

# **Sugar Hill**

## **Hazard Mitigation Plan Update 2017**



**This Plan integrates the following:**

- **Hazard Mitigation Plan Update (FEMA)**
- **Community Wildfire Protection Plan (DNCR)**

**August 1, 2017  
Final**

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**Prepared for the Town of Sugar Hill and NH Homeland Security &  
Emergency Management**

**By  
The Sugar Hill Planning Team**

**With assistance from Mapping and Planning Solutions**

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*“Plans are worthless, but planning is everything. There is a very great distinction because when you are planning for an emergency you must start with this one thing: The very definition of “emergency” is that it is unexpected, therefore it is not going to happen the way you are planning.”*

*-Dwight D. Eisenhower*

#### HAZARD MITIGATION PLAN DEFINITIONS

“A natural hazard is a source of harm or difficulty created by a meteorological, environmental, or geological event.”

“Hazard mitigation is any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards (44CFR 201.2). Hazard mitigation activities may be implemented prior to, during, or after an event. However, it has been demonstrated that hazard mitigation is most effective when based on an inclusive, comprehensive, long-term plan that is developed before a disaster occurs.”

(Source: Local Mitigation Plan Review Guide, FEMA, October 1, 2011)



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**Cover: Foliage in Sugar Hill**

**Photo Credit: Jim Salge**

(<https://newengland.com/today/travel/new-hampshire/jim-salge-new-hampshire-foliage-photos/>)

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## Acknowledgements

This Plan integrates elements to qualify it as a Community Wildfire Protection Plan (CWPP) according to the US Forest Service and the Department of Natural & Cultural Resources. The Plan was created through a grant from New Hampshire Homeland Security & Emergency Management (HSEM). The following organizations have contributed invaluable assistance and support for this project:

- NH Homeland Security & Emergency Management (HSEM)
- Federal Emergency Management Agency (FEMA)
- NH Office of Strategic Initiatives (NHOSI)
- Mapping and Planning Solutions (MAPS)
- NH Forests & