**This program provides funding for mitigation activities before disaster strikes. In recent years it has provided assistance for mitigation planning. In FY03, Congress passes a competitive pre-disaster mitigation grant program that will include project funding.**	State, local, and tribal governments

Agency	Office/ Directorate	Program	Purpose	Funding Beneficiaries
Department of Homeland Security	*Emergency Preparedness and Response Directorate*	Flood Mitigation Assistance Program (FMA) http://www.fema.gov/government/grant/fma/index.shtm	**The FMA program was created as part of the National Flood Insurance Reform Act (NFIRA) of 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP).FEMA provides FMA funds to assist States and communities implement measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the National Flood Insurance Program.**	State, local and tribal governments
	Emergency Preparedness and Response Directorate	Repetitive Flood Claims Program (RFC) http://www.fema.gov/government/grant/rfc/index.shtm	**The Repetitive Flood Claims (RFC) grant program was authorized by the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004 (P.L. 108–264), which amended the National Flood Insurance Act (NFIA) of 1968 (42 U.S.C. 4001, et al). Up to $10 million is available annually for FEMA to provide RFC funds to assist States and communities reduce flood damages to insured properties that have had one or more claims to the National Flood Insurance Program (NFIP).**	State, local and tribal governments
	Emergency Preparedness and Response Directorate	Severe Repetitive Loss Program (SRL) http://www.fema.gov/government/grant/srl/index.shtm	**The Severe Repetitive Loss (SRL) grant program was authorized by the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004, which amended the National Flood Insurance Act of 1968 to provide funding to reduce or eliminate the long-term risk of flood damage to severe repetitive loss (SRL) structures insured under the National Flood Insurance Program (NFIP).**	State, local and tribal governments
	Emergency Preparedness and Response Directorate	Map Modernization http://www.fema.gov/plan/prevent/fhm/mm_main.shtm	**This funding provides assistance to develop digital flood maps, support flood-mapping activities and expand the Cooperating Technical Partners Program to communities and regional entities.**	State, local and tribal governments

Agency	Office/ Directorate	Program	Purpose	Funding Beneficiaries
Programs to interdict potentially hazardous events from occurring				
Department of Health and Human Services	*Centers for Disease Control*	Immunization Grants www.cdc.gov	To assist States and communities in establishing and maintaining preventive health service programs to immunize individuals against vaccine-preventable diseases.	States
Other				
Department of Housing and Urban Development	*NH Office of Energy and Planning*	Community Development Block Grant (CDBG) Program http://www.hud.gov/offices/cpd/communitydevelopment/programs/	HUD provides flexible grants to help cities, counties, and States recover from Presidentially declared disasters, especially in low-income areas, subject to availability of supplemental appropriations.	State, local and tribal governments

Mitigation Programs of Other NH State Agencies

The following State of New Hampshire agencies are directly or indirectly involved in activities that include Hazard Mitigation Planning and/or program implementation:

- NH Department of Transportation Bureau of Repair and Maintenance
- NH OSP/NFIP Program
- NH OSP Coastal Program
- NH DRED Division of Forests and Lands
- NHDES Water Resources Division – Dam Safety Program
- NHDES Wetlands Program
- NHDES Shoreline Protection

APPENDIX G.
PREVIOUS STAPLEE AND PROJECT EVALUATIONS

Staplee Criteria from Windham 2013 Hazard Mitigation Plan Update:

Table 11a: Mitigation Action: Develop a Continuity of Operations Plan for the Town

Criteria	Score
Does it reduce disaster damage?	3
Does it contribute to other goals?	3
Does it benefit the environment?	3
Does it meet regulations?	2
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?	2
A: Is it Administratively workable?	2
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
TOTAL SCORE	**38**

Table 11b: Mitigation Action: Provide/Construct a Secondary Egress for the Town Safety Complex

Criteria	Score
Does it reduce disaster damage?	3
Does it contribute to other goals?	3
Does it benefit the environment?	1
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?	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?	3
TOTAL SCORE	**29**

Table 11c: Mitigation Action: Purchase and Distribute Emergency Kits for Residents that Identify Alternate Communication Methods

Criteria	Score
Does it reduce disaster damage?	1
Does it contribute to other goals?	3
Does it benefit the environment?	1
Does it meet regulations?	1
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?	2
E: Are other Environmental approvals required?	3
TOTAL SCORE	**32**

Table 11d: Mitigation Action: Retrofit Buildings and Purchase Generators to Power Municipal Buildings During Power Outages

Criteria	Score
Does it reduce disaster damage?	3
Does it contribute to other goals?	3
Does it benefit the environment?	1
Does it meet regulations?	2
Will historic structures be saved or protected?	3
Does it help achieve other community goals?	3
Could it be implemented quickly?	1
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
TOTAL SCORE	**36**

Table 11e: Mitigation Action: Upgrade Culverts on Nashua Road and Castle Hill Road

Criteria	Score
Does it reduce disaster damage?	3
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?	2
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?	2
E: Are other Environmental approvals required?	2
TOTAL SCORE	**37**

Table 11f: Mitigation Action: Purchase a Woodchipper

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?	3
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?	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
TOTAL SCORE	**39**

Staplee Criteria from 2008 Hazard Mitigation Plan Update:

Hazard	Problem Statement	Projects *Prevention /Property Protection/ Public Educ./ Nat.Resources /Emerg.Serv / Structural*	Social	Technical	Administrative	Political	Legal	Economic	Environments
Flood	1. Heavy and prolonged rain events cause flood damage primarily to roads and culverts.	Upgrade culverts on Daron Road, Rowe Road, Roulston Road, East Nashua Road, Lovell Road and Castle Hill Road Bridge	+	+	+	+	+	+	+
	2. Some residential structures are prone to flooding.	Public Education: Brochures at town hall and Public Service Announcements (PSA) on local cable	+	+	+	+	+	+	+
	3. Flooding limits access to some critical areas in town (i.e retail, commercial, municipal, residential).	Provide/Construct a secondary egress for the Town Safety Complex	-	+	+	-	+	+	+
Winter Weather	4. Snow removal costs associated with heavy snowstorms can create a financial burden to the town.	None							
	5. All structures are susceptible to collapse due to heavy snow loads	Develop a PSA for winter weather hazards	+	+	+	+	+	+	+
		Provide collapsed building training for Fire Department	+	+	+	+	+	+	+
	6. Resulting power outages result in increased emergency response calls and could require opening the shelter.	Retrofit the Shelter and purchase a generator (portable or fixed) to allow shelter operations during power outages.	+	+	+	+	+	+	+
	7. Severe winter weather limits access to some critical areas in town (i.e. residential areas & secondary roads).	Purchase a snow sled and ATV for transportation of EMS Patients.	+	+	+	+	+	+	+

Hazard	Problem Statement	Projects *Prevention /Property Protection/ Public Educ./ Nat.Resources /Emerg.Serv / Structural*	Social	Technical	Administrative	Political	Legal	Economic	Environments
	8. Severe winter weather can impact staffing assignments – (Continuity of Operations).	Develop a Continuity of Operations Plan for the Town.	+	+	+	+	+	+	+
		Retrofit buildings and purchase a generator to power the municipal complex buildings during power outages.	+	+	+	+	+	+	+
Severe Wind	9. Wind damage can result in downed utilities causing power outages and limit access.	Purchase a woodchipper.	+	+	+	+	+	+	+
		Purchase a winch for police to remove debris and obstacles.	+	+	+	+	+	+	+
		Develop MOUs with LL&S in Salem and M&R woodprocessing plant in Derry to take wood debris.	+	+	+	+	+	+	+
	10. Severe winds can cause structural damage to critical facilities and other structures.	Work with a private tree service to assess critical facilities and trim trees to prevent utility and structural damage.	+	+	+	+	+	+	+
	11. High population (recreational) areas are at high risk in severe wind events.	Develop public education signage pertaining to severe wind events.	+	+	+	+	+	+	+
Hurricane	12. Power outages from downed utilities, minor structural damage, limit access and flooding can affect the town as a result of a hurricane.	Addressed in other identified projects.	+	+	+	+	+	+	+
	13. Hurricane can impact staffing assignments – (Continuity of Operations)	Addressed in other identified projects.	+	+	+	+	+	+	+

Hazard	Problem Statement	Projects *Prevention /Property Protection/ Public Educ./ Nat.Resources /Emerg.Serv / Structural*	Social	Technical	Administrative	Political	Legal	Economic	Environments
	14. Potential for significant injury and deaths.	none	+	+	+	+	+	+	+
Lightning	15. Structural and forest fires can result from frequent lightning strikes	Purchase a woodland 4-wd fire vehicle with portable pumps.	+	+	+	+	+	+	+
	16. Outdoor populations are at risk during lightning events.	Addressed in other identified projects.	+	+	+	+	+	+	+
	17. Communication towers at risk during lightning events.	Purchase and distribute emergency kits for residents that identify alternate communication methods.	+	+	+	+	+	+	+
		Purchase a satellite phone for town emergency.	+	+	+	+	+	+	+
Wild/Forest Fire	18. Need to determine and implement areas in town that need additional fire suppression capability (dry hydrants, cisterns, etc).	Work with Resource Conservation and Development (RC&D) on developing a Water Availability / Resource Plan.	+	+	+	+	+	+	+
		Identify a pump station for additional water supply (perhaps the transfer station or Wilson Property).	+	+	+	+	+	+	+
	19. Limited accessibility for emergency apparatus (Town Forest area / near the interstate) – need secondary roads – use the class 6 (Collins brook) road for a secondary access out of fire department.	Purchase a mobile command vehicle	+	+	+	+	+	+	+
		Purchase bladder packs for fire suppression in limited access areas.	+	+	+	+	+	+	+
Extreme Heat	20. Special populations are at high risk during prolonged extreme heat	Addressed in other identified projects.	+	+	+	+	+	+	+

Hazard	Problem Statement	Projects *Prevention /Property Protection/ Public Educ./ Nat.Resources /Emerg.Serv / Structural*	Social	Technical	Administrative	Political	Legal	Economic	Environments
	events.								
Drought	21. Private wells dry-up during periods of drought.	Develop PSA promoting limited water use during droughts.	+	+	+	+	+	+	+
	22. An extended drought increases the probability of fires and may hinder fire suppression. (range road is one area – brook on 111 has been used for center school – but has been drying up – so the 40,000 cisterns at the fire covers the school)	Addressed in other identified projects.	+	+	+	+	+	+	+
Dam Failure	23. There are several dams in and outside of Windham that, if breeched, could cause significant flood damage.	Identify structures and infrastructure located in the dam inundation pathway of South Road Dam in Londonderry.	+	+	+	+	+	+	+
	24. Contamination of potable water.	None							
Landslide	25. There are several areas in town susceptible to landslide.	None	+	+	+	+	+	+	+
Earthquake	26. Structures made of un-reinforced masonry are most susceptible to earthquake damage.	None	+	+	+	+	+	+	+
Human	27. There is a potential for mass casualty incidents due to the high volume of traffic on I-93, 128, 28 and 111.	Provide mass casualty training for the Fire Department.	+	+	+	+	+	+	+

Hazard	Problem Statement	Projects *Prevention /Property Protection/ Public Educ./ Nat.Resources /Emerg.Serv / Structural*	Social	Technical	Administrative	Political	Legal	Economic	Environments
Caused Hazard	28. Transportation related Hazardous Material incidents are highly probably and will result in moderate human, property & business impact.	Update Windham's Hazardous Material Equipment (gas meters, PID, etc.)	+	+	+	+	+	+	+
		Conduct hazardous material training for town employees.	+	+	+	+	+	+	+
	29. Municipal buildings, including schools, are at risk to armed assault.	Implement key card entry for all schools.	+	+	+	+	+	+	+
	30. Groundwater contamination has occurred in the past.	None	+	+	+	+	+	+	+
	31. There is a potential for terrorist incidents.	Addressed in other identified projects.	+	+	+	+	+	+	+
Prolonged Power Outage	32. Special populations are at risk during prolonged power outages.	Conduct emergency preparedness PSAs and public education campaign for especial populations.	+	+	+	+	+	+	+
	33. Communication failures are likely.	Addressed in other identified projects.	+	+	+	+	+	+	+
	34. Windham and the region at large are at risk to public health emergencies.	Work with the Health Region to conduct a public education campaign for public health emergencies.	+	+	+	+	+	+	+
	35. Continuity of operations for town government and response operations.	Addressed in other identified projects.	+	+	+	+	+	+	+

APPENDIX H.
COMMITTEE MEETINGS, MINUTES AND ATTENDANCE SHEETS

Windham Hazard Mitigation Committee Meeting

AGENDA: Meeting # 1
Friday November 2, 2018
Windham Fire Dept. 3 Fellows Rd.
Windham, NH

1. **Introductions**
    a. Elect Chair
    b. Minute Taker
    c. Ground Rules (Plan requirements, Time Match, Who's Missing?)
2. **Overview of the Hazard Mitigation Planning Process**
    a. Review of materials (including maps)
    b. Posting requirements
    c. Public Involvement and Outreach
    d. Purpose and benefits of Hazard Mitigation Plans
    e. Tasks to complete the plan update (see attached)
    f. Review HMP Goals
    g. Development Trends
3. **Identify/Update Past and Potential Hazards (HMP Section II)**
    a. Identify past hazard events in Windham.
    Natural hazards are addressed as follows:
        i. Flooding
        ii. Wind
        iii. Wildfire
        iv. Ice and Snow Events
        v. Earthquakes
        vi. Other Hazards
    b. Discuss maps
4. **Hazard Vulnerability Assessment**
5. **Critical Facilities at Risk**
6. **Task List for Meeting #2**
    a. Hazard Identification and Probability

b. Costs
c. Photos

7. Next Meeting Schedule_____ and Adjournment

Windham Hazard Mitigation Committee Meeting

Minutes: Meeting #1
Friday, November 2, 2018 9am
Windham Fire Department, 3 Fellows Road
Windham, NH

Attendees: David Sullivan, Thomas McPherson, Michael Caron, Edward Morgan, Rex Norman, Michael McGuire, Richard Gregory, Paula Carmichael, Jack McCartney, Gerald Lewis
Southern NH Planning Commission: Cam Prolman, Associate Planner; Madeleine DiIonno, Assistant Planner
Committee Member Absent: Stephen Brady, Eric Delong, Frank Farmer, Maryann Horaj, Richard Langlois, Daniel Popovici-Muller

Introductions

a. Elected Tom McPherson, Windham Fire Chief as Committee Chair
b. Elected Minute Takers – Paula Carmichael HR Director with assistance from Jack McCartney, General Service Director
c. Discussed Ground Rules (Plan requirements, Time match, who's missing?)
d. The Committee will be tasked with reviewing the Town's Hazard Mitigation Plan. The plan is required to be reviewed every 5 years by FEMA
e. We may have attendees as needed from Homeland Security and Shelters.

Overview of the Hazard Mitigation Planning Process

a. Cam reviewed the Goals and Objectives Handout
b. Maps of Windham and Rockingham County were provided for the team.
c. Cam gave a brief explanation of what the hazard mitigation plan covers. This included: flood zones, areas of major development, major culvert repair or needs and other issues that might arise.
d. Committee Meetings are to be posted with agenda
e. Public outreach is recommended for input on the plan/demonstrate to FEMA; be creative to get message of plan out for public awareness
f. Share any pictures of recent hazard events with Cam – tree damage/flooding, any other incident Rex has aerial photos that can be added to the GIS
g. 2013 plan had 10 listed tasks, the 2019 plan per FEMA guidelines has 9

Identify/Update Past and Potential Hazards (HMP Section II)

a. Hazards identified in the plan must have documentation on how the Town responds

Hazard Vulnerability Assessment/Critical Facilities at Risk

a. Reviewed natural hazards and made changes as needed
b. Reviewed critical facilities list and made changes as needed
c. Added Lowell Road Tank Farm
d. Added Town Senior Center

Mitigation Action Plan

a. Eliminated #5 due to Town having sufficient shelters and emergency shelters with generators
b. Eliminated #15 (police department winch) as fire department is equipped with winches in many vehicles
c. Eliminated #18 (bladder packs for Fire Department) newer methods being used.

Wrap-up

a. Southern NH Planning Commissions will review the plan, make amended changes, add new map. Final review by Committee.
b. Actions plans will be reviewed regularly (at minimum quarterly) at department head meetings.

