

# TOWN OF PLYMOUTH NEW HAMPSHIRE



## Hazard Mitigation Plan

Town Adoption Date: September 26, 2016  
FEMA Approval Date: \_\_\_\_\_

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**TABLE OF CONENTS**


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1. INTRODUCTION	
Authority	1-1
Funding Source	1-1
Purpose	1-1
Introduction	1-1
Scope of Plan	1-2
Methodology	1-2
Goals	1-5
Planning Committee	1-6
2. COMMUNITY PROFILE	
Community Description	2-1
National Flood Insurance Program	2-1
Disaster Risk	2-2
Natural Hazard Analysis Matrix	2-2
Human Caused Hazard Analysis Matrix	2-3
Calculating Potential Loss	2-4
Current Development Trends	2-4
Future Development	2-5
3. HAZARD IDENTIFICATION	
Winter Weather	3-1
Flooding	3-4
Hurricane	3-5
Severe Wind	3-6
Lightning	3-9
Drought	3-10
Wildfire	3-10
Dam Failure	3-11
Earthquake	3-12
Hail	3-13
Extreme Heat	3-14
Landslide	3-15
Avalanche & Radon	3-15
4. CRITICAL FACILITIES	
Introduction	4-1
Inventory of Critical Facilities & Assets	4-2
Estimating Potential Loss	4-5
5. CAPABILITY ASSESSMENT	
Existing Protection Matrix	5-1
Integration of Mitigation Priorities	5-3

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TABLE OF CONTENTS – CONTINUED

---

6. HAZARD MITIGATION PROJECTS	
Hazard Identification	6-1
Problem Statements	6-1
Goals Identified	6-1
Project Identification	6-1
Completed Projects Since 2011	6-2
2016 Prioritized Mitigation Projects	6-3
Incorporating Mitigation into Local Planning	6-3
Mitigation Action Plan	6-4
7. ADOPTION, IMPLEMENTATION AND MONITORING	
Adoption, Implementation and Monitoring	7-1
Resolution	7-3
APPENDIX A	Hazard Mitigation Resources
APPENDIX B	Documentation of Planning Process
APPENDIX C	Approval Letter from FEMA

*Original Edition: June 13, 2011*

*Updated Edition: September 26, 2016*

## Chapter 1 INTRODUCTION

### Authority

This Hazard Mitigation Plan was prepared in accordance with the Disaster Mitigation Act of 2000 (DMA), Section 322, Mitigation Planning. Accordingly, this Hazard Mitigation Plan will be referred to as the “Plan”.

### Funding Source

This Plan was funded by the NH Homeland Security and Emergency Management (HSEM) through an Pre Disaster Mitigation (PDM) Grant, with in-kind matching funds by the Town of Plymouth.

### Purpose

This Hazard Mitigation Plan is a planning tool to be used by the Town of Plymouth, as well as other local, state and federal governments, in their effort to reduce the effects from natural and man-made hazards.

### Introduction

On October 30, 2000 the President signed into law the Disaster Mitigation Act of 2000 (DMA 2000). The ultimate purpose of DMA 2000 is to:

- Establish a national disaster hazard mitigation program that will reduce loss of life and property, human suffering, economic disruption, and disaster assistance costs resulting from disasters, and
- Provide a source of pre-disaster hazard mitigation funding that will assist State and local governments in accomplishing that purpose.

DMA 2000 amends the Robert T. Stafford Disaster Relief and Emergency Assistance Act by, among other things, adding a new section, 322 – Mitigation Planning. This places new emphasis on local mitigation planning. **It requires local governments to prepare and adopt jurisdiction-wide hazard mitigation plans as a condition of receiving Hazard Mitigation Assistance (HMA) grants.** Local governments must review and if necessary, update the mitigation plan every five years to continue program eligibility. However, it is recommended that this Plan be reviewed/updated annually or after a hazard event to be consistent with Chapter 7.

#### Why Develop a 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. Our State is subject to many types of natural hazards: floods, hurricanes, severe winter weather, earthquakes, tornadoes, downbursts, and wildfires, all of which can have significant economic and social impacts. Some, such as hurricanes, are seasonal and strike in predictable locations. Others, such as floods, can occur anytime of the year and almost anywhere in the State.

## Scope of the Plan

The scope of this Plan includes the identification of natural hazards affecting the town, as identified by the Hazard Mitigation Planning Committee. The hazards reviewed under the scope of this plan include those that are outlined in the State of New Hampshire's Multi-Hazard Mitigation Plan Update 2013. With one exception; due to no history or risk of avalanche or radon in the Town, the Committee chose not to recognize the risk of this hazard in this Plan.

**Flooding**  
**Dam Failure**  
**Drought**  
**Extreme Heat**  
**Earthquake**

**Hail**  
**Human Caused**  
**Hurricane**  
**Landslide**

**Lightning**  
**Severe Wind**  
**Winter Weather**  
**Wildfire**

## Methodology

The Hazard Mitigation Planning Committee with the assistance of Hubbard Consulting, developed the contents of this Plan through a Hazard Mitigation Planning Process. Prior to this planning process the Town had hired an engineering firm to develop a hazard mitigation plan. Although that plan was never completed, there was a substantial amount of data gathered which was used by the Committee and Hubbard Consulting to develop this 2004 Plan. The Committee held a total of 3 meetings beginning on May 26, 2004 and ending on September 13, 2004. Two Public Information Meetings for the public to review and comment on the plan were held on May 26, 2004 and December 13, 2004.

During the 2011 update the Committee met to review and revise the Plan. Prior to the first public information meeting town department heads were notified and public notices were posted to residents and business owners requesting that they consider serving on the Committee. The committee analyzed and revised Chapters 2, 3, 4, 5 and 6. The Board of Selectmen held a public hearing on June 13, 2011 to formally adopt the Plan. The Plymouth Board of Selectmen held a public meeting on June 13, 2011 to formally adopted the Plan. FEMA formally approved the plan on July 19, 2011.

The Plan was again updated in 2016. The Plymouth Hazard Mitigation Planning Committee with the assistance of Hubbard Consulting LLC held a total of five meetings on January 5, 2016, April 6, 2016, May 6, 2016, May 20, 2016 and June 17, 2016. Public notices were posted at the Town Office, Post Office and Town Website, inviting members of all town departments and boards, surrounding communities, businesses, academia, State agencies and non-profit agencies. In addition, email notifications were sent to adjacent communities, the North Country Council, the Chamber of Commerce and the NH HSEM. A representative of Central NH Public Health Network attended one meeting and her feedback was incorporated into the plan as appropriate. The Emergency Management Directors from surrounding towns were notified of the Plan Update and asked to comment on the Plan (see Appendix B). The committee analyzed

and revised the following sections of the Plan and provided input to update them: Chapters 1, 2, 3, 4, 5, 6 and 7. After acceptance by the committee, the Plan was submitted to the NH HSEM and FEMA Region 1 for formal Approval. The Board of Selectmen formally adopted the Plan on September 26, 2016.

The committee developed this Plan as a result of the above meetings and the following planning process.

#### Step 1: Form a Hazard Mitigation Planning Committee

Prior to the first public information meeting the Town contacted town department heads and posted public notices to residents, business owners and neighboring towns, requesting that they consider serving on the Committee (See Appendix B). The Committee Members consisted of town staff. A press release was published in the local newspaper and town office inviting residents, businesses, neighboring communities, academia and other private non-profit interests to participate in the planning process.

#### Step 2: Set Hazard Mitigation Goals and Objectives

At the first working meeting the committee reviewed and made minor revisions to the town's Hazard Mitigation Goals. The Hazard Mitigation Goals were adapted from the State of New Hampshire's Natural Hazards Mitigation Plan. This first step is extremely important in helping the committee understand the purpose of the Plan and the direction it should go. (See the end of this chapter for the "Hazard Mitigation Goals of the Town of Plymouth, NH".)

#### Step 3: Hazard Identification

The Committee members identified natural hazards and human-caused hazards that have or could potentially affect the Town of Plymouth. The results of this step can be found in Chapters 2 and 3.

#### Step 4: Critical Facilities Analysis

The committee members created a Critical Facilities List for the town. The Critical Facilities List is divided into 3 sections: Facilities needed for Emergency Response; Facilities not necessary for emergency response; and places and populations to protect in the event of a disaster. The results of this step can be found in Chapter 4.

#### Step 5: Capability Assessment

The committee members identified what plans and policies are already in place to reduce the affects of hazards. The results of this step can be found in Chapter 5. Many of these plans and technical reports were reviewed and incorporated during the planning process, including the Plymouth Emergency Operations Plan and Plymouth Master Plan.

#### Step 6: Develop Objectives

The Committee identified "Problem Statements" for each of the hazards identified earlier in the planning process. All of the hazards have at least one problem

statement associated with them (See Problem Statement in Appendix B). These problem statements were then utilized as objectives in developing mitigation projects, as described in the next step.

#### Step 7: Develop Specific Mitigation Measures

As a result of the problem statements identified in step 6, the committee brainstormed specific projects or mitigation measures to address each hazard. The Committee Members used the “*Mitigation Project Identification Worksheet*”, as shown in Appendix B, to identify mitigation projects that directly address the hazards affecting the community. Finally, the committee prioritized the top priority projects and listed them in the Mitigation Action Plan found at the end of Chapter 6.

#### Step 8: Adopt and Implement the Plan

After acceptance by the committee the Plan was submitted to the NH Homeland Security and Emergency Management and FEMA Region 1 for formal Approval. The Board of Selectmen formally adopted the Plan on September 26, 2016. The letter of approval from FEMA Region 1 can be found in Appendix C.

With respect to any ongoing mitigation projects, the lead and support agencies/people for such activity will be tasked with implementing the Plan’s mitigation projects. The committee approved the “Prioritized Mitigation Projects” list, which identifies responsibility, funding/support and a timeframe for each of the prioritized projects. The Emergency Management Director should be tasked with requesting annual reports as to the progress of each project.

#### Step 9: Monitor and Update the Plan

It is important that this plan be monitored and updated annually or after a presidentially declared disaster. Chapter 7 specifically addresses this issue.

## Mitigation Goals, Objectives & Actions

During the 2016 update, the Committee reviewed the 2011 Plymouth Hazard Mitigation Plan goals and made only minor revisions. The Goals were not modified for any substantial content, as there has not been any substantial change in development. The goals for the Town of Plymouth are as follows:

1. To improve upon the protection of the general population, the citizens of the Town of Plymouth and guests, from all natural and man-made hazards.
2. To reduce the potential impact of natural and man-made disasters on the Town of Plymouth's Emergency Response Capability.
3. To reduce the potential impact of natural and man-made disasters on Critical Facilities in the Town of Plymouth.
4. To reduce the potential impact of natural and man-made disasters on the Town of Plymouth's infrastructure.
5. To improve the Town of Plymouth's emergency preparedness and communication network.
6. To improve the Town of Plymouth's disaster response and recovery capability.
7. To reduce the potential impact of natural and man-made disasters on private property in the Town of Plymouth.
8. To reduce the potential impact of natural and man-made disasters on the Town of Plymouth's economy.
9. To reduce the potential impact of natural and man-made disasters on the Town of Plymouth's natural environment.
10. To reduce the Town of Plymouth's potential liability with respect to natural and man-made hazards.
11. To reduce the potential impact of natural and man-made disasters on the Town of Plymouth's specific historic treasures.
12. To identify, introduce and implement cost effective Hazard Mitigation measures so as to accomplish the Town's Goals and Objectives.
13. To work in conjunction and cooperation with the State of New Hampshire's Hazard Mitigation Goals.

## 2016 Hazard Mitigation Planning Committee

<b>Name</b>	<b>Title/Affiliation</b>
Alex Hutchins	Plymouth Police Department
Angel Ekstrom	Central NH Public Health Network Coordinator
Anne Abear	Plymouth Finance Director
Brian Murphy	Plymouth Code Enforcement & Deputy EMD
Casino Clogston	Plymouth Fire Department
Jason Randall	Plymouth Village Water & Sewer District
Joe Fagnant	Plymouth Highway Department
Jon Francis	SAU 48
Kathryn Lowe	Plymouth Town Hall
Lisa Doner	Plymouth Conservation Commission
Paul Freitas	Plymouth Town Administrator
Paul Hatch	NH HSEM Field Representative
Sharon Penny	Plymouth Town Planner
Steve Lefebvre	Plymouth Police Department
Tom Morrison	Plymouth Fire Department
Jane Hubbard	Hubbard Consulting LLC

The committee members listed above participated in monthly committee meetings, provided departmental information, contributed in their field of expertise, reviewed and commented on committee meeting minutes, reviewed drafts of the Plan and worked together to identify and prioritize mitigation projects.

*Many thanks to all the hard work and effort from each and every one of you.  
This plan would not exist without your knowledge and experience.  
Thank you!*

## Chapter 2 COMMUNITY PROFILE

### Community Description

The Town of Plymouth is located in central New Hampshire in Grafton County, along the Pemigewasset River, which flows to the Merrimack River in Franklin, NH. The Speare Memorial Hospital is the major medical and health service provider to Plymouth, NH including out-patient and emergency care. The hospital is located on Highland Street, with approximately 40 doctors on staff and a total of 47 beds available for inpatient hospital care.

The topography of Plymouth varies from the steep slopes of Plymouth Mountain and Mount Tim, to relatively flat floodplain areas along the Pemigewasset River, which flows north to south to its confluence with the Merrimack River in Franklin, NH; and the Baker River, which flows west to east to its confluence with the Pemigewasset River in Plymouth. The major stream tributaries within the Town include:

- Clay Brook, flowing north to south to the Pemigewasset River;
- Glove Brook, flowing west to east to the Pemigewasset River; and
- Sanborn Hill River, flowing south to north into the Baker River.

Loon Lake is the largest lake (111 acres) within the Town of Plymouth. It is located in the northwest corner of the Town. This lake is a pristine natural lake, with no manmade dam structures. The majority of the lakeshore is undeveloped, with many small, full- and part-time residences. The lake is used solely for recreational purposes.

### National Flood Insurance Program (NFIP)

Floodplains for this Plan are defined as the 100-year and 500-year flood hazard zones, as depicted on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM). Plymouth participates in the National Flood Insurance Program (NFIP) administered by FEMA. In order to enable landowners to qualify for federally insured flood insurance, the Town, in its administration of site plan review, subdivision regulations and zoning, must regulate development in the floodplain using federal standards.

The Town's existing ordinance meets the minimum requirements of the NFIP, according to the latest Community Assistance Visit. The Town will continue to maintain procedures and regulations that are in compliance with the NFIP by conducting Community Assistance Visits (CAVs) and Community Assistance Contacts (CAC) with the Office of Energy and Planning and updating the Floodplain Ordinance as federal requirements are updated. The last CAV was conducted on July 29, 2009.

The town joined the NFIP on May 3, 1982 and is currently participating in the NFIP. The community has Digital Flood Insurance Rate Maps (DFIRM) and a Flood Insurance Study dated February 20, 2008. According to the NFIP Policy and Claims report by FEMA, there are 16 NFIP policies. There have been 13 claims

made since 1975. There is one repetitive loss property (2-4 family). (Note: there was another rep loss property on the same road but has been mitigated.) The number of policies only 1 claim.

Policies in Force	Total Insurance in Force	Number of Closed Paid Losses	\$ amount of Paid Losses
16	\$3,600,600	13	\$62,724

**Disaster Risk**

Plymouth is prone to a variety of natural hazards. These include: flooding, dam failure, severe wind events (downbursts, hurricanes, and tornadic activity), wildfire, drought, earthquake, landslide, lightning, hail, extreme heat, and severe winter weather, and man-made hazards. During the 2016 Update, the Committee made some changes to the hazard risk. The Committee came to a consensus to not include Avalanche and Radon, as there is no real threat of these hazards. The following tables summarize the impact and probability of natural and man-made hazards.

Natural Hazards	Severity	Probability* In 25 years	Risk Severity x Probability
	Avg. of Human /Property /Business 0: n/a 1: Low 2: Moderate 3: High 4: Catastrophic	Likelihood this will occur 0: Improbable 1: Remote 2: Occasional 3: Probable 4: Frequent	0-4: Low 5-8: Moderate 9-12: High 13-16: Severe
Flood (Riverine & Ice Jam)	2	3	6
Severe Winter Weather	2	3	6
Hurricane	2	2	4
Severe Wind (Tornado/Downburst)	2	2	4
Earthquake	3	1	3
Lightning	1	3	3
Drought	1	2	2
Wild/Forest Fire	1	2	2
Hail	1	2	2
Dam Failure	2	1	2
Extreme Heat	1	1	1
Landslide	1	1	1
Avalanche	N/A	N/A	N/A

Human Caused Hazards	Severity	Probability* In 25 years	Risk Severity x Probability
	Avg. of Human /Property /Business 0: n/a 1: Low 2: Moderate 3: High 4: Catastrophic	Likelihood this will occur 0: Improbable 1: Remote 2: Occasional 3: Probable 4: Frequent	0-4: Low 5-8: Moderate 9-12: High 13-16: Severe
Mass Casualty (Medical)	3	2	6
Mass Casualty (Trauma)	2	3	6
Utility Interruption	2	3	6
Civil Disorder	2	3	6
Terrorist Attack (WMD)	3	2	6
Armed Attack (assault, sniper)	3	2	6
Haz Mat (Transport)	2	2	4
Conventional Bomb	2	2	4
Haz Mat (Fixed)	2	2	4
Biological Terrorism	3	1	3
Transport Incident (plane, train, etc.)	1	3	3
Arson	1	2	2
Urban Fire	1	2	2
Radiological Release	1	1	1

\*Probability Terms are defined as:

- Improbable: Not likely to occur in any 25 year period.
- Remote: Less than 1% probability in the next 25 year period.
- Occasional: Between 1% and 50% probability in the next 25 year period.
- Probable: Between 50% and 99% probability in the next 25 year period.
- Frequent: Near 100% probability in the next year.

**CALCULATING POTENTIAL LOSS**

It is difficult to determine the amount of damage that could be caused by natural or human-caused hazards because the damage will depend on the hazard’s extent and severity, making each hazard event somewhat unique. Therefore, to calculate potential economic loss, we have assumed that structures impacted by hazards could result in damage of either 1% or 5% of the assessed value.

Based on this assumption, the potential loss from any of the identified hazards would range from \$6,220,748(1%) or \$31,103,744 (5%) based on the 2015 town valuations which lists the assessed value of all structures in Plymouth to be \$622,074,890. (See table below).

Human loss of life was not included in the potential loss estimates, but could be expected to occur, depending on the severity and type of the hazard.

<b>ASSESSED VALUE OF ALL STRUCTURES</b>			
<b>Type</b>	<b>2015 Value</b>	<b>1% Damage</b>	<b>5% Damage</b>
Residential	202,678,330	2,026,783	10,133,916
Manufactured Housing	5,396,200	53,962	269,810
Commercial	99,255,765	992,557	4,962,788
Tax Exempt	307,330,295	3,073,302	15,366,514
Utilities	7,414,300	74,143	370,715
<b>Total</b>	<b>622,074,890</b>	<b>6,220,748</b>	<b>31,103,744</b>
<i>Source: NH DRA 2015 MS-1</i>			

**CURRENT DEVELOPMENT TRENDS <sup>1 2</sup>**

Population, Housing Stock, and Growth Patterns

According to the NH Employment Security website, “Population change for Plymouth totaled 3,692 over 54 years, from 3,210 in 1960 to 6,902 in 2014. The largest decennial percent change was an increase of 32 percent between 1960 and 1970, the smallest, a one percent increase between 1990 and 2000.” The minimal amount of growth over the last 14 years does not require any changes to priorities of this Plan.

*Table 1: Plymouth Population*

<b>Year</b>	<b>Population</b>
2014	6,902
2010	6,990
2000	5,886
1990	5,815
1980	5,094
1970	4,225
<small>SOURCE: <a href="http://www.nhes.nh.gov/elmi/products/cp/profiles-htm/Plymouth.htm">http://www.nhes.nh.gov/elmi/products/cp/profiles-htm/Plymouth.htm</a></small>	

Current projections from the New Hampshire Office of Energy and Planning (NH OEP) show the population growth rate will continue increasing at a similar rate in Plymouth over the next twenty-five years, where the year-round population in 2040 is projected to be 8,078 an increase of 9% (Table 2).<sup>3</sup>

*Table 2: Plymouth Population Projection*

<b>Year</b>	<b>Population</b>
2015	7,318
2020	7,768
2025	7,904
2030	8,001
2040	8,078

<sup>1</sup> 2010 US Census Data

<sup>2</sup> Town of Plymouth Master Plan 2013

<sup>3</sup> Municipal Population Projections 2010 to 2040. NH Office of Energy and Planning, 2013, <https://www.nh.gov/oep/data-center/documents/2013-projections-municipalities.pdf> 2016

**FUTURE DEVELOPMENT**

Evidence of the low rate of growth can be seen by the number of building permits issued annually (Table 3). The Committee recognized the potential for future commercial and residential growth along Routes 25 and 3A and Fairgrounds Road. However existing regulations and plans manage and address these areas, so there were no changes in mitigation priorities. In future updates of this Plan the Town may want to consider mitigation priorities for these areas.

*Table 3: New Residential Building Permits  
Issued*

<b>Time Period</b>	<b># of Permits</b>
2011	42
2012	3
2013	7
2014	3
2015	7

## Chapter 3 HAZARD IDENTIFICATION

### WINTER WEATHER

**Probability:** Probable

**Definition:**

**Heavy Snow Storms:** A winter storm can range from moderate snow to blizzard conditions. Blizzard conditions are considered blinding wind-driven snow over 35 mph that lasts several days. A severe winter storm deposits four or more inches of snow during a 12-hour period or six inches of snow during a 24-hour period. **Ice Storms:** An ice storm involves rain that freezes upon impact. Ice coating at least one-fourth inch in thickness is heavy enough to damage trees, overhead wires and similar objects.

**Blizzard:** 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. **Nor'Easter:** 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 impacted the coast and inland areas in a Northeasterly direction. Winds from a Nor'easter can meet or exceed hurricane force winds.

**Location:**

There is a town-wide vulnerability to severe winter weather. Nor'easters (wind), Ice Storms, Heavy Snow Accumulations and Severe Cold can occur at any place within the town and generally affect the entire town when it happens. The higher elevations are more likely to experience snow or ice before the lower terrain.

**Impact:**

Heavy snow accumulations (generally considered one that deposits six or more inches of snow in a 12-hour period) especially those associated with nor'easters can have a significant effect on the Town, including extended power outages, road closures, collapsed roofs and increased snow removal costs. During ice storms, ice forms on cold surfaces, such as trees and power lines, and may continue to form until the ice is quite deep, as much as several inches thick. Ice damage results in power outages, road closures and forest damage. Ice on the roads can be the most difficult for a rapid emergency response. Functional needs populations are at risk during prolonged power outages. Private roads are difficult for emergency response vehicles due to restricted access during winter.

**Extent:**

NOAA's National Climatic Data Center produced the Regional Snowfall Index (RSI) for significant snowstorms that impact the eastern two thirds of the U.S. The RSI ranks snowstorm

CATEGORY	RSI VALUE	DESCRIPTION
1	1-3	Notable
2	3-6	Significant
3	6-10	Major
4	10-18	Crippling
5	18.0+	Extreme

impacts on a scale from 1 to 5, similar to the Fujita scale for tornadoes or the Saffir-Simpson scale for hurricanes. In addition, the National Weather Service developed and

utilizes the Sperry-Piltz Ice Accumulation Index (SPIA) to forecast the impact of an ice storm. The index below ranges from an ice storm rated as "0" which has little impact, to an index rating of 5 that has catastrophic damage to exposed utility systems.

**Previous Occurrence:**

**January of 1923:** 4 storms within a week left over 30 inches of snow.

**February 8-10, 1969:** Event Accumulations up to 27" in southeastern New Hampshire and up to 42" in northeastern New Hampshire. Regions with snow accumulations exceeding 50 cm: parts of the New York City and Boston metropolitan areas, western Connecticut, western and eastern Massachusetts, southern Vermont, northern Rhode Island, eastern New Hampshire, and southern Maine.

**February 22-28, 1969:** Events Accumulations to 98" in Western Central New Hampshire, 34" in coastal areas and 2 to 3' across New Hampshire generally. The storm produced excessive amounts of snow across New England with accumulations of greater than 75 cm across large sections of eastern Massachusetts, New Hampshire, and Maine.

**January 20, 1978:** 20" snowstorm with 20' high snowdrifts

**February 5-7, 1978:** Events accumulations to 28" in northeast New Hampshire, 25" in west central New Hampshire and 33" along coastal New Hampshire. Hurricane-force winds and record-breaking snowfall made this storm one of the more intense to occur this century across parts of the northeastern United States. Regions with snow accumulations exceeding 50 cm: sections of northeastern Pennsylvania, northern New Jersey, western and southeastern New York, Connecticut, Rhode Island, Massachusetts, southern Vermont, and parts of New Hampshire and Maine.

**Ice Storm 1998:** A severe ICE STORM hit sections of New Hampshire from January 7 through January 9. The hardest hit areas in northern and central New Hampshire were generally between about 1000 and 2000 ft. above sea level. Statewide, the storm knocked out power to about 55,000 customers, an estimated 125,000 people. During the time without power, residents and those involved with the restoration efforts had to contend with snow, additional freezing rain, rain, slippery roads, falling ice and other debris, sub-zero temperatures, strong winds, and dangerous wind chills. For many homes, the lack of electrical power also meant no heat, no running water, no means for cooking food. The storm caused an estimated 30 million dollars in damages.

**Winter 2004:** A snow 'avalanche' fell onto Bell Road and completely blocked the road. The snow was 3 to 4 feet deep and 100' to 200' long.

**February 10, 2005:** An intensifying area of low pressure slowed significantly as it moved into the Gulf of Maine on the 10th of February resulting in a widespread heavy snowfall across much of New Hampshire from the early morning hours of the 10th into the afternoon of the 11th. Accumulations of 2 to 33 inches were reported across the state with the highest totals occurring in central and northern portions of the state.

**January 12, 2011:** Low pressure off the Carolina coast on the morning of the 11th intensified rapidly as it moved slowly northeast to near Cape Cod by the morning of the 12th, and then to just east of Nova Scotia by the morning of the 13th. The storm brought heavy snow to the state with some mixed precipitation along the immediate coast. Snowfall amounts ranged from about 6 inches on the north side of the western mountains to 10 to 19 inches across much of the remainder of the area.

**March 6-7, 2011:** An area of low pressure began to develop over the southeastern states Sunday March 6<sup>th</sup>. Light rain, associated with the approaching cold front began to fall Sunday morning. As the colder air continued to move the rain changed to freezing rain across Grafton County and the higher elevations of Sullivan and Merrimack Counties. Across the state, heavy snow, freezing rain and rain continued through the night and finally ended early Monday afternoon, March 7<sup>th</sup>. In addition to the precipitation, strong and gusty winds developed across the region Sunday night and continued Monday. Across northern New Hampshire, snowfall accumulations from the storm

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

ranged from 8 to 22 inches. In Grafton and Sullivan Counties, significant ice accretions were reported, although local amounts were likely higher. This ice, in combination with the wind, brought down trees and tree limbs across Grafton and Sullivan Counties leading to numerous power outages and more than \$700,000 in damage. The rainfall and melting snow caused river levels to rise which caused river ice to break and move downstream. Several breakup ice jams occurred, with the most notable jams being in West Claremont on the Sugar River and in Plymouth on the Pemigewasset River. (See also Ice Jam in Flooding)

**October 29, 2011:** An area of low pressure developed off the coast of North Carolina Saturday morning, October 29, then moved north to just east of the Delmarva Peninsula by Saturday evening, and through the Gulf of Maine Saturday night. The storm brought a heavy, wet snow to southern and central New Hampshire. Snow began to fall across southern New Hampshire late Saturday afternoon, became heavy during the night, and ended before 7 am Sunday morning. The snow was mixed with rain along the immediate coast. The combination of the heavy wet snow and leaves still on the trees caused numerous trees and branches to snap and fall, causing widespread power outages. About 315,000 customers lost power during the storm, mostly across the southeastern part of the state. Some customers were without electrical service for almost a week. Snowfall amounts were quite variable across the state with southern areas and the higher terrain receiving the most snow, and in some cases, record snowfall.

**3/18-19/13 DR-4105**

An area of low pressure moving east from the Ohio Valley intensified off the New Jersey coast during the morning of the 19th and then moved northeast to Nova Scotia by the morning of the 20th. The developing low brought heavy snow to the entire State with close to a foot of snow in southeastern sections. Across the western part of the state, from 6 to 10 inches of snow fell.

**March 3, 2014:** Low pressure moving east from the Ohio Valley on the morning of the 12th and a developing low off the mid-Atlantic coast caused heavy snow across much of western and northern New Hampshire. Snow and mixed precipitation continued through much of the day on the 13th as the low moved through the Gulf of Maine and into the Canadian Maritimes. The northern half of the State generally saw between 6 and 18 inches of snow with lesser amounts to the south. In the southeastern third of the State, the precipitation fell mainly as rain.

**November 26-27, 2014:** An area of low pressure developed off the Carolina coast on the morning of the 26th and raced rapidly up the eastern seaboard during the day to Nova Scotia by the morning of the 27th. The low brought heavy snow to all of New Hampshire with a mixture of precipitation along the coast. Snowfall amounts generally ranged from 4 to 8 inches in the northern mountains to 10 to 15 inches across portions of Sullivan, Grafton, Belknap, and Carroll Counties, to 4 to 8 inches across the southeastern part of the state.

**January 26-28, 2015:** Snow spread northward across the region Monday night and became heavy on Tuesday, the 27th. Winds became strong during the day Tuesday leading to blizzard conditions at times along and inland from the coast. The snow persisted into Tuesday night in many areas with blowing and drifting snow. Snowfall amounts ranged from 10 to more than 30 inches across much of the southeastern part of the state. Elsewhere, amounts were generally 6 to 14 inches with some lower amounts in the Connecticut River Valley.

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## RIVERINE FLOODING

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**Probability:** Probable

**Definition:**

Flooding is the temporary overflow of water onto land that is not normally covered by water. Flooding results from the overflow of major rivers and tributaries, storm surges, and/or inadequate local drainage. Flooding events considered in this Plan include 100-year and 500-year floodplain events, rapid snow pack melt and ice jams.

**Location:**

The Town of Plymouth lies in the Pemigewasset and Baker River Watersheds. Flooding occurs in the 100 year floodplain, primarily on as designated on the FEMA Flood Insurance Rate Map. These areas primarily include the Baker and Pemigewasset Rivers and smaller streams and tributaries throughout town.

**Impact:**

The extent of damage caused by any flood depends on the depth and duration of flooding, the topography of the area flooded, velocity of flow, rate of rise, and the amount and form of development in the floodplain. Most of the past flooding events result in erosion and damage to culverts and roads throughout town, as well as residential and non-residential buildings. The Town's only two drinking water wells are in the 100-year floodplain and the potential to be lost in larger floods.

**Extent:**

FEMA defines flood hazards by the 100-year and 500-year flood events. A 100-year flood event is defined as flood event having a 1% chance of being equaled or exceeded in any given year. The 500-year flood event is defined as flood event having a .2% chance of being equaled or exceeded in any given year. The Town of Plymouth Flood Insurance Rate Maps (FIRM) identify both an A and AE zones. A zones are subject to the 100-year flood, however because there has been no detailed hydraulic studies, there is no Base Flood Elevation (BFE) determined for these zones. The AE zones are subject to the 100 year flood and have BFEs delineated on the FIRM.

**Previous Occurrence:**

**March 1936:** Double flood; first due to rains and snowmelt; second, due to large rainfall.

**September 1938:** Hurricane of 1938 caused statewide flooding.

**June 1972:** Five days of heavy rain caused some of the worst flooding since 1927 damage was extensive along the Pemigewasset River.

**August 1986:** FEMA DR-771-NH: Severe summer storms with heavy rains, tornadoes; flash flood and severe winds.

**April 1987:** Severe Storms & Flooding. FEMA DR-789-NH

**August 1990:** FEMA DR-876-NH: A series of storm events from August 7-11, 1990 with moderate to heavy rains produced widespread flooding in New Hampshire.

**August 1991:** FEMA DR-917-NH: Hurricane Bob struck New Hampshire causing extensive damage in Rockingham and Stafford counties, but the effects were felt statewide.

**January 1996:** FEMA DR-1077-NH – Storms and flooding

**October 1996:** FEMA DR-1144-NH – Severe storms and flooding

**July 1998:** FEMA DR-1231-NH – Severe storms and flooding

**September 1999:** FEMA DR-1305-NH in Belknap, Grafton and Cheshire Counties This was originally a Hurricane that heavily impacted North Carolina and dumped heavy rains on New

England resulting in a Presidential Declaration of Disaster in NH. Rainfall totals from the event generally ranged from about 4 to 7 inches statewide.

**May 14, 2006:** A low pressure developed south of New England and remained nearly stationary from the 12th to the 15th resulting in over 12 inches of rain in some locations. The Pemigewasset River at Bristol (flood stage 8.0 ft.) crested at 11.4 ft. In Plymouth, Cummings Hill Road was completely washed out. Texas Hill Road and sections of Reservoir Road, Morse Road, Look Lake Road, Chaisson Road and Old Hebron Road were affected from erosion and received considerable damage. Texas Hill to Bridgewater went down 8 – 10 ft.

**October 29, 2006:** The Pemigewasset River at Plymouth, (flood stage 13.0 ft), crested at 13.8 ft. Strong low pressure moving out of the lower Mississippi River Valley dumped 2 to 4 inches of rain on already saturated ground causing minor flooding on several rivers.

**April 2007:** Flooding and damages were countywide. The storm brought heavy rain to the region which, when combined with snow melt, produced widespread flooding across much of the region. The flooding of small rivers and streams was worst in southern and coastal areas and led to numerous road closures. In addition to the meteorological factors, damage from the wind was exacerbated because of the heavy rain that accompanied the wind and the soft, wet ground caused by the spring thaw. The Town of Plymouth lost Morse Road and the town owned bridge on Morse Road. FEMA funds (\$125,000) replaced road and bridge. Emergency officials went to houses to advise residents of the bridge damage. A local shelter was opened but not utilized.

**August 2008:** Localized flash flooding occurred on Cummings Hill, Texas Hill and Morse Road but caused little damage. The Town received \$465,723 in grant funds for the repair of Cummings Hill and Texas Hill and \$11,411 for drainage on Texas Hill Road.

**March 6-7, 2011:** Heavy rain and snow melt caused an ice jam and a brief period of minor flooding on the Baker River at Plymouth (flood stage 10.0 ft), which crested at 10.6 ft. According to CRREL, "In a 'Memo for Record' issued by Andy Tuthill, CRREL on 11 Mar 2011, in which the river ice conditions in NH and VT were reported following an aerial recon on 8 Mar 2011, following heavy rainfall on 5-6 Mar 2011, Andy reported, "A mile-long (jam on) the Baker River in Plymouth was causing minor field flooding. With the expected rise of 1.5 ft Baker at Plymouth will still remain." Only minor road damage occurred.

**August 28, 2011 DR-4026** – Tropical Storm Irene – see hurricane section

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## HURRICANE

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**Probability:** Occasional

**Definition:**

A hurricane is a tropical cyclone in which winds reach speeds of 74 miles per hour or more and blow in a large spiral around a relatively calm center. The eye of the storm is usually 20-30 miles wide and the storm may extend over 400 miles. High winds are a primary cause of hurricane-inflicted loss of life and property damage. The Saffir-Simpson Hurricane Wind Scale is a 1 to 5 rating based on a hurricane's sustained wind speed. This scale estimates potential property damage. Hurricanes reaching Category 3 and higher are considered major hurricanes because of their potential for significant loss of life and damage. Category 1 and 2 storms are still dangerous, however, and require preventative measures.

**Location:**

When hurricane events occur in Plymouth they affect the entire town. Certainly, the heavy rainfall associated with hurricanes will impact the 100-year floodplain but the high winds can have an impact on the whole town.

**Impact:**

New Hampshire’s exposure to direct and indirect impacts from hurricanes is real, but modest, as compared to other states in the region. That being said, the probability of hurricanes occurring in Plymouth is possible. The largest impact is on the floodplain areas due to heavy rains. High winds cause trees to fall down thereby causing power outages, structural damage to buildings, road closures and debris management issues.

Category	Wind Speed (mph)	Damage at Landfall
1	74-95	Minimal
2	96-110	Moderate
3	111-130	Extensive
4	131-155	Extreme
5	> 155	Catastrophic

**Extent:**

Wind speeds within hurricanes may reach 250 miles per hour in a Category 5 hurricane, as measured on the Saffir-Simpson Hurricane Scale. Tropical depressions are considered to be of hurricane force when winds reach 74 miles per hour. Damage resulting from winds of this force can be substantial, especially considering the duration of the event, which may last for many hours.

**Previous Occurrence:**

**September 21, 1938:** The Great New England Hurricane affected southern New England, resulted in 13 Deaths and 1,363 families received assistance. Disruption of electric and telephone services for weeks. 2 Billion feet of marketable lumber blown down. Flooding throughout the State, in some cases equaling and surpassing the Flood of 1936. Total Direct Losses were \$12,337,643.

**August 31, 1954:** Hurricane Carol affected southern New England. Extensive amount of trees blown down and property damage. Large crop loss. Localized flooding.

**October 1999:** This was originally a Hurricane that heavily impacted North Carolina and dumped heavy rains on New England resulting in a Presidential Declaration of Disaster in NH; FEMA DR-1305-NH in Belknap, Grafton and Cheshire Counties. In Plymouth, Buffalo Road washed out as a result of the storm.

**August 28, 2011 DR-4026:** Tropical Storm Irene brought 2-3 inches of rain to southeastern New Hampshire and higher amounts throughout New Hampshire. Downed trees and power lines caused widespread outages, but was completely restored within several days. Rainfall amounts across the state ranged from 1.5 to 3 inches across southeastern New Hampshire with 3 to 6 inches across most of the remainder of the State, except in the White Mountains where 5 to 8 inches of rain fell. In the White Mountains, much of the rain fell within a period of only several hours causing serious flash flooding of rivers and streams across Carroll, Grafton, and Coos Counties. Heavy rain from the Storm caused flooding on the Baker River at Plymouth (flood stage 10.0 ft), which crested at 14.0 ft. Loon Lake Road was completely shut off due to flooding and stranded approximately 30 homes. People were evacuated via the railroad bed by Plymouth Public Works Department. There was no significant damage and the Town did not receive any FEMA money.

**October 29-31, 2012 Hurricane Sandy DR-4095:** On Monday, October 29th, A band of heavy rain and high winds associated with Sandy moved northward into New Hampshire. The high winds associated with this band of heavy rain downed numerous trees and caused widespread power outages. These strong and persistent winds combined with the powerful gusts to down numerous trees throughout the State and caused widespread power outages, especially across southern New Hampshire. The Plymouth EOC and shelter were opened (only 2 transients went to the shelter). Besides a significant leak in the Town Hall roof, the largest impact was trees and wires down. The Town did not receive any FEMA monies.

## SEVERE WIND

**Probability:** Occasional

**Definition:**

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud. These events are spawned by thunderstorms and occasionally by hurricanes. They may also occur singularly or in multiples. A downburst is a severe, localized wind blasting down from a thunderstorm. These “straight line” winds are distinguishable from tornadic activity by the pattern of destruction and debris. Downbursts fall into two categories: Microburst which covers an area less than 2.5 miles in diameter; and Macroburst which covers an area at least 2.5 miles in diameter.

**Location:**

Severe wind events (downburst, tornadoes or high winds associated with thunderstorms) can occur anywhere in Plymouth. Generally the higher elevations are more susceptible as well as more vulnerable due to the fact that they are home to emergency response/mutual aid towers. Due to the sporadic nature of tornados and severe wind events, they could occur anywhere in the Town of Plymouth.

**Impact:**

Depending on the size and location of these events, the destruction to property may be devastating. Several of the more significant and recent events within southern New Hampshire have caused several millions of dollars in damage and at least 5 fatalities. An F-2 Tornado, according to the Fujita scale, maintains wind speeds from 13-157 mph. A tornado occurring in Plymouth would cause considerable damage. Roofs could be torn off frame houses; mobile homes demolished; large trees snapped or uprooted; and light object missiles would be generated as a result of an F-2 Tornado.

EF 0	65-85 mph
EF 1	86-110 mph
EF 2	111-135 mph
EF 3	136-165 mph
EF 4	166-200 mph
EF 5	Over 200 mph

**Extent:**

According to the Enhanced Fujita scale, which rates tornado intensity, an EF-2 tornado maintains wind speeds from 111-135 mph and can cause considerable damage. Roofs could be torn off frame houses; mobile homes demolished; large trees snapped or uprooted; and light object missiles would be generated as a result of an EF-2 Tornado.

**Previous Occurrence:**

**July 22, 2005:** Grafton County law enforcement had numerous reports of tree limbs down on power lines in Plymouth and several surrounding towns.

**January 18, 2006:** High winds knocked over trees which caused power outages and other damages to the area. Trees were reported down in Grafton County by local officials.

**October 20, 2006:** A small but intense area of low pressure moved northeastward through the Gulf of Maine late on the 20th and into the Canadian Maritimes by the afternoon of the 21st. While most winds across the state were in the 35-45 mph range, winds likely gusted to near 60 mph in many areas. In Laconia, the maximum observed wind was 47 mph. The winds downed numerous trees onto power lines, houses, and vehicles. Public Service of New Hampshire reported more than 15,000 customers without electrical service while the New Hampshire Electrical Cooperative reported 8500 customers without service.

**Oct. 28, 2006:** A rapidly intensifying storm system moved up the eastern seaboard on Saturday the 28th, then tracked north across New York State on Saturday night. Sustained winds of 30 to 40

mph were common with gusts to 60 mph. Trees were reported down throughout the state. In Bethlehem and Laconia, trees were reported to have fallen on homes. Storm related wind damage totaled in the hundreds of thousands of dollars.

**Aug 25, 2007:** A severe thunderstorm downed numerous trees and wires in Plymouth. Numerous severe thunderstorms began developing statewide during the late afternoon of August 17th and continued through the evening hours. Wind damage was widespread with these storms along with a few reports of large hail.

**Feb 26, 2010:** Low pressure developed off the mid-Atlantic coast on the morning of the 25th and deepened as it moved north, reaching southern New England by evening. Ahead of the low, east winds rapidly increased across New Hampshire with numerous gusts in excess of 60 mph being reported. A record number of homes and businesses lost power. Utilities reported 310,000 customers without power during the peak of the storm. In Plymouth there were multiple trees down in multiple locations. Immediately after the wind there was a snow event. Most of the town was without power for five days or more. Russell Street, Pleasant Street, Weeks Street, Page Street, Thurlow Street and Parker Street were without power the longest. Chaddarin Road, Beech Hill Road and Fair Ground Road were impacted by downed trees and power outages. Plymouth State University lost power in some buildings for short time. The local shelter was opened for 2 days. School was out for 6 days. Both schools received structural damage. The Town Hall had \$16,000 in damage and the police department had \$4,000 in damage. The Highway department spent the next month clearing/cleaning the street.

**June 9, 2011:** Broad shortwave crossing southern Canada pushed an associated cold front into southern Canada during the early afternoon. A pre-frontal trough moved into eastern New York during the early afternoon with individual cells and line segments forming into one large squall line with bowing segments. The squall line pushed into central and southern New Hampshire by mid afternoon and reached the coast by early evening. Good heating ahead of this line with dew points in the upper 60s to lower 70s resulted in capes of 1500 to 3000 j/kg across much of the region. Although shear was limited, stronger cells moving around 35 kts transported strong mid level winds to the surface resulting in numerous reports of wind damage. Up to 45,000 people were without power by late afternoon in southern New Hampshire. Stronger cells also produced quarter to golf ball size hail. A severe thunderstorm downed trees on buildings in Plymouth.

**August 21, 2011:** A strong upper trough and associated cold front pushed into the region on the afternoon of the 21st. Good low level moisture and instability combined with an impressive wind field aloft to produce numerous severe thunderstorms during the afternoon and evening hours. All reports of damage were due to strong winds. A severe thunderstorm downed trees blocking the road between Interstate 93 and Plymouth.

**June 2, 2013:** An approaching cold front combined with strong wind fields over the region resulting in a widespread severe thunderstorm outbreak during the afternoon and evening hours of June 2nd. These storms produced mainly wind damage with isolated reports of large hail and some flash flooding. A severe thunderstorm downed trees near Plymouth Elementary School.

**September 11, 2013:** A late summer surge of heat and humidity enveloped much of the northeast on the 11th of September. Afternoon temperatures climbed into the lower to mid 90s with dew points in the lower 70s resulting in high CAPE values throughout the forecast area. In addition, a very strong low to mid level jet was in place across the region producing a highly sheared environment. Late afternoon convection developing over western New England quickly formed into a large squall line with numerous bowing segments. This line of storms produced numerous reports of wind damage and large hail as it crossed the forecast area through the late evening hours before pushing offshore shortly before midnight. A severe thunderstorm downed trees and wires in Plymouth.

## LIGHTNING

**Probability:** Probable

**Definition:**

By definition, all thunderstorms contain lightning. Lightning is a giant spark of electricity that occurs within the atmosphere, or between the atmosphere and the ground. As lightning passes through the air, it heats the air to a temperature of 50,000 F, considerably hotter than the surface of the Sun.

**Location:**

The entire town. Including critical facilities, are at moderate risk to lightning hazard. The higher elevation areas have an increased probability; however lightning strikes can occur anywhere in the Town.

**Impact:**

Residents and visitors to the New Hampshire area are more vulnerable to being struck by lightning because of the activities with which they are involved, particularly on those warm summer days when lightning is most likely to occur. Often, many people are outside enjoying the variety of recreational activities that attract people to New England during the summer when the vulnerability to lightning strike is highest. More likely to be affected are structures and utilities, often resulting in structure fires and power outages.

**Extent:**

The National Oceanographic Atmospheric Administration (NOAA) defines the extent of lightning activity with a LAL scale as shown in the table below.

LAL 1	No Thunderstorms
LAL 2	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent. 1 to 5 cloud ground strikes in a 5 minute period.
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.
LAL 4	Scattered thunderstorms. Moderate rain is commonly produced. Lightning is frequent, 11 to 15 cloud to ground strikes in a 5 minute period.
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.
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.

**Previous Occurrence:**

**June 27, 2005:** Lightning struck and ignited a fire that completely destroyed a 24- by 30-foot wooden barn in Plymouth causing an estimated \$60,000 in damage. Firefighters were able to prevent an attached home from suffering significant damage. The Plymouth town hall was also struck and damaged. Slate shingles and bricks from the roof and spire were blown onto the sidewalk below, and the lightning strike left a 4-foot crack in the brick structure. A considerable amount of communications and other electronic equipment inside the building was also damaged or destroyed by the lightning strike. Total damage to the building and electronic equipment was estimated to be about \$50,000. Also in Plymouth, a woman was struck and injured when lightning followed the well line into the basement of her home and along the concrete floor to where she was standing. She was taken to a nearby hospital for a treatment and then released.

**2006:** Wood frame campus building was hit and caught fire. Damaged but not destroyed.

## DROUGHT

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**Probability:** Occasional

**Definition:**

Drought is a deficiency in precipitation over an extended period, usually a season or more, resulting in a water shortage causing adverse impacts on vegetation, animals, and/or people.

**Location:**

Droughts are difficult to define geographically. Due to their widespread nature a drought would affect the entire Town. However, a drought can affect fire suppression in those areas that do not have access to water.

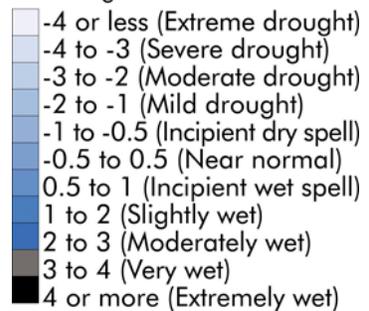
**Impact:**

A drought is defined as a long period of abnormally low precipitation, especially one that adversely affects growing or living conditions. Droughts are not as damaging to the Town as floods or winter weather. However a severe drought can affect public water supply, increase the probability of fires, and impede fire suppression. Those areas with minimal fire protection are at a higher risk as a result of a prolonged drought.

**Extent:**

The Palmer Drought Severity Index (PDSI) was devised in 1965, and was the first drought indicator to assess moisture status comprehensively. It uses temperature and precipitation data to calculate water supply and demand, incorporates soil moisture, and is considered most effective for un-irrigated cropland. It primarily reflects long-term drought and has been used extensively to initiate drought relief. It is more complex than the SPI and the Drought Monitor.

PDSI Legend



**Previous Occurrence:**

According to the State of New Hampshire Multi-Hazard Mitigation Plan Update 2013, the White Mountain area experienced droughts in 1953, 1957, 1964, 1978, 1984 and 2002. The 2001/02 drought was not as severe but resulted in some private wells going dry. There have been no droughts in Plymouth in the last five years.

## WILDFIRE

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**Probability:** Occasional

**Definition:**

Any free burning uncontrollable wild land fire not prescribed for the area which consumes the natural fuels and spreads in response to its environment.

**Location:**

Rattlesnake Mountain and the White Mountain National Forest have an abundance of soft wood and a high percentage of wildland/urban interface, which puts the town at a high risk for wildfires. Many houses and camps are located in forested areas are not easily accessible.

**Impact:**

Fires in New Hampshire are predominantly human-caused, and roughly half of the total fire activity is in the most populous three southern counties. The proximity of many populated areas to the forested lands exposes these areas and their populations to the potential impact of wildfire. The estimated impact to structures could be derived from the information included in the critical facilities in Chapter 4.

**Extent:**

The extent of damage to structures and the general populations will vary depending on climate, warning, and the time of year. Even the time of day could affect the extent, as there is an increase of recreational hikers and tourists during the daytime. The National

Wildfire Coordinating Group (NWCG) classifies a wildfire into one of several ranges of fire, based upon the number of acres burned. The following list provides NWCG's scale for wildfire values:

Value	Description
A	Up to .25 acres
B	0.26 to 9.9 Acres
C	10.0 to 99.9 Acres
D	100 to 299 Acres
E	300 to 999 Acres
F	1000 to 4999 Acres
G	5000 to 9999 Acres
H	10000 to 49999 Acres
I	50000 to 99999 Acres
J	100000 to 499999 Acres
K	500000 to 999999 Acres
L	1000000 + Acres

**Previous Occurrence:**

**1930's:** A small 5 to 10-acre wildfire burned near Loon Lake but caused no significant damage.

**May 2008:** The neighboring Town of Rumney experienced a moderate wildfire. Approximately 70 firefighters (from Plymouth and neighboring towns, and national crews from the US Forest Service) battled a fire for several days on the cliffs of Rattlesnake Mountain that consumed about 50 acres covering 100-foot rock faces.

**DAM FAILURE**

**Probability:** Remote

**Definition:**

According to the NH Department of Environmental Services (DES), a dam is any artificial barrier which impounds or diverts water which: has a height of 6 feet or more; or is located at the outlet of a great pond, regardless of height or storage; or is an artificial barrier which impounds liquid Industrial or liquid commercial wastes, or septage or sewage, regardless of height or storage.

**Location:**

There are 6 non-menace dams (Fox Pond, Recreation Pod, 2 Gateway Detention ponds, Walmart east detention pond and Tractor Supply Detention Pond) and 2 low hazard dams (Tenney Mt. Pond and Walmart Detention Pond) located in Plymouth. There are no high hazard dams outside of Plymouth that would pose a significant threat to the town.

**Impact:**

A dam failure or breach could occur due to extreme rainfall amounts and/or a human caused incident. A failure or breach would result in rapid loss of water that is normally held by the dam resulting in an inundation downstream.

**Extent:**

NH Department of Environmental Services categorizes Dams into one of four classifications, which are differentiated by the degree of potential damages that a failure of the dam is expected to cause. The classifications are designated as non-menace, low hazard, significant hazard and high hazard. A Low Hazard Dam is defined by the NH Department of Environmental Services as "a dam that has a low hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in any of the following: no possible loss of life; low economic loss; structural damage to town road." A Non-Menace structure is a dam that is not a menace because it is in a location and of a size that failure or misoperation of the dam would not result in probable loss of life or loss to Property.

**Previous Occurrence:** There are no recorded dam failures.

## **EARTHQUAKE**

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**Probability:** Remote

**Definition:**

An earthquake is a rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. Larger earthquakes usually begin with slight tremors but rapidly take the form of one or more violent shocks, and end in vibrations of gradually diminishing force called aftershocks. The magnitude and intensity of an earthquake is determined by the use of scales such as the Richter scale and Mercalli scale.

**Location:**

According to the State of New Hampshire Multi-Hazard Mitigation Plan Update 2013, New Hampshire is considered to lie in an area of "Moderate" seismic activity with respect to other areas of the United States and is bordered to the North and Southwest by areas of "Major" activity. Generally, the entire Town is at risk to earthquakes.

**Impact:**

Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric and phone lines, and often cause landslides, flash floods, fires, and avalanches. It is assumed that all of the buildings in the Town have not been designed to withstand seismic activity. More specifically, the older historic buildings that are constructed of non-reinforced masonry are especially vulnerable to any moderate sized earthquake. In addition, utilities (water, gas, etc) are susceptible to earthquake damage. . For a more detailed review of the impact of earthquakes refer to the Plymouth Essential Facilities Report, published in 2002 by Klotz Consultants Group. The report identifies, locates, collects and records the structural and general building data of the Essential Facilities and analyzes the functionality of these facilities based on various sized earthquakes. Plymouth has experienced the effect of small to moderate earthquakes that had minor to no effect on the town's infrastructure.

**Extent:**

Earthquakes with a magnitude of 2.0 to 4.9 on the Richter scale are considered minor to light, and those 5.0 to 6.9 are considered moderate to strong. However, if a large (6+ on the Richter Scale) occurred in or around the town, it is assumed that structural damage would be moderate to severe.

Richter Scale	Magnitude Earthquake Effects
2.5 or less	Usually not felt, but can be recorded by seismograph.
2.5 to 5.4	Often felt, but only causes minor damage.
5.5 to 6.0	Slight damage to buildings and other structures.
6.1 to 6.9	May cause a lot of damage in very populated areas.
7.0 to 7.9	Major earthquake. Serious damage.
8.0 or greater	Great earthquake. Can totally destroy communities near the epicenter.

**Previous Occurrence:**

The following table summarizes earthquakes of 2.5 magnitude or greater that have occurred in New Hampshire and New England:

Location	Date	Magnitude
Ossipee, NH	December 20, 1940	5.5
Ossipee, NH	December 24, 1940	5.5
Dover-Foxcroft, ME	December 28, 1947	4.5
Kingston, RI	June 10, 1951	4.6
Portland, ME	April 26, 1957	4.7
Middlebury, VT	April 10, 1962	4.2
Near NH Quebec Border, NH	June 15, 1973	4.8
West of Laconia, NH	Jan. 19, 1982	4.5
Ontario-Quebec Border	June 23, 2010	5.0
Boscawen, NH	September 26, 2010	3.1
Virginia	August 23, 2011	5.8
Southern Maine	October 16, 2012	4.0

**HAIL**

**Probability:** Occasional

**Definition:** Hail is defined as a showery precipitation in the form of irregular pellets or balls of ice more than 5 mm in diameter, falling from a cumulonimbus cloud.

**Location:**

Due to its widespread nature a hail event could affect any part of Town.

**Impact:**

Hail can damage communications and IT functions, and can damage agricultural crops. Due to the complexities and various factors involved in the formation of hail particle size and weight, the impact can vary tremendously.

**Extent:**

The bigger the diameter of the hailstone, the bigger the impact on agriculture, infrastructure and other objects.

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

**Previous Occurrence:**

**June 1, 2011:** Severe thunderstorms developed out ahead of a cold front during the afternoon of June 1 and produced mostly 1-inch hail across sections of the state. North of Plymouth, 1.75-inch hail was reported.

**EXTREME HEAT**

**Probability:** Remote

**Definition:** A Heat Wave is a “Prolonged period of excessive heat, often combined with excessive humidity.” Heat kills by pushing the human body beyond its limits. In extreme heat and high humidity, evaporation is slowed and the body must work extra hard to maintain a normal temperature.

**Location:**

Extreme heat events are difficult to define geographically. Due to their widespread nature, a period of extreme heat would affect the entire town.

**Impact:**

A heat wave is defined as 3 or more consecutive days of 90 degrees or higher. Extreme heat conditions may impact the health of residents and visitors. Facilities without generators and air-conditioners that house the elderly and disabled are very susceptible to human health issues. Utilities are also vulnerable as the demand for air-conditioning rises.

**Extent:**

According to OSHA, The risk of heat-related illness becomes greater as the weather gets hotter and more humid. This situation is particularly serious when hot weather arrives suddenly early in the season, before workers have had a chance to adapt to warm weather. This table provides guidelines for the risk related to extreme heat.

Heat Index	Risk Level	Protective Measures
Less than 91°F	Lower (Caution)	Basic heat safety and planning
91° to 103°F	Moderate	Implement precautions and heighten awareness
103° to 115°F	High	Additional precautions to protect workers
Greater than 115°F	Very High to Extreme	Triggers even more aggressive protective measures

**Previous Occurrence:**

The town has experienced frequent heat waves in any given 25-year period. However, the impact upon the town and its residents is minimal. The Committee had no specific dates or additional information of past extreme heat events.

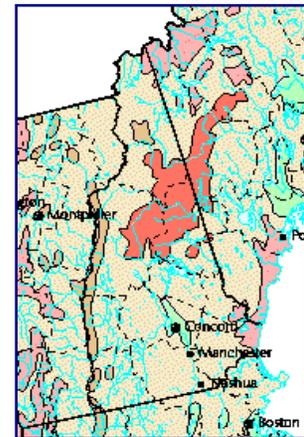
**LANDSLIDE**

**Probability:** Remote

**Definition:** A Landslide is the downward or outward movement of slope forming materials reacting under the force of gravity. These include mudflows, mudslides, debris flows, rockslides, debris avalanches, debris slides and earth flows. Landslides may be formed when a layer of soil atop a slope becomes saturated by significant precipitation and slides along a more cohesive layer of soil or rock.

**Location:**

Areas of concern are along steep slopes greater than 15%. The most detrimental impact currently is the land behind the Elementary School.



**Impact:**

At the moment the potential impact would be to the Elementary School, Fairgrounds Road and Chaddarin Lane.

**Extent:**

Although New Hampshire has a moderate risk statewide, there have been relatively few landslide events. The most well known landslide is the Old Man of the Mountain; a symbol of the State of New Hampshire that collapsed in 2003. Most other events of this hazard type are often attributed to corresponding flood events. The Table to the right shows the incidence and susceptibility of landslides throughout the State.

**Previous Occurrence:**

There have been no significant landslide events. However, since Hurricane Sandy in 2012 there is slow progress at Plymouth Elementary School, which will eventually impact the Town’s sewer lines and the school sports fields.

**AVALANCHE and RADON**

Due to no history or risk of avalanche or radon within the Town of Plymouth, the Committee chose not to recognize the risk of these hazards in this Plan.

## Chapter 4 CRITICAL FACILITIES

### Introduction

The Critical Facilities List for the Town of Plymouth has been identified by the Plymouth Hazard Mitigation Planning Committee. The list is divided into three sections: Facilities needed for Emergency Response (Category 1), Facilities Not Necessary for Emergency response (Category 2), and Populations and facilities to protect in the event of a disaster (Category 3). In addition, the Inventory of Critical Facilities table assesses the value of these structures.

#### **CATEGORY 1 (Facilities needed during an event)**

Plymouth Town Hall, 6 Post Office Square

Primary Emergency Operations Center, 2<sup>nd</sup> floor Town Hall, 6 Post Office Square

Secondary EOC, Pease Public Library 1 Russell St.

Plymouth Police Station, 334 Main Street

Plymouth Fire Station, 42 Highland Street

Plymouth Public Works Garage, 31 South St.

Plymouth CoGen Powerplant, 6 Toby Road

Speare Memorial Hospital, 16 Hospital Road

Hartman Union Building, 17 High Street (Shelter)

Plymouth Congregational Church, 4 Post Office Square (Shelter)

Plymouth Water & Sewer Department, 227 Old N Main St



*Town Hall*



*Fire Station*



*Speare Memorial Hospital*

**CATEGORY 2 (Facilities NOT immediately needed during an event)**

Town Wells, Foster Street

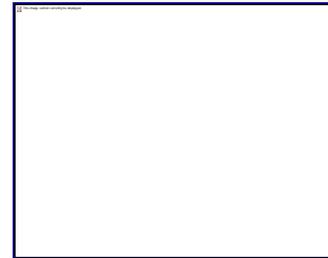
Water Booster Station, Reservoir Road

Water Tank 01, Reservoir Road

Water Tank 02, Reservoir Road

Plymouth Wastewater Treatment Plant, Railroad Square

Plymouth Municipal Airport



*Plymouth State University*

**CATEGORY 3 (Populations & Places to Protect)**

Plymouth State University, Village Area

Plymouth Elementary School, Old Wardbridge Road

Plymouth Regional High School, Old Wardbridge Road

“Crystal Springs”, DW Highway – maintained by Town of Plymouth

Smith Bridge Road Covered Bridge

Senior Center, Railroad Depot

Historical Society Building, Court Street

Plymouth Town Hall, 6 Post Office Square



*Plymouth Elementary School*



*Plymouth Regional High School*



*Smith Bridge Covered Bridge*

Critical Facilities Inventory							
Facility	Name/Location	Owner	Category 1	Category 2	Category 3	Hazard Vulnerability	Replace Value
Town Hall	Plymouth Town Hall	Municipal	✓			Winter Weather, Hurricane, Severe Wind, Earthquake, Lightning, Human	1,020,000
EOC	Plymouth Police Station	Municipal	✓			Winter Weather, Hurricane, Severe Wind, Earthquake, Lightning, Human	273,100
	Plymouth Town Hall	Municipal	✓			Winter Weather, Hurricane, Severe Wind, Earthquake, Lightning, Human	1,020,000
Police Station	Plymouth Police Station	Municipal	✓			Winter Weather, Hurricane, Severe Wind, Earthquake, Lightning, Human	273,100
	PSU Campus Police Station	PSU	✓			Winter Weather, Hurricane, Severe Wind, Earthquake, Lightning, Human	154,700
Fire Station/ EMS	Plymouth Fire Station	Municipal	✓			Winter Weather, Hurricane, Severe Wind, Earthquake, Lightning, Human	499,300
Hospital	Speare Memorial Hospital	Private	✓			Winter Weather, Hurricane, Severe Wind, Earthquake, Lightning, Human	20,077,200
	Mid State Health Center	Private	✓			Winter Weather, Hurricane, Severe Wind, Earthquake, Lightning, Human	2,041,800
Shelters	Hartman Union Building	PSU	✓			Winter Weather, Hurricane, Severe Wind, Earthquake, Lightning, Human	12,970,400
	Plymouth Elementary School	SAU	✓			Winter Weather, Hurricane, Severe Wind, Earthquake, Lightning, Human	4,951,600
	Plymouth High School	SAU	✓			Winter Weather, Hurricane, Severe Wind, Earthquake, Lightning, Human	5,297,600
	Pease Library	Municipal	✓			Winter Weather, Hurricane, Severe Wind, Earthquake, Lightning, Human	1,533,000
	Plymouth Congregational	Private	✓			Winter Weather, Hurricane, Severe Wind, Earthquake, Lightning, Human	1,095,500

Critical Facilities Inventory							
Facility	Name/Location	Owner	Category 1	Category 2	Category 3	Hazard Vulnerability	Replace Value
	Prospect Dining Hall (feeding only)	PSU	✓			Winter Weather, Hurricane, Severe Wind, Earthquake, Lightning, Human	2,253,900
Water Treatment	Plymouth Water & Sewer Department	Municipal			✓	Flood, Winter Weather, Hurricane, Severe Wind, Earthquake, Lightning	134,500
	Town Wells, Foster Street	Municipal	✓			Drought, HazMat, Human	n/a
	Water Booster Station, Reservoir Road	Municipal		✓		Drought, HazMat, Human	n/a
	Water Tank 01, Reservoir Road	Municipal		✓		Drought, HazMat, Human	625,000
	Water Tank 02, Reservoir Road	Municipal		✓		Drought, HazMat, Human	150,000
Sewer Treatment	Plymouth Wastewater Treatment Plant, Railroad Square	Municipal	✓			Drought, HazMat, Human	561,700
Public Works	Plymouth Public Works Garage, Green Street	Municipal		✓		Flood, Winter Weather, Hurricane, Severe Wind, Earthquake, Lightning	113,200
	Recycling Center	Municipal			✓	Winter Weather, Lightning, Human Caused Hazards	600,000
Transportation	Transport Central at the Senior Center	501C3 / Private		✓		Winter Weather, Human	n/a
Public Utilities	Plymouth CoGen Powerplant, 6 Toby Road	PSU		✓		Earthquake, Tornado, Hurricane, Winter, Lightning, Downburst, HazMat, Human	1,400,000
Schools	Plymouth State University	PSU			✓	Winter Weather, Hurricane, Severe Wind, Earthquake, Lightning, Human	Varies
	Plymouth Elementary School	SAU			✓	Winter Weather, Hurricane, Severe Wind, Earthquake, Lightning, Human	12,736,000
	Plymouth Regional High School	SAU			✓	Winter Weather, Hurricane, Severe Wind, Earthquake, Lightning, Human	16,740,800
	Calvary Christian	Private			✓	Winter Weather, Hurricane, Severe Wind, Earthquake, Lightning, Human	3,496,000
	Mt. Village Charter School	Private			✓	Winter Weather, Hurricane, Severe Wind, Earthquake, Lightning, Human	103,800
	Beckett School	Private			✓	Winter Weather, Hurricane, Severe Wind, Earthquake, Lightning, Human	1,566,500

Critical Facilities Inventory							
Facility	Name/Location	Owner	Category 1	Category 2	Category 3	Hazard Vulnerability	Replace Value
High Population Areas	Plymouth State University Campus	PSU			✓	Flood, Winter Weather, Hurricane, severe Wind, Earthquake, Lightning, Human	Varies
	Village/Downtown Area	Varies			✓	Winter Weather, Hurricane, severe Wind, Earthquake, Lightning, Human	n/a
	Grafton County Senior Center	County			✓	Winter Weather, Hurricane, severe Wind, Earthquake, Lightning, Human	1,448,300
	Speare Memorial Hospital	Private			✓	Winter Weather, Hurricane, severe Wind, Earthquake, Lightning, Human	20,077,200
	Speare memorial @ Boulder Point	Private			✓	Winter Weather, Hurricane, severe Wind, Earthquake, Lightning, Human	5,809,700
	Mid State Health @ Boulder Point	Private			✓	Winter Weather, Hurricane, severe Wind, Earthquake, Lightning, Human	2,041,800
	Tenney Mt. Corridor	Varies			✓	Winter Weather, Hurricane, severe Wind, Earthquake, Lightning, Human	n/a
	Walmart	Private			✓	Winter Weather, Hurricane, severe Wind, Earthquake, Lightning, Human	8,716,500
	Soldier Home for Veterans	Private			✓	Winter Weather, Hurricane, severe Wind, Earthquake, Lightning, Human	Under Construction
Cultural Features	"Crystal Springs", DW Highway	Municipal			✓	Drought, HazMat, Human	n/a
	Smith Bridge Road Covered Bridge	NH-DOT			✓	Earthquake, Hurricane, Lightning, Severe Wind, Human	unknown

**ESTIMATING POTENTIAL LOSSES TO CRITICAL FACILITIES**

The Category 1 Critical Facilities identified in Plymouth are estimated to be worth over \$40,525,700. The Table above provides an estimate of the current monetary value for each of the Critical facilities in Plymouth. These values can also be used to determine potential loss estimates in the event a natural or manmade hazard damages a portion of, or the entire facility. The estimates were generated by the town assessor and are based on property tax documentation.

## Chapter 5 CAPABILITY ASSESSMENT

The following table is a list of current policies and regulations adopted by the Town of Plymouth that protect people and property from natural and man-made hazards. The Town reviewed and incorporated mitigation strategies into these policies and regulations, as appropriate. The table includes a description of the policy/regulation, the responsible agent, the policy's effectiveness and mitigation strategies to improve mitigation efforts.

Capability Assessment				
Existing Protection	Description	Responsible Agent	Effectiveness <i>Poor/Good/Exc.</i>	Recommended Changes
Emergency Operations Plan 2013	The Town has an EOP that meets the recommendations by the NH HSEM. This plan identifies the response procedures and capabilities of the Town of Plymouth in the event of a natural or man-made disaster.	EMD	Good	Update in 2017
Emergency Preparedness Plan, Plymouth Co-Generation Plant 2016	A general document that establishes "procedures for the mitigation of a major accident at the Plymouth Co-Generation Plant, 6 Tobey Road".	EMD/Fire Chief	Good	Updating in 2016
Plymouth, NH Drainage Study (Dec 1994)	In 1994 Hoyle, Tanner & Associates, Inc. (HTA) was retained by the Town of Plymouth to perform an evaluation of the Village areas existing closed catch basin drainage system, and make recommendations for upgrades to the system.	Public Works Director	Good	Will be updated as projects are completed
Plymouth Wastewater Facility - Emergency Operation and Response Program (2001)	Deals with emergency response issues which affect the treatment plan and identifies procedures for responding.	Plymouth Village Water & Sewer District (PVWSD) Administrator	Good	None
Plymouth Village Water & Sewer District Emergency Response Plan – Water Distribution System (Nov 2001)	An emergency response plan that identifies procedures to respond to an issue that affects the Water & Sewer District.	PVWSD Administrator	Good	Review & possibly update
Source Water Protection Plan for Plymouth Village Water & Sewer District (Nov 2001)	The purpose of this SPP is to protect the quality of Plymouth's drinking water by identifying and managing potential sources of contamination and threatening activities that occur within the source protection area.	PVWSD Administrator	Good	Needs to be coordinated with the zoning ordinance and town planning process
Plymouth State University Emergency Operations Plan (2016)	This plan identifies the response procedures and capabilities of the PSU in the event of a natural or man-made disaster.	PSU	Good	None.
Zoning Ordinance (2012)	Plymouth 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.	Community Planner/ Planning Board	Good	Incorporate source water protection measures.

<b>Capability Assessment</b>				
<b>Existing Protection</b>	<b>Description</b>	<b>Responsible Agent</b>	<b>Effectiveness</b> <i>Poor/Good/Exc.</i>	<b>Recommended Changes</b>
Floodplain Ordinance (Article VII) (2008)	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.	Community Planner/ Planning Board	Good	Develop compensatory flood requirements
Subdivision and Site Plan Regulations (2002)	The purpose of Plymouth's subdivision and site plan 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.	Community Planner/ Planning Board	Good	Update for clarification
Master Plan (2008)	The Master Plan serves as the guiding document for future development in Plymouth. Second, it serves as the guiding document to assist the Planning Board as it updates the Town Zoning Ordinance, Subdivision and Site Plan Review Regulations.	Planning Board / Community Planner	Good	Continue to update Chapters in the Master Plan.
Shoreland Protection Act (2008)	Establishes minimum standards for the subdivision, use and development of shorelands adjacent to the state's public water bodies.	Planning Board / NH DES	Good	Continue to enforce shoreland regulations.
Central NH Haz Mat	Regional HazMat Team that serves the region.	Lakes Region Haz Mat team	Good	Continue training for the 5 haz mat techs.
Central NH Public Health Network	A Public Health Network that serves the region.	Public Health Network	Good	Continue to participate in Regional Public Health Meetings.
Lakes Region Fire Mutual Aid	With communities within the Lakes Region FMA.	LRFMA	Good	Continue to participate in LRFMA.
Police Mutual Aid	With surrounding communities and Grafton County Sheriff's Office	Police	Good	Update mutual aid agreements as necessary.
Elementary School Emergency Response Plan (2016)	This plan identifies the response procedures and capabilities of the School District in the event of a natural or man-made disaster.	Asst. Principal	Good	Continuously monitor and update to meet state requirements.
High School Emergency Response Plan (2016)	This plan identifies the response procedures and capabilities of the School District in the event of a natural or man-made disaster.	Principal/Staff	Good	Continuously monitor and update to meet state requirements.
Code Red (Reverse Notification System)	Emergency notification system to notify residents and visitors of emergencies.	Grafton County Sheriff	Good	Include CodeRed process in EOP.
PSU Alert System	Emergency notification system to notify students of emergencies.	Plymouth State University	Good	Continue alerting through signs, sirens and texts.

Capability Assessment				
Existing Protection	Description	Responsible Agent	Effectiveness <i>Poor/Good/Exc.</i>	Recommended Changes
Speare Memorial Hospital Emergency Response Plan (2016)	This plan identifies the response procedures and capabilities of the Hospital in the event of a natural or man-made disaster.	Speare Memorial Hospital	Good	Continuously monitor and update to meet state requirements.
Public Access Channel (3 & 20)	Provide public alerts and notifications through the public access channel.	Town	Good	Continue to post emergency info on public access channels

\*Effectiveness terms are defined as:

- Poor: Outdated and/or ineffective and needs to be reviewed/updated.
- Good: Meets minimum requirements and may require potential reviews/updates.
- Excellent: Regulations meets all requirements and requires no reviews/updates.

### Integration of Mitigation Priorities into Planning and Regulatory Tools

The Town should conduct periodic review of these regulations and this Hazard Mitigation Plan. Reviewing these plans on a regular basis will ensure the integration of mitigation strategies. This review will continue to be a priority of the Plymouth Emergency Management Director and will likely include yearly 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 Plymouth, 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* (found in Chapter 6), 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.

## Chapter 6 MITIGATION PROJECTS

### Hazard Identification

The Committee utilized the *Hazard Identification Worksheet*, as shown in Appendix B, to identify potential hazards, the historical occurrence, locations, assets at risk and the probability of each hazard. The results of this process can be found in Chapter 3.

### Problem Statements

From the Hazard Identification process the Committee developed a list of Problem Statements for each Hazard (see Appendix B). Based on the hazards and risks within the town, the Committee summarized the ‘problems’ associated for every hazard identified. These problem statements allowed the Committee to identify mitigation alternatives during the project identification step described below.

### Goals Identified

During the 2016 update, the Committee reviewed the 2011 Plymouth Hazard Mitigation Plan goals and made only minor revisions. The Goals were not modified for any substantial content, as there has not been any substantial change in development

### Project Identification

Using the *Mitigation Project Identification Worksheet* (see Appendix B) as a guide, the Committee members identified mitigation projects for each problem Statement. Specific objectives included: Prevention, Property Protection, Public Education, Natural Resource Protection, Emergency Services and Structural Projects. In total, there were 16 projects identified.

This process resulted in the *Mitigation Project Identification Matrix*. For illustrative purposes the table below is an excerpt from the *Matrix* included in Appendix B. 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. One component of STAPLEE is the Economic criteria which aided the committee in determining whether the benefits outweigh the costs.

Mitigation Project Identification Matrix									
Hazard	Problem Statement	Projects <i>Prevention /Property Protection/ Public Educ./ Nat.Resources /Emerg.Serv / Structural</i>	Social	Technical	Administrative	Political	Legal	Economic	Environment
Flood	Heavy and prolonged rain events cause flood damage to roads and culverts and bridges and has the potential for residential flooding.	Continue enforcement of National Flood Insurance Program (NFIP) regulations and educate the public on the NFIP program.	+	+	+	+	+	+	+

**Completed Projects since 2011**

The Town of Plymouth completed the latest version of this plan in 2011. Since that time the town has completed the projects listed below. These completed projects are not included in the 2016 edition of the Hazard Mitigation plan. In addition, the Committee added new projects to the Mitigation Action Plan, all of which are included in the Action Plan.

<b>Completed Projects since 2011</b>
1. Update and maintain plan for emergency evacuation of Plymouth residents, guests, and Plymouth State University students.
2. Update the 1987 Emergency Management Plan to meet the new Emergency Support Function (ESF) format required by the NH Homeland & Emergency Management.
3. Provide portable radios for the Highway Department and Water & Sewer Department
4. Develop an exercise/drill procedure to annually test Plymouth’s Emergency Operations Plan.
5. Develop a team of town officials and professional engineers to review the Town’s roadway and drainage standards, for improvement recommendations and mitigation measures.
6. Develop MOU with local Petroleum Companies to provide gas to emergency vehicles during prolonged power outages.
<b>Continuing Projects since 2011</b>
<i>(Note: these projects were identified by the committee as either on-going or annual projects that they wanted to maintain or were just simply not started because the responsible department simply did not initiate action.)</i>
1. Work with the NH-DES, NWS and USGS to develop a real-time flood-forecasting system and reservoir operations model to reduce flooding impacts and potential flood damage within Plymouth and the Pemigewasset and Baker River network.
2. Upgrade the Emergency Operations Center to include security features and backup power system.
3. Continue to implement the Plymouth Village Water & Sewer Districts’ “Drinking Water Source Protection Program” in conjunction with NH-DES, to identify methods for protecting public water supplies in Plymouth and develop a plan for implementing the identified protection methods through zoning ordinance amendment.
4. Relocate the Town Highway Garage out of the 100-year floodplain.
5. Continue implementation of planned Stormwater improvements throughout the town; Cummings Hill Road, Texas Hill Road, Morse Road, Old Hebron Road, Chaisson Road, Loon Lake Road, Bell Road and Reservoir Road.
6. Provide National Incident Management System (NIMS) / Incident Command System (ICS) training to emergency management personnel, critical facility managers and other town staff members. Since 2004, training has been an on-going process and needs to continue.
7. Develop and continue the Comprehensive Emergency Management Planning for Schools (CEMPS) program at the Elementary School and Regional High School. Since 2004, many of the essential staff have taken ICS training and both schools are updating there plans.
<b>Deleted Projects Since 2011</b>
“Coordinate with and research NHDOT and other state and federal agencies relative to grants that may be available for mitigation projects on the Town’s road and drainage systems.” was deleted because it is already part of the budget, and redundant to other road projects already listed.

**2016 Prioritized Mitigation Projects:**

In 2016, each committee member reviewed the updated list of Mitigation Projects. After careful evaluation, the committee ranked the projects by voting for half of the projects. The project that received the most votes was ranked as the highest priority and the project receiving the least amount of votes received the lowest priority. (See Prioritized Mitigation Projects in Appendix B.) 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. The prioritized projects are identified in the Mitigation Action Plan.

There have been no significant changes to mitigation priorities for the Town of Plymouth. The Town has not experienced any changes in resources, new hazard impacts, or development patterns that merit changes to mitigation priorities. The Hazard Mitigation Committee identified new projects as described below and prioritized them as discussed above.

**Incorporating Mitigation into Local Planning**

In order for the requirements of this plan to be effective, it is essential that the Town of Plymouth incorporate the strategies and actions into its planning process. Educating employees working within the Town Agencies along with members of the various Boards on the provisions of the plan is critical for ensuring that disaster preparedness and risk mitigation become part of their planning process when holding discussions, making decisions, and developing plans and Standard Operating Procedures (SOPs). As noted above, information outreach is a high priority action item that will impact more than just Town employees and Board members. Since interested citizens attend various Town meetings where decisions are made, having a community base that understands the importance of disaster mitigation planning will also assist in ensuring that future plans and actions integrate the requirements found in this plan.

The Board of Selectmen will instruct the Town Agency Heads to review their SOPs and ensure that where appropriate, the requirements of this plan are integrated into those procedures. They will also coordinate with both the Zoning Board and the Planning Board to ensure that risk mitigation planning continues to be a part of their recommendation/decision process in order to fulfill the goals and objectives outlined in this plan.

Since the last update of this Plan in 2011, the Town incorporated Hazard Mitigation Planning into the following documents:

- Master Plan – The Master Plan is updated every 5 to 10 years in accordance with RSA 674. The most recent edition was adopted in 2013 and included the 2011 Hazard Mitigation Plan as an Appendix.

The Master Plan also includes a discussion of capital improvements within the Town.

- Plymouth Emergency Operations Plan (EOP) – The EOP is designed to allow the Town to respond more effectively to disasters as well as mitigate the risk to people and property. The EOP was updated in 2013 and was reviewed to ensure that where appropriate, specific mitigation actions outlined in the HMP were also addressed in the EOP.

**Mitigation Action Plan**

The projects identified in 2011 included preparedness projects as well as mitigation projects. During the 2016 update, the committee prioritized only the FEMA defined mitigation projects. The Non-Mitigation Projects are listed below. The mitigation projects are compiled in the Mitigation Action Plan found on Page 6-4 which identifies Responsibility, Funding, Time frame, Hazards Addressed and the Priority for each mitigation project. The preparedness (NON-Mitigation) projects are identified on page 6-5.

<b>NON-MITIGATION PROJECTS</b>	
1.	Upgrade the Emergency Operations Center to include security features and backup power system.
2.	Construct a Public Safety Center to house police and fire.
3.	Evaluate the need for additional “physical security” at the Town Hall, Police Department, Fire Department, Highway Department and Senior Center.
4.	Upgrade a steam cleaner system with bigger generator to maintain clear culverts during cold weather conditions (i.e. ice/debris blockage) to prevent flooding.
5.	Purchase a wood chipper for highway and recycling center for use in disposing of wood debris.
6.	Improve protection of Vital Records and develop a Continuity of Operations Plan (COOP) to be included in the update Emergency Operations Plan.
7.	Conduct an assessment of the Village and Plymouth State University for CBRNE exposure.
8.	Provide National Incident Management System (NIMS) / Incident Command System (ICS) training to emergency management personnel, critical facility managers and other town staff members. Since 2004, training has been an on-going process and needs to continue.
9.	Develop and continue the Comprehensive Emergency Management Planning for Schools (CEMPS) program at the Elementary School and Regional High School. Since 2004, many of the essential staff have taken ICS training and both schools are updating there plans.

**MITIGATION ACTION PLAN**

The following is the completed list of projects, recommended by the Committee. The following action plan identifies Responsibility, Funding and a Time frame for the mitigation projects for each objective. The actions will begin as soon as the plan is approved and the community is eligible for funding, unless otherwise stated, and will be completed as noted in the implementation date column in the table below.

Mitigation Action Plan - Plymouth, NH						
Mitigation Action	Responsibility/ Oversight	Funding/ Support	Timeframe*	Hazards Addressed	Estimated Cost	Priority
1. Purchase and install a generator at the Plymouth regional high school, which is a designated cooling shelter.	SAU 48	School Budget & Grants	Medium	Extreme Heat	\$75,000	High
2. Purchase and install a generator at the public works garage.	DPW	Town Budget 7 Grants	Short	Drought, Extreme Heat, Flood, Hail, Hurricane, Lightning, Severe Wind, Wildfire and Winter Weather	\$75,000	High
3. Work with the NH-DES, NWS and USGS to repair existing gauge for real-time flood-forecasting system to reduce flooding impacts and potential flood damage within Plymouth and the Pemigewasset and Baker River network.	Town Admin. / EMD and NH DES	State Budget & Grants	Short	Flood, Hurricane	\$10,000	High
4. Upgrade box culvert at Loon Lake Road to reduce flooding which could impact approximately 80 homes.	DPW	Town Budget & Grants	Short	Flood, Hurricane	\$135,000	High
5. Upgrade box culvert on Yeaton Road.	DPW / NH DOT	Town Budget & Grants	Short	Flood, Hurricane	\$135,000	High
6. Provide soil stabilization at the Plymouth Elementary School field to prevent safety concerns and impact to the sewer pipe.	SAU 48 & PVWSD	School Budget & Grants	Short	Landslide	2-3 Million	High
7. Continue to support the Plymouth Village Water & Sewer Districts' "Drinking Water Source Protection Program" in conjunction with NH-DES, to identify methods for protecting public water supplies in Plymouth and develop a plan for implementing the identified protection methods through zoning ordinance amendment.	PVWSD	Town Budget & Grants	Short	Drought	\$0 to 410,000	Medium

Mitigation Action Plan - Plymouth, NH						
Mitigation Action	Responsibility/ Oversight	Funding/ Support	Timeframe*	Hazards Addressed	Estimated Cost	Priority
8. Continue implementation of planned Stormwater improvements throughout the town; Cummings Hill Road, Texas Hill Road, Morse Road, Old Hebron Road, Chaisson Road, Loon Lake Road, Bell Road and Reservoir Road.	DPW	Town Budget & Grants	Short	Flood, Hurricane	\$20,000 - \$50,000 per road	Medium
9. Relocate and/or flood proof the Town Highway Garage which is located in the 100-year floodplain.	Board of Selectmen	Town Budget & Grants	Long	Flood, Hurricane	2-3 Million	Medium
10. Continue to install lightning protection systems at critical facilities.	Town Admn. / EMD	Town Budget & Grants	Medium	Lightning	\$5,000 per building	Medium
11. Repair/replace the outlet at Fox Pond.	Parks & Rec	Town Budget	Short	Dam Failure	\$1,000	Low
12. Implement inspection and maintenance program to ensure structural integrity of Town owned dams.	DPW & NH DES	Town Budget & Grants	Short	Dam Failure	\$1,000 to \$3,000	Low
13. Provide public awareness regarding water conservation during periods of drought.	PVWSD	Town Budget	Short	Drought	\$0 - \$1,500	Low
14. Conduct seismic retrofitting for critical public facilities most at risk to earthquakes.	Town Admin. / EMD	Town Budget & Grants	Short	Earthquake	\$0 - \$50,000	Low
15. Educate citizens regarding the dangers of seasonal hazards.	EMD & Fire	Town Budget & Grants	Short	Drought, Extreme Heat, Flood, Hail, Hurricane, Lightning, Severe Wind, Wildfire and Winter Weather	\$1,000 - \$2,000	Low
16. Coordinate with NH DES to reduce lowland flooding/ponding at the downside outlet of Loon Lake.	DPW & NH DES	Town Budget & Grants	Short	Flood, Hurricane	\$75,000 – 4100,000	Low

\*Timeframe: Short Term=1 year or less, or ongoing Medium Term=2-3 years Long Term=4-5 years

## **Chapter 7**

### **ADOPTION, IMPLEMENTATION, MONITORING**

#### **Adoption**

The Plymouth Selectmen by majority vote officially adopted the *Plymouth Hazard Mitigation Plan Update 2016* on September 26, 2016. The formal Adoption is on page 7-3.

#### **Implementation**

There were 13 mitigation projects that were prioritized by the Committee. For each project the Committee identified who, when and how they would be implemented. Please refer to the “Action Plan” in Chapter 6 for a description of the timeframe and persons or departments responsible for implementation of the Prioritized Projects.

It will be the future responsibility of the Emergency Management Director to ensure implementation of these Prioritized Projects.

#### **Monitoring & Updates**

The *Plymouth Hazard Mitigation Plan Update 2016* should be reviewed and evaluated annually; and formally updated every five years. The Emergency Management Director is responsible for initiating this review and needs to consult with members of the Plymouth Hazard Mitigation Planning Committee, in order to track progress and update the Prioritized List in Chapter 6. The EMD will ensure the following:

- The Hazard Analysis will be evaluated for accuracy.
- Projects completed will be evaluated to determine if they met their objective.
- Projects not completed since the last update will be reviewed to determine feasibility of future implementation.
- Lastly, new projects will be identified and included in future updates as needed.
- The public, members of the Committee, surrounding communities, businesses, academia, State agencies and non-profit agencies, will continue to be invited and involved during this process. These groups can be notified through invitations, public notices, newspapers articles, brochures and/or other public outreach activities.
- In keeping with the process of adopting the Plymouth Hazard Mitigation Plan Update 2016, a public hearing to receive public comment will be held. This will require the posting of two public notices.
- Updates to the *Plan* may be adopted subsequent to a public meeting or hearing by the Plymouth Board of Selectmen.
- Once every five years, the EMD will submit an updated plan to FEMA for approval.

<b>Annual Hazard Mitigation Plan Update, Monitor &amp; Evaluate Schedule and Public Involvement</b>			
<b>Meeting Schedule</b>	<b>Task</b>	<b>Town of Plymouth Responsibilities</b>	<b>Public Involvement (neighboring communities)</b>
Annually or as needed	Assess current status of funding for mitigation projects. Discuss any new projects/plans that should be obtained for your community.	Dept. heads and Board of Selectmen to locate and apply for sources of funding and implement the proposed strategies and plans.	Residents, businesses, and neighboring / watershed communities.
Annually or as needed	Meet to discuss the Hazard Mitigation Plan content and any updates needed for the plan	Department Heads or other agencies.	Residents, businesses, and neighboring / watershed communities.
Annually or as needed	Discussion and evaluation of Training Programs and public outreach efforts. New public outreach methods discussed.	Department Heads or other agencies.	Residents, businesses, and neighboring / watershed communities.

# CERTIFICATION OF ADOPTION

**TOWN OF PLYMOUTH, NH  
6 Post Office Square, Plymouth, NH 03264  
September 26, 2016**

## **A RESOLUTION ADOPTING THE TOWN OF PLYMOUTH, NH HAZARD MITIGATION PLAN UPDATE 2016**

WHEREAS, the Town of Plymouth, NH has historically experienced severe damage from natural hazards and it continues to be vulnerable to the effects of - only those natural hazards profiled in the plan (i.e. *flooding, thunderstorm, high wind, winter storms, earthquakes, and dam failure*), resulting in loss of property and life, economic hardship, and threats to public health and safety; and

WHEREAS, the Town of Plymouth, NH, has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its Hazard Mitigation Plan Update 2016 under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held between January 2016 and June 2016 regarding the development and review of the Hazard Mitigation Plan Update 2016; and

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

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

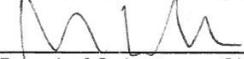
WHEREAS, adoption of this Plan will make the Town of Plymouth, NH eligible for funding to alleviate the impacts of future hazards; now therefore be it

RESOLVED by the Board of Selectmen:

The Plan is hereby adopted as an official plan of the Town of Plymouth, NH

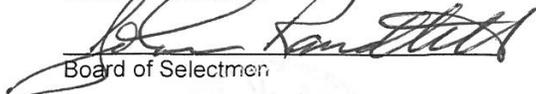
1. The respective official identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;
2. Future revisions and Plan maintenance required by 44 CFR 201.6 and FEMA are hereby adopted as part of this resolution for a period of five (5) years from the date of this resolution.
- 3.
4. An annual report on the progress of the implementation elements of the Plan shall be presented to the Board of Selectmen by April 1<sup>st</sup> of each year.

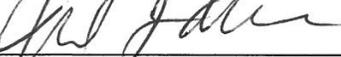
Adopted, this 26th day of September, 2016.

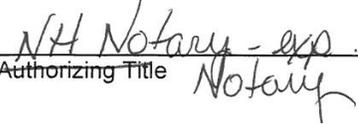
  
Board of Selectmen, Chairman

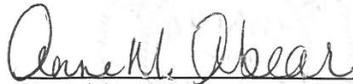
  
Board of Selectmen

  
Board of Selectmen

  
Board of Selectmen

  
Board of Selectmen

  
NH Notary - exp 9/7/21  
Authorizing Title Notary

  
Authorizing Signature

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## ACRONYMNS

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**BMP – Best Management Practices**  
**CDBG - Community Development Block Grant**  
**CRS – Community Rating System**  
**DES – Department of Environmental Services**  
**DHS – Department of Homeland Security**  
**DMA – Disaster Mitigation Act**  
**DOT – Department of Transportation**  
**EAP – Emergency Action Plan**  
**EMD – Emergency Management Director**  
**EMPG – Emergency Management Performance Grant**  
**EMS – Emergency Medical Services**  
**EOC – Emergency Operations Center**  
**EOP – Emergency Operations Plan**  
**FEMA – Federal Emergency Management Agency**  
**FIRM – Flood Insurance Related Maps**  
**FMA – Flood Mitigation Assistance Program**  
**GIS – Geographic Information System**  
**HAZMAT – Hazardous Material**  
**HMGP – Hazard Mitigation Grant Program**  
**HSEM – Homeland Security and Emergency Management**  
**ICC – International Code Council**  
**NFIP – National Flood Insurance Program**  
**NH HSEM – NH Homeland Security and Emergency Management**  
**PDM – Pre-Disaster Mitigation**  
**OEP – Office of Energy Planning**  
**RC&D – Resource Conservation and Development**  
**USGS – United State Geological Survey**

## APPENDICES

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Appendix A  
Appendix B  
Appendix C

Hazard Mitigation Resources  
Documentation of Planning Process  
Approval Letter from FEMA

## **APPENDIX A**

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### **Hazard Mitigation Resources**

### ◆ HAZARD MITIGATION GRANT PROGRAM - "Section 404 Mitigation"

The Hazard Mitigation Grant Program (HMGP) in New Hampshire is administered in accordance with the 404 HMGP Administration Plan which was derived under the authority of Section 404 of the Stafford Act in accordance with Subpart N. of 44 CFR.

The program receives its funding pursuant to a Notice of Interest submitted by the Governor's Authorized Representative (or GAR, i.e. the Director of NH HSEM) to the FEMA Regional Director within 60 days of the date of a Presidentially Declared Disaster.

The amount of funding that may be awarded to the State/Grantee under the HMGP may not exceed 15% of (over and above) the overall funds as are awarded to the State pursuant to the Disaster Recovery programs as are listed in 44 CFR Subpart N. Section 206.431 (d) (inclusive of all Public Assistance, Individual Assistance, etc.). Within 15 days of the Disaster Declaration, an Inter-Agency Hazard Mitigation Team is convened consisting of members of various Federal, State, County, Local and Private Agencies with an interest in Disaster Recovery and Mitigation. From this meeting, a Report is produced which evaluates the event and stipulates the State's desired Mitigation initiatives.

Upon the GAR's receipt of the notice of an award of funding by the Regional Director, the State Hazard Mitigation Officer (SHMO) publishes a Notice of Interest (NOI) to all NH communities and State Agencies announcing the availability of funding and solicits applications for grants. The 404 Administrative Plan calls for a State Hazard Mitigation Team to review all applications. The Team is comprised of individuals from various State

- Eligible Subgrantees include:**
- State and Local governments,
  - Certain Not for Profit Corporations
  - Indian Tribes or authorized tribal organizations
  - Alaskan corporations not privately owned.

- Minimum Project Criteria**
- Must conform with the State's "409" Plan
  - Have a beneficial impact on the Declared area
  - Must conform with:
    - NFIP Floodplain Regulations
    - Wetlands Protection Regulations
    - Environmental Regulations
    - Historical Protection Regulations
  - Be cost effective and substantially reduce the risk of future damage
  - Not cost more than the anticipated value of the reduction of both direct damages and subsequent negative impacts to the area if future disasters were to occur i.e., min 1:1 benefit/cost ratio
  - Both costs and benefits are to be computed on a "net present value" basis
  - Has been determined to be the most practical, effective and environmentally sound alternative after a consideration of a range of options
  - Contributes to a long-term solution to the problem it is intended to address
  - Considers long-term changes and has manageable future maintenance and modification requirements

Agencies.

- Eligible Projects** may be of any nature that will result in the protection to public or private property and include:
- Structural hazard control or protection projects
  - Construction activities that will result in protection from hazards
  - Retrofitting of facilities
  - Certain property acquisitions or relocations
  - Development of State and local mitigation standards
  - Development of comprehensive hazard mitigation programs with implementation as an essential component
  - Development or improvement of warning systems

## ◆ FLOOD MITIGATION ASSISTANCE (FMA) PROGRAM

New Hampshire has been a participant in the Flood Mitigation Assistance Program (FMA or FMAP) since 1996/97. In order to be eligible, a community must be a participant in the National Flood Insurance Program.

In 1997, the State was awarded funds to assist communities with Flood Mitigation Planning and Projects. A Planning Grant from the 1996/97 fund was awarded to the City of Keene in 1998. In preparation for the development of the Flood Mitigation Plan, the Planning Department of the City of Keene created a digital data base of its floodplain including the digitizing of its tax assessing maps as well as its Special Flood Hazard Areas in GIS layers. The Plan Draft was submitted to FEMA for review and approval in March of 2000. The Plan includes a detailed inventory of projects and a "model" project prioritization approach.

In 1998, the FMAP Planning Grant was awarded to the Town of Salem. Given the complexity of the issues in the Spicket River watershed, the Town of Salem subcontracted a substantial portion of the development of its Flood Mitigation Planning to SFC Engineering Partnership of Manchester, NH, a private engineering firm. Salem submitted a Plan and proposed projects to the State and FEMA in May of 1999 which were approved by FEMA. This made Salem the first community in NH to have a FEMA/NFIP approved Flood Mitigation Plan.

### Flood Mitigation Assistance Program

- NFIP Funded by a % of Policy Premiums
- Planning Grants
- Technical Assistance Grants to States (10% of Project Grant)
- Project Grants to communities
- Communities must have FEMA approved Flood Mitigation Plan to receive Project Funds

## *Eligible Projects*

*(44 CFR Part 78)*

- Elevation of NFIP insured residential structures
- Elevation and dry-proofing of NFIP insured non-residential structures
- Acquisition of NFIP insured structures and underlying real property
- Relocation of NFIP insured structures from acquired or restricted real property to sites not prone to flood hazards
- Demolition of NFIP insured structures on acquired or restricted real property
- Other activities that bring NFIP insured structures into compliance with statutorily authorized floodplain management requirements
- Beach nourishment activities that include planting native dune vegetation and/or the installation of sand-fencing.
- Minor physical mitigation projects that do not duplicate the flood prevention activities of other Federal agencies and lessen the frequency of flooding or severity of flooding and decrease the predicted flood damages in localized flood problem areas. These include: modification of existing culverts and bridges, installation or modification of flood gates, stabilization of stream banks, and creation of small debris or flood/storm water retention basins in small watersheds (not dikes, levees, seawalls etc.)

## ◆ PRE-DISASTER MITIGATION PROGRAM (PDM)

FEMA has long been promoting disaster resistant construction and retrofit of facilities that are vulnerable to hazards in order to reduce potential damages due to a hazard event. The goal is to reduce loss of life, human suffering, economic disruption, and disaster costs to the Federal taxpayer. This has been, and continues to be accomplished, through a variety of programs and grant funds.

Although the overall intent is to reduce vulnerability before the next disaster threatens, the bulk of the funding for such projects actually has been delivered through a "post-disaster" funding mechanism, the Hazard Mitigation Grant Program (HMGP). This program has successfully addressed the many hazard mitigation opportunities uniquely available following a disaster. However, funding of projects "pre-disaster" has been more difficult, particularly in states that have not experienced major disasters in the past decade. In an effort to address "pre-disaster mitigation", FEMA piloted a program from 1997-2001 entitled "Project Impact" that was community based and multi-hazard oriented.

Through the Disaster Mitigation Act of 2000, Congress approved creation of a national Pre-disaster Hazard Mitigation program to provide a funding mechanism that is not dependent on a Presidential disaster declaration. For FY2002, \$25 million has been appropriated for the new grant program entitled the **Pre-Disaster Mitigation Program (PDM)**. This new program builds on the experience gained from Project Impact, the HMGP, and other mitigation initiatives.

Eligible projects include:

- State and local hazard mitigation planning
- Technical assistance [e.g. risk assessments, project development]
- Mitigation Projects
  - Acquisition or relocation of vulnerable properties
  - Hazard retrofits
  - Minor structural hazard control or protection projects
- Community outreach and education [up to 10% of state allocation]

The funding is 75% Federal share, 25% non-Federal, except as noted below. The grant performance periods will be 18 months for planning grants, and 24 months for mitigation project grants. The PDM program is available to regional agencies and Indian tribes. Special accommodation will be made for "small and impoverished communities", who will be eligible for 90% Federal share, 10% non-Federal.

## ◆ COMMUNITY DEVELOPMENT BLOCK GRANT PROGRAM

*These Federal funds are provided through the U.S. Department of Housing and Urban Development (HUD) and are administered by the CDBG Program of the New Hampshire Office of State Planning.*

Some CDBG disaster related funding has been transferred to FEMA recently and the SHMO is scheduled to receive guidance as to which specific funds and, new program management criteria.

The specific CDBG funds designated for hazard mitigation purposes are made available to address "unmet needs" pursuant to a given Disaster Declaration to States which request them. For these funds, project selection guidance is provided by NH HSEM and NHOSP administers the grant.

Pursuant to Declaration DR-1144-NH, \$557,000.00 was made available to the State and pursuant to DR-1199-NH, the grant award is targeted at \$1,500,000.00.

In October of 1998, HUD announced the program guidelines for the expenditure of the DR-1144-NH related funding and the community of Salem applied for, and has received preliminary approval for funding to acquire a 19 unit trailer park in the Floodplain.

### **Community Development Block Grant**

- *U.S. Dept. of Housing and Urban Development*
- *Funds for a Declared Disaster's "Unmet Needs"*
- *Projects must meet one of three National Objectives*
- *Provide a direct benefit to low and moderate income persons or households*
- *Prevent or eliminate slums and blight*
- *Eliminate conditions which seriously and immediately threaten the public health and welfare*

*Additional conditions with respect to the expenditure of these funds includes the provision that at least 50% of the grant award must be expended in a manner which benefits individuals who earn 80% or less than the area's (county's) median income.*

<b>WEBSITES FOR MITIGATION RESOURCES</b>	
American Planning Association	<a href="http://planning.org">http://planning.org</a>
Community Rating System	<a href="http://www.fema.gov/national-flood-insurance-program-community-rating-system">http://www.fema.gov/national-flood-insurance-program-community-rating-system</a>
FEMA Mitigation Planning	<a href="http://www.fema.gov/multi-hazard-mitigation-planning">http://www.fema.gov/multi-hazard-mitigation-planning</a>
FEMA Public Assistance Program	<a href="https://www.fema.gov/public-assistance-local-state-tribal-and-non-profit">https://www.fema.gov/public-assistance-local-state-tribal-and-non-profit</a>
Flood Mitigation Assistance Program	<a href="http://www.fema.gov/flood-mitigation-assistance-program">http://www.fema.gov/flood-mitigation-assistance-program</a>
Hazard Mitigation Grant Program	<a href="http://www.fema.gov/hazard-mitigation-grant-program">http://www.fema.gov/hazard-mitigation-grant-program</a>
HAZUS and HAZUS–MH	<a href="https://www.fema.gov/hazus">https://www.fema.gov/hazus</a>
Mitigation Success Stories	<a href="http://www.fema.gov/mitigation-best-practices-portfolio">http://www.fema.gov/mitigation-best-practices-portfolio</a>
National Flood Insurance Program	<a href="http://www.fema.gov/nfip">http://www.fema.gov/nfip</a>
National Hurricane Program	<a href="http://www.fema.gov/hazards/hurricanes/nhp.shtm">http://www.fema.gov/hazards/hurricanes/nhp.shtm</a>
NOAA Storm Events	<a href="http://www.ncdc.noaa.gov/stormevents/">http://www.ncdc.noaa.gov/stormevents/</a>
NH Homeland Security & Emergency Management	<a href="http://www.nh.gov/safety/divisions/hsem/">http://www.nh.gov/safety/divisions/hsem/</a>
Pre-Disaster Mitigation Program	<a href="https://www.fema.gov/pre-disaster-mitigation-grant-program">https://www.fema.gov/pre-disaster-mitigation-grant-program</a>
Small Business Administration	<a href="http://www.sba.gov/disaster">http://www.sba.gov/disaster</a>
U.S. Army Corps of Engineers	<a href="http://www.usace.army.mil">http://www.usace.army.mil</a>
U.S. Department of Agriculture (USDA)	<a href="http://www.usda.gov/da/disaster/nda.htm">http://www.usda.gov/da/disaster/nda.htm</a>
USDA , Natural Resources Conservation Service	<a href="http://www.nrcs.usda.gov">http://www.nrcs.usda.gov</a>
U.S. Department of Housing and Urban Development	<a href="http://portal.hud.gov/hudportal/HUD">http://portal.hud.gov/hudportal/HUD</a>

## **APPENDIX B**

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### **Documentation of Planning Process**

#### **Including:**

**Agendas**

**Attendance Sheets**

**Public Notices / Email Notices**

**Problem Statements**

**Mitigation Project Identification Matrix**

**Prioritized Mitigation Projects**

# Plymouth, NH Hazard Mitigation Plan

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January 5, 2016

## Committee/Public Meeting AGENDA

1. Introductions
2. Review/Update Goals
3. Review/Update Hazard History
4. Review/Update Risk Matrix
5. MISC:
  - a. Any significant changes in development since fall of 2010, especially in hazard prone areas?
  - b. Participation/activities in NFIP since 2010?
  - c. Was the HMP incorporated into other planning mechanisms? If not, why?
6. Review for next meeting:
  - Update Critical Facilities (Chap. 4)
  - Update Capability Assessment (Chap.5)
  - Distribute Sample Mitigation Projects

### ATTENDEES

Alex Hutchins	Plymouth Police Department
Anne Abear	Plymouth Finance Director
Brian Murphy	Plymouth Code Enforcement & Deputy EMD
Casino Clogston	Plymouth Fire Department
Joe Fagnant	Plymouth Highway Department
Jon Francis	SAU 48
Kathryn Lowe	Plymouth Town Hall
Lisa Doner	Plymouth Conservation Commission
Paul Freitas	Plymouth Town Administrator
Paul Hatch	NH HSEM Field Representative
Sharon Penny	Plymouth Town Planner
Steve Lefebvre	Plymouth Police Department
Tom Morrison	Plymouth Fire Department
Jane Hubbard	Consultant, Hubbard Consulting LLC

# Plymouth, NH Hazard Mitigation Plan

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April 6, 2016

## Committee/Public Meeting AGENDA

1. Review Problem Statements
2. Review/Update Critical Facilities (Chap 4)
3. Review/Update Capabilities (Chap. 5)
4. Update Mitigation Projects (Chap. 6)
5. Review for next meeting:  
Identify NEW mitigation projects

### ATTENDEES

Anne Abear	Plymouth Finance Director
Brian Murphy	Plymouth Code Enforcement & Deputy EMD
Casino Clogston	Plymouth Fire Department
Joe Fagnant	Plymouth Highway Department
Paul Freitas	Plymouth Town Administrator
Paul Hatch	NH HSEM Field Representative
Sharon Penny	Plymouth Town Planner
Steve Lefebvre	Plymouth Police Department
Tom Morrison	Plymouth Fire Department
Jane Hubbard	Consultant, Hubbard Consulting LLC

# Plymouth, NH Hazard Mitigation Plan

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May 6, 2016

## Committee/Public Meeting AGENDA

1. Identify NEW mitigation projects, using the ‘Problem Statements to Projects’ worksheet and STAPLEE Methodology.

Next Meeting:  
Complete Mitigation Action Plan

### ATTENDEES

Angle Ekstrom	Central NH Public Health Network
Anne Abear	Plymouth Finance Director
Brian Murphy	Plymouth Code Enforcement & Deputy EMD
Casino Clogston	Plymouth Fire Department
Joe Fagnant	Plymouth Highway Department
Jon Francis	SAU 48
Kathryn Lowe	Plymouth Town Hall
Paul Hatch	NH HSEM Field Representative
Sharon Penny	Plymouth Town Planner
Steve Lefebvre	Plymouth Police Department
Tom Morrison	Plymouth Fire Department
Jane Hubbard	Consultant, Hubbard Consulting LLC

# Plymouth, NH Hazard Mitigation Plan

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May 20, 2016

## Committee/Public Meeting AGENDA

1. Vote for Mitigation Projects
2. Complete the Mitigation Action Plan

Next Meeting:  
Review FINAL DRAFT of the Mitigation Plan

### ATTENDEES

Brian Murphy	Plymouth Code Enforcement & Deputy EMD
Casino Clogston	Plymouth Fire Department
Jason Randall	PVWSD
Joe Fagnant	Plymouth Highway Department
Kathryn Lowe	Plymouth Town Hall
Paul Freitas	Plymouth Town Administrator
Sharon Penny	Plymouth Town Planner
Steve Lefebvre	Plymouth Police Department
Tom Morrison	Plymouth Fire Department
Jane Hubbard	Consultant, Hubbard Consulting LLC

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# Plymouth, NH Hazard Mitigation Plan

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June 17, 2016

## Committee/Public Meeting AGENDA

1. Review Final Draft of Hazard Mitigation Plan Update 2016

### ATTENDEES

Anne Abear	Plymouth Finance Director
Brian Murphy	Plymouth Code Enforcement & Deputy EMD
Casino Clogston	Plymouth Fire Department
Jason Randall	PVWSD
Joe Fagnant	Plymouth Highway Department
Paul Freitas	Plymouth Town Administrator
Paul Hatch	NH HSEM Field Representative
Steve Lefebvre	Plymouth Police Department
Tom Morrison	Plymouth Fire Department
Jane Hubbard	Consultant, Hubbard Consulting LLC

## **PUBLIC NOTICE TO THE RESIDENTS OF PLYMOUTH, NH**

### **PUBLIC NOTICE**

**January 5, 2016 at 10:00am  
Plymouth Town Office  
Plymouth, NH**

The Town of Plymouth, with the Hazard Mitigation Planning Committee, is currently working to update Plymouth's *Hazard Mitigation Plan*. The *Plan* identifies potential natural and man-made hazards throughout the town and various projects and/or strategies to mitigate their effects. The President signed into law, the Disaster Mitigation Act of 2000 (DMA), Section 322-Mitigation Planning. It requires all local governments to prepare and adopt jurisdiction-wide hazard mitigation plans as a condition of receiving Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation (PDM) project grants.

All residents, neighboring communities, businesses, and interested parties are formally invited to review a draft of the Updated *Plan* and publicly comment on their concerns regarding the *Plan*.

For more information please contact Sandy Moulton, via email at [townadmin@plymouth-nh.org](mailto:townadmin@plymouth-nh.org).

*The above notice was posted at the Town Office, Plymouth Post Office and the Town Website. In addition, email notices were sent to neighboring towns, chamber of commerce and the regional planning commission, as shown below.*

*The following was emailed on 12/29/15, 4/3/16, 5/2/16 and 6/2/16:*

The Town of Plymouth, NH is in the process of updating its Hazard Mitigation Plan. This Plan is a tool to be used by the Town, as well as other local, state and federal governments, to reduce the effects of natural and man-made hazards. Our communities and organizations share common hazards which do not respect governmental boundaries. Therefore, we are personally inviting you to participate in the planning process to update the Town's Hazard Mitigation Plan.

We encourage you to attend the Committee meeting on -----, at 10:00am at the Plymouth Town Office. If you are unable to attend this meeting, you may access a copy of the planning documents and/or comment on hazard mitigation issues by emailing Jane Hubbard with Hubbard Consulting LLC at [jhubb\\_99@yahoo.com](mailto:jhubb_99@yahoo.com) or at [603-848-8801](tel:603-848-8801).

For further information on mitigation planning, we are attaching a fact sheet. We look forward to hearing your ideas on how to mitigate future hazards for the community.

Thank you, on behalf of the Town of Plymouth,  
Jane Hubbard

Emailed to the following contacts:

Kelly Bolder  
George Clayman  
Alexandria EMD  
[alexandrianh@metrocast.net](mailto:alexandrianh@metrocast.net)

Bill Bellion  
Canaan EMD  
[cfchief@canaannh.org](mailto:cfchief@canaannh.org)

Claudette Hebert  
Dorchester EMD  
[selectmen@townofdorchester.net](mailto:selectmen@townofdorchester.net)

Roger Thompson  
Groton EMD  
[grotonroger@gmail.com](mailto:grotonroger@gmail.com)

John Babiarz  
Grafton EMD  
[Selectmen@townofgraftonnh.com](mailto:Selectmen@townofgraftonnh.com)

Angel Ekstrom  
Central NH Regional Public Health Network  
[aekstrom@midstatehealth.org](mailto:aekstrom@midstatehealth.org)

Central NH Chamber of Commerce  
[info@centralnh.org](mailto:info@centralnh.org)

Christine Frost, Exec. Dir  
North Country Council  
[cfrost@nccouncil.org](mailto:cfrost@nccouncil.org)

Mark Halloran, Superintendent  
SAU 48  
[mhalloran@pemibaker.org](mailto:mhalloran@pemibaker.org)

Parker Moore  
Emergency Management Planning Specialist  
[Parker.moore@dos.nh.gov](mailto:Parker.moore@dos.nh.gov)

Paul Hatch  
NH HSEM Field Rep  
[Paul.hatch@dos.nh.gov](mailto:Paul.hatch@dos.nh.gov)

Jennifer Gilbert, NFIP Coord.  
Office of Energy & Planning  
[jennifer.gilbert@nh.gov](mailto:jennifer.gilbert@nh.gov)

Hazard	Problem Statements	Projects <i><b>BOLD are existing projects from last edition of plan</b></i>	Social	Technical	Administrative	Political	Legal	Economic	Environment
<b>Dam Failure</b>	There are 13 low hazard dams located in Plymouth, and there are no high hazard dams outside of Plymouth that would pose a significant threat to the town.	Repair/replace outlet at Fox Pond.	+	+	+	+	+	+	+
		Implement inspection and maintenance program to ensure structural integrity of dams.	+	+	+	+	+	+	+
<b>Drought</b>	Public and private wells would be affected in an extended drought.	Provide public awareness regarding water conservation during periods of drought.	+	+	+	+	+	+	+
		<b>Continue to support the Plymouth Village Water &amp; Sewer Districts’ “Drinking Water Source Protection Program” in conjunction with NH-DES, to identify methods for protecting public water supplies in Plymouth and develop a plan for implementing the identified protection methods through zoning ordinance amendment.</b>	+	+	-	+	+	+	+
<b>Earthquake</b>	Critical facilities are susceptible to earthquake damage.	Conduct seismic retrofitting for critical public facilities most at risk to earthquakes.	+	+	+	-	+	-	+
<b>Extreme Heat</b>	Special populations (i.e. elderly, medical, children/schools) would be at risk during an extended period of extreme heat.	Purchase and install a generator at the Plymouth regional high school, which is a designated cooling shelter.	+	+	+	+	+	+	+
		Purchase and install a generator at the public works garage.	+	+	+	+	+	+	+
		Educate citizens regarding the dangers of seasonal hazards.	+	+	+	+	+	+	+
		Support Grafton County Senior Center in obtaining back up power.	+	+	+	+	+	+	+
<b>Flood</b>	Heavy and prolonged rain events cause flood damage to roads and culverts and bridges and has the potential for residential flooding, as well as search and rescue response.	<b>Work with the NH-DES, NWS and USGS to repair existing gauge for real-time flood-forecasting system to reduce flooding impacts and potential flood damage within Plymouth and the Pemigewasset and Baker River network.</b>	+	+	-	+	+	+	+

Hazard	Problem Statements	<b>Projects</b> <i><b>BOLD are existing projects from last edition of plan</b></i>	Social	Technical	Administrative	Political	Legal	Economic	Environment
	There are several areas in Town that are prone to repetitive flooding which impact roads, culverts and structures.  There is 1 repetitive loss property located near the Baker River.	<b>Continue implementation of planned Stormwater improvements throughout the town; Cummings Hill Road, Texas Hill Road, Morse Road, Old Hebron Road, Chaisson Road, Loon Lake Road, Bell Road and Reservoir Road.</b>	+	+	+	+	+	+	+
		Coordinate with NH DES on lowland flooding/ponding at the downside outlet of Loon Lake.	+	+	-	+	+	+	+
		Upgrade box culvert at Look Lake Road to reduce flooding which could impact approximately 30 homes.	+	+	+	+	+	+	+
		Upgrade box culvert on Yeaton Road.	+	+	+	+	+	+	+
		<b>Relocate and/or flood proof the Town Highway Garage which is located in the 100-year floodplain.</b>	+	+	+	+	+	-	+
		<b>Upgrade a steam cleaner system with bigger generator to maintain clear culverts during cold weather conditions (i.e. ice/debris blockage) to prevent flooding.</b>	+	+	+	+	+	+	+
		NONE – this property has been elevated.							
<b>Hail</b>	There is minimal risk of hail to humans and infrastructure.	Educate citizens regarding the dangers of seasonal hazards.	+	+	+	+	+	+	+
<b>Hurricane</b>	Power outages from downed utilities, minor structural damage, limited access and flooding can affect the town as a result of a hurricane.	Purchase and install a generator at the Plymouth regional high school, which is a designated cooling shelter. (REPEAT)	+	+	+	+	+	+	+
		Purchase and install a generator at the public works garage. (REPEAT)	+	+	+	+	+	+	+
		Educate citizens regarding the dangers of seasonal hazards. (REPEAT)	+	+	+	+	+	+	+
<b>Landslide</b>	Areas of steep slope and loose soil are susceptible to the risk of landslide.	Provide soil stabilization at the Plymouth Elementary School field to prevent safety concerns and impact to the sewer pipe.	+	+	-	+	+	-	+

Hazard	Problem Statements	Projects <i><b>BOLD are existing projects from last edition of plan</b></i>	Social	Technical	Administrative	Political	Legal	Economic	Environment
Lightning	Structural and forest fires can result from frequent lightning strikes.	Continue to install lightning protection systems at critical facilities.	+	+	+	+	+	+	+
	Populations involved in outdoor activities are at risk from lightning strikes.	None							
Severe Wind <i>(Tornado /Downburst)</i>	Wind damage can result in downed utilities causing power outages and limited access.	<b>Purchase a wood chipper for highway and recycling center for use in disposing of wood debris.</b>	+	+	+	+	+	+	+
		Purchase and install a generator at the Plymouth regional high school, which is a designated cooling shelter. (REPEAT)	+	+	+	+	+	+	+
		Purchase and install a generator at the public works garage. (REPEAT)	+	+	+	+	+	+	+
		Educate citizens regarding the dangers of seasonal hazards. (REPEAT)	+	+	+	+	+	+	+
		Replace chainsaws for debris removal purposes.	+	+	+	+	+	+	+
Wild/Forest Fire	There are portions of town with minimal on-site sources of water for fire suppression.	Educate citizens regarding the dangers of seasonal hazards. (REPEAT)	+	+	+	+	+	+	+
		Upgrade utility truck with skid tank.	+	+	+	+	+	+	+
Winter Weather	Extended power outages due to winter storms may require activation of a shelter.	None							
	Special populations (i.e. elderly, medical) would be at risk during an extended period of severe cold and winter weather.	Educate citizens regarding the dangers of seasonal hazards. (REPEAT)	+	+	+	+	+	+	+
Human Caused Hazards	Major roadways, through and adjacent to Plymouth, are potential areas of technological hazards.	None							
	Municipal buildings, medical facilities, public schools, Plymouth State	<b>Upgrade the Emergency Operations Center to include security features.</b>	+	+	+	+	+	+	+

Hazard	Problem Statements	<b>Projects</b> <i>BOLD are existing projects from last edition of plan</i>	Social	Technical	Administrative	Political	Legal	Economic	Environment
	University and other public facilities are at risk to human caused hazards.	<b>Construct a Public Safety Center to house police and fire.</b>	+	+	+	+	+	+	+
		<b>Evaluate the need for additional “physical security” at the Town Hall, Police Department, Fire Department, Highway Department and Senior Center.</b>	+	+	+	+	+	+	+
		<b>Improve protection of Vital Records and develop a Continuity of Operations Plan (COOP) to be included in the update Emergency Operations Plan.</b>	+	+	+	+	+	+	+
		<b>Conduct an assessment of the Village and Plymouth State University for CBRNE exposure.</b>	+	+	+	+	+	+	+
	Societal hazards may result in civil disorder and terrorism.	None							

For purposes of prioritizing the mitigation projects listed in the table below, each committee member should vote for half of the projects (total of 8) by placing a check mark in the "# of votes" column. The projects will be prioritized based upon the total number of votes received for each project.

PRIORITIZED MITIGATION PROJECTS	# OF VOTES
1. Repair/replace the outlet at Fox Pond.	1
2. Implement inspection and maintenance program to ensure structural integrity of dams.	1
3. Provide public awareness regarding water conservation during periods of drought.	0
4. Continue to support the Plymouth Village Water & Sewer Districts' "Drinking Water Source Protection Program" in conjunction with NH-DES, to identify methods for protecting public water supplies in Plymouth and develop a plan for implementing the identified protection methods through zoning ordinance amendment.	5
5. Conduct seismic retrofitting for critical public facilities most at risk to earthquakes.	0
6. Purchase and install a generator at the Plymouth regional high school, which is a designated cooling shelter.	8
7. Purchase and install a generator at the public works garage.	8
8. Educate citizens regarding the dangers of seasonal hazards.	0
9. Work with the NH-DES, NWS and USGS to repair existing gauge for real-time flood-forecasting system to reduce flooding impacts and potential flood damage within Plymouth and the Pemigewasset and Baker River network.	6
10. Continue implementation of planned Stormwater improvements throughout the town; Cummings Hill Road, Texas Hill Road, Morse Road, Old Hebron Road, Chaisson Road, Loon Lake Road, Bell Road and Reservoir Road.	4
11. Coordinate with NH DES to reduce lowland flooding/ponding at the downside outlet of Loon Lake.	1
12. Replace box culvert at Look Lake Road to reduce flooding which could impact approximately 30 homes.	7
13. Replace box culvert on Yeaton Road.	7
14. Relocate and/or flood proof the Town Highway Garage which is located in the 100-year floodplain.	3
15. Provide soil stabilization at the Plymouth Elementary School field to prevent safety concerns and impact to the sewer pipe.	8
16. Continue to install lightning protection systems at critical facilities.	4

Priority:      Low 0-2      Medium 3-5      High 6-8

  8   voters total

## **APPENDIX C**

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### **Approval Letter from FEMA**