Task List/Action Items for meeting #2

- Update road layout maps for 2019 plan – Rex to update and pass along to Eric. Eric/IT to scan and send to Maddie. Review flood areas and/or areas of concern on said maps. Helpful for mapping updates and FEMA initiatives
- Update list of new developments/determine if we are more or less vulnerable from the 2013 plan - IT to run report of new developments since 2013
- Review goals and objectives of plan – keep 2013 or update to current state goals. Tom to update
- Update committee member names - Tom
- Review new guidelines
- Review changes to mitigation action plan

Meeting Adjourned at 10:30am

Next Meeting Scheduled for December 7th at 9am

Town of Windham, New Hampshire

Hazard Mitigation Committee Meeting #1

November 2, 2018
9:00AM

ATTENDANCE SHEET

Name	Position Title/ Department Affiliation	E-mail & Phone
Edward Morgan	Assistant Fire Chief Windham Fire Dept.	Emorgan@windhamnh.gov
Rex Norman	Director Community Development	RNORMAN@WINDHAMNH.GOV
Mike McGeorge	"	mmcgeorge@windhamnh.gov
Dick Gregory	Planning Director	dgregory@windhamnh.gov
Mike Caron	CAPTAIN WPD	MCARON@WINDHAMPD.COM
Paula Carmichael	HR Director	HR@WindhamNH.gov
Angela Wesson	Intern	
Jack McCartney	General Services Director	jmccartney@windhamnh.gov
Cam Prolman	SNHPC	cprolman@SNHPC.ORG
Maddie DiIonno	SNHPC	mdiionno@snhpc.org
David Sullivan	Town Administrator	dsullivan@WINDHAMNH.GOV
Thomas McPherson	Fire Chief - EMD	Firechief@Windhamnh.gov
Gerry Lewis	Police Chief	GLEWIS@WINDHAMPD.COM

Windham Hazard Mitigation Committee Meeting

AGENDA: Meeting # 2
Friday December 7th, 2018
Windham Fire Dept. 3 Fellows Rd.
Windham, NH

1. Welcome and Introduction

2. Capability Assessment

- Identify Existing Mitigation Strategies/Projects
- Identify New Mitigation Strategies/Projects

3. Evaluate Each Strategy/Project

- Using the STAPLEE METHOD.

4. Prioritize Proposed Mitigation Strategies

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

5. Establish an implementation strategy for each new mitigation Strategy defining the following three questions (Step 8)

- Who will lead the effort?
- How will it be implemented? *(Technical and Financial resources)*
- When will it take place?

6. Discuss Monitoring, Updating and Adoption of Plan

Windham Hazard Mitigation Committee Meeting

Minutes Meeting # 2
Friday December 7th, 2018
Windham Fire Dept. 3 Fellows Rd.
Windham, NH

Attendees: David Sullivan, Thomas McPherson, Michael Caron, Edward Morgan, Rex Norman, Michael McGuire, Richard Gregory, Paula Carmichael, Jack McCartney, Gerald Lewis, Stephen Brady

Southern NH Planning Commission: Cam Prolman, Associate Planner; Madeleine DiIonno, Assistant Planner

Committee Member Absent: Eric Delong, Frank Farmer, Maryann Horaj, Richard Langlois, Daniel Popovici-Muller

Welcome and Introduction

Minutes from 11/7/2018 meeting were approved – Gregory motion to approved, Morgan second; vote was unanimous.

Cam and Maddie gave a quick review of last meeting mitigation strategies and a summary of items to address at this meeting. Cam also spoke of things that may need to be addressed by changing the risk rating.

Capability Assessment

Identify Existing Mitigation Strategies/Projects

Cam spoke of upgrades to the culverts or bridges on Rock Pond Road, Moeckel Road, and Golden Brook Road

There were no changes to the temperature guidelines

Road infrastructure also stayed the same. Chief McPherson suggested changing the risk factor, but after discussion it was decided to leave it as a medium as it is currently.

Identify New Mitigation Strategies/Projects

Cyber events were discussed due to possible high risk. It was decided a mitigation plan should be developed.

Chief Lewis discussed continuous training for terrorism and active shooter. The Town has mutual aid agreements with surrounding departments.

Evaluate Each Strategy/Project

The Committee reviewed seven (7) new items. The committee recommended timeframes, cost, responsible person or party, and possible funding sources.

- **Prioritize Proposed Mitigation Strategies**

The Committee reviewed the plan and prioritized each new mitigation strategy by number. Other strategies were discussed and recommended to be moved on the list due to changes in priorities; ongoing items; or ongoing training.

Establish an implementation strategy for each new mitigation Strategy; Discuss Monitoring, Updating and Adoption of Plan

Once the plan is complete, it will be presented to the Board of Selectmen for approval and adoption. The final plan must be approved by FEMA.

Meeting Adjourned at 10:20am

Ongoing Task List/Action Items for meeting

- Update road layout maps for 2019 plan – Rex to update and pass along to Eric. Eric/IT to scan and send to Maddie. Review flood areas and/or areas of concern on said maps. Helpful for mapping updates and FEMA initiatives
- Update list of new developments/determine if we are more or less vulnerable from the 2013 plan - IT to run report of new developments since 2013
- Review goals and objectives of plan – keep 2013 or update to current state goals. Tom to update
- Update committee member names - Tom
- Review new guidelines
- Review changes to mitigation action plan

Next Meeting Scheduled for January 18th at 9am

Town of Windham, New Hampshire

Hazard Mitigation Committee Meeting #2

December 7, 2018
9:00AM

ATTENDANCE SHEET

Name	Position Title/ Department Affiliation	E-mail & Phone
Cam Pralman	SNHPC	cpralman@snhpcog.org
Dick Gregory	TOW	dgregory@windham.nh.gov
REX NORMAN	DIRECTOR WINDHAM COMMUNITY DEV.	RNORMAN@WINDHAM.GOV
GERALD LEWIS	POLICE CHIEF	603-434-5577 GLEWIS@WINDHAMPD.COM
THOMAS MCPHERSON	FIRE CHIEF	firechief@windhamnh.gov
DAVID SULLIVAN	TOWN ADMINISTRATOR	TOWNADMIN@WINDHAMNH.GOV
Steve Brady	Deputy Fire Chief	sbrady@windhamnh.gov
MADDIE DILONNO	SNHPC	mdilonno@snhpc.org
Paula Carmichael	HR Director/Town	HR@windhamNH.gov

Windham Hazard Mitigation Committee Meeting

AGENDA: Meeting # 3
Friday February 1st, 2019
Windham Fire Dept. 3 Fellows Rd.
Windham, NH

1. Welcome and Introduction

2. Approve the Minutes from December 7th, 2018 meeting

3. Review Task List from meetings 1 & 2:

- New and proposed mitigation actions matrix and summary
- Review final Critical Facilities table and map
- Review other maps

4. Discuss Monitoring, Updating and Adoption of Plan

5. Next Steps

- Final edits by SNHPC staff
- Final review by Windham Hazard Mitigation Committee
- Plan Submittal

Town of Windham, New Hampshire

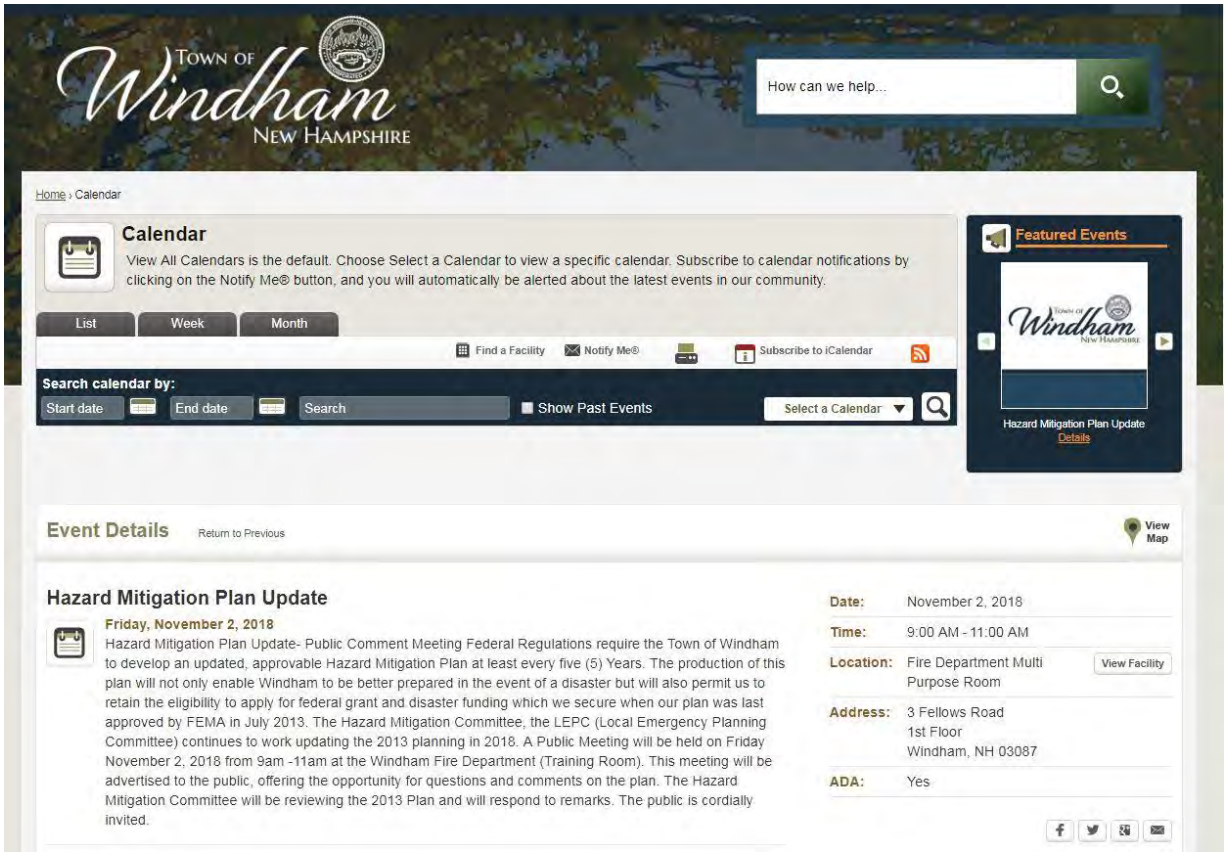
Hazard Mitigation Committee Meeting #3

February 1, 2019
9:00AM

ATTENDANCE SHEET

Name	Position Title/ Department Affiliation	E-mail & Phone
Cam Pedman	SNHPC	
Dave Sullivan	Windham	
Dick Gregory	Windham Planning	dgregory@windhamnh.gov
Mike Carrow	Captain WPD	MCARROW@WINDHAMPD.COM
Roger Preston	Facilities Manager	
Paula Rosenfeld	HR Director Windham	HR@WindhamNH.gov
Rick Norman	Director Community Development	
Jack McCartney	Highway Department	jmccartney@windhamnh.gov
Stephen Brady	Deputy Fire Chief	sbrady@windhamnh.gov
Tom McPherson	Fire Chief	Firechief@windhamnh.gov

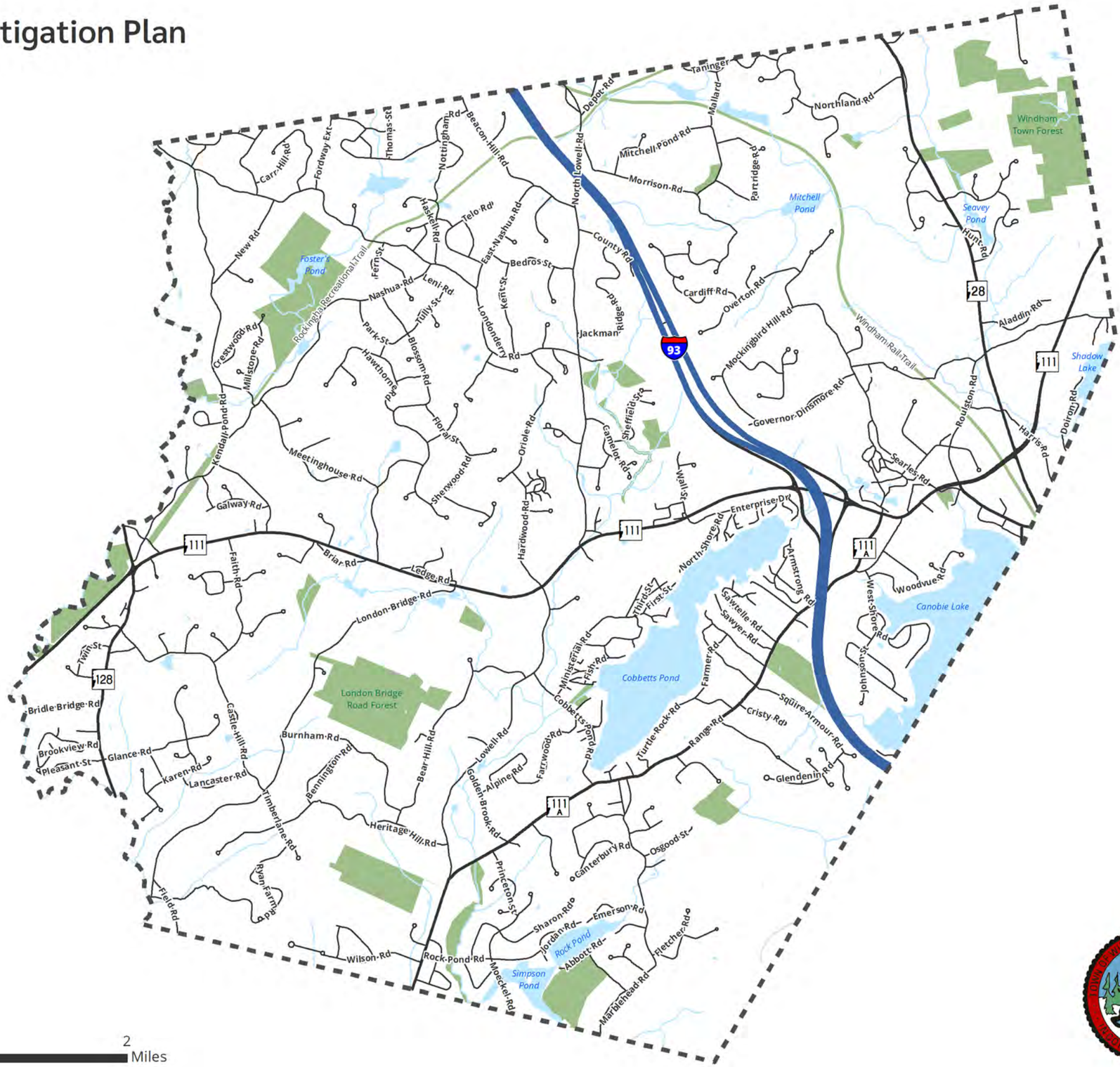
APPENDIX I.
Notice of Public Meetings



Appendix J.
Maps

Windham Hazard Mitigation Plan

Map 1



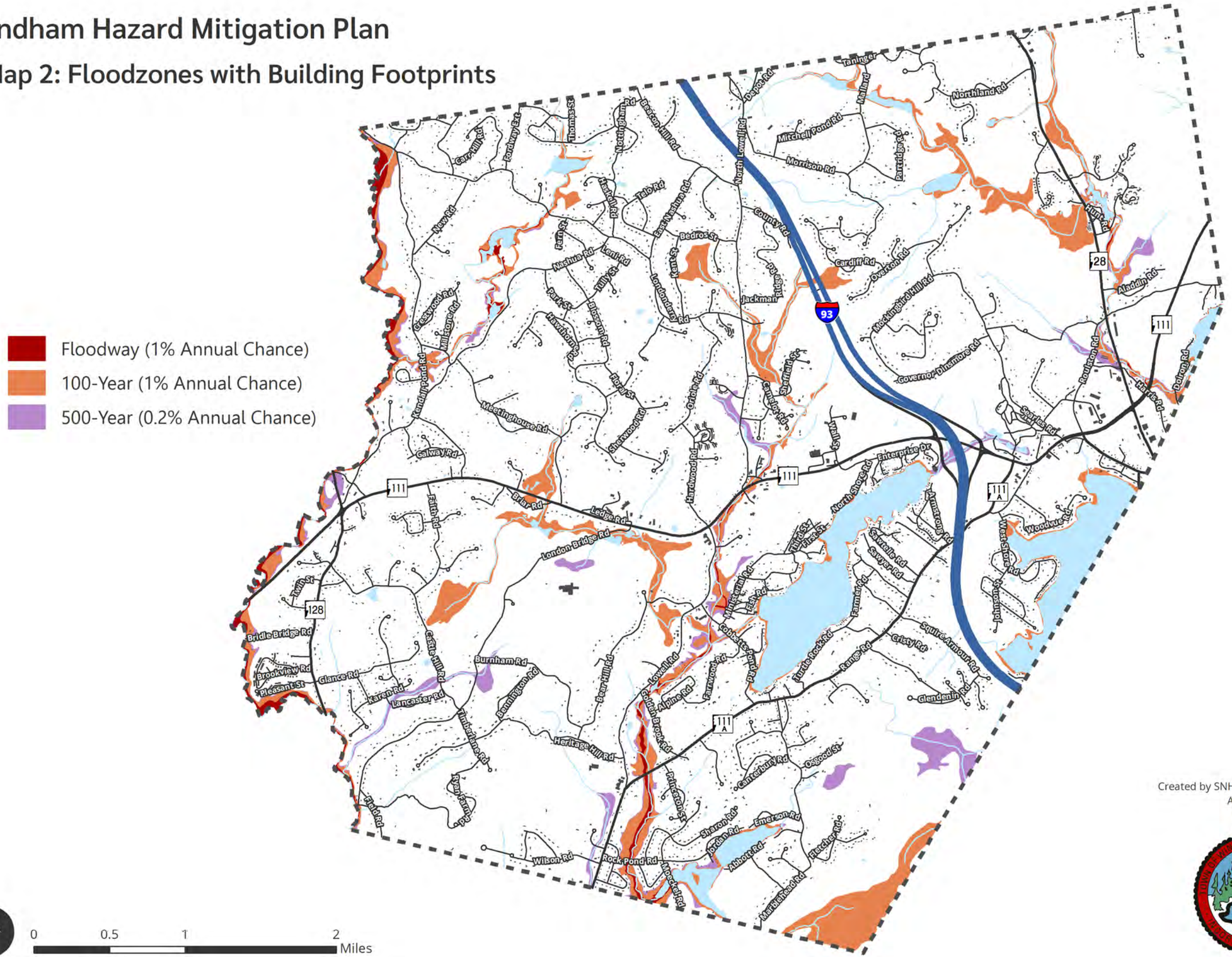
0 0.5 1 2 Miles

Created by SNHPC, 2019. Sources: Google Maps; NH Department of Transportation; NH Office of Strategic Initiatives; US Geological Survey.

SNHPC

Windham Hazard Mitigation Plan

Map 2: Floodzones with Building Footprints

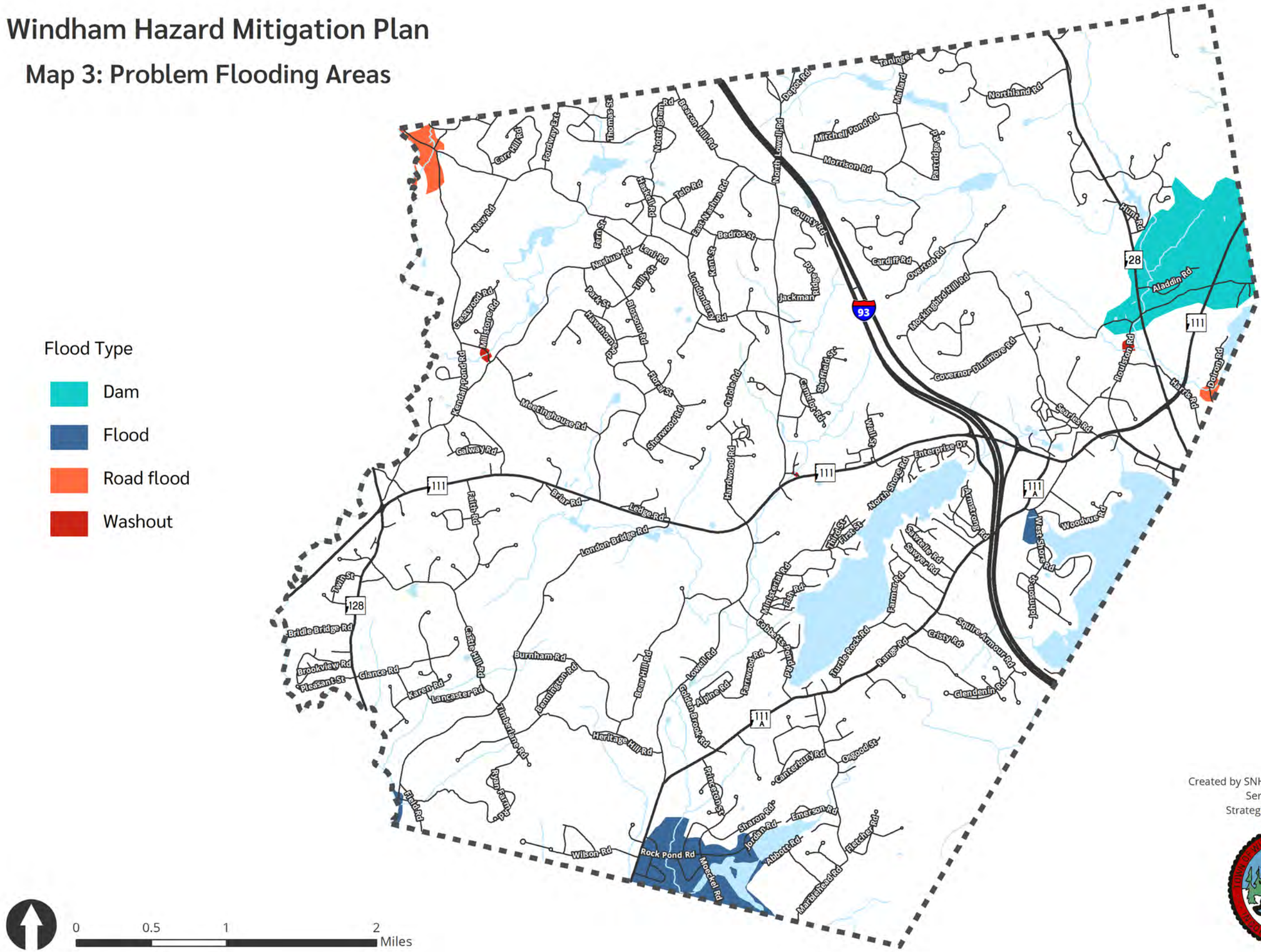


Created by SNHPC, 2019. Sources: Federal Emergency Management Agency; Microsoft; NH Department of Transportation; University of New Hampshire; US Geological Survey.

SNHPC

Windham Hazard Mitigation Plan

Map 3: Problem Flooding Areas

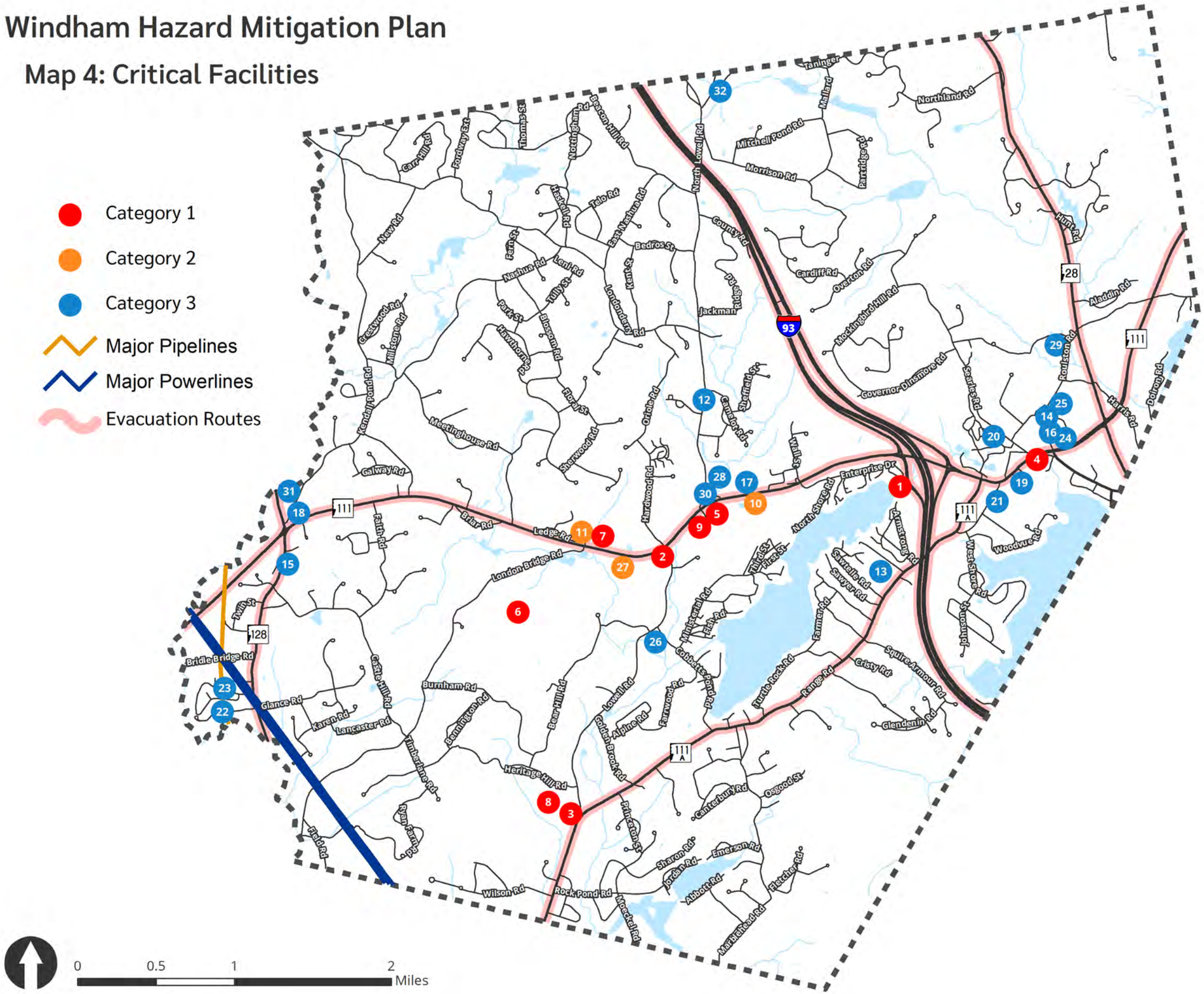


Created by SNHPC, 2019. Sources: NH Department of Environmental Services; NH Department of Transportation; NH Office of Strategic Initiatives; Town of Windham; US Geological Survey.

SNHPC

Windham Hazard Mitigation Plan

Map 4: Critical Facilities



Emergency Response Facilities	
1	Castleton Banquet and Conference Center
2	Center School
3	Golden Brook School
4	Searles School and Chapel
5	Windham Fire Department
6	Windham High School
7	Windham Highway Department
8	Windham Middle School
9	Windham Police Department
Non Emergency Facilities	
10	Post Office
11	Transfer Station
Facilities/Populations to Protect	
12	Assisted Living at Pine Hill
13	Chadwick Place
14	Elliot Family Medicine at Windham
15	Grace House of Windham
16	Green Sprouts
17	J P Kids & Company
18	Kiddie Academy of Windham
19	LabCorp
20	Warde Health Center
21	Wee Care Learning Center
22	Whispering Winds Adult Community
23	Windam Meadows ll Condo Association
24	Windham Academy Public Charter School
25	Windham Cooperative Kindergarten
26	Windham Learning Tree Academy
27	Windham School Distric Office
28	Windham Terrace
29	Windham Woods School
Historic Areas	
30	Town Center Complex
31	Union Hall
32	Windham Depot

Created by SNHPC, 2019. Sources: Google Maps; NH Department of Transportation; Town of Windham; University of New Hampshire; US Geological Survey.

SNHPC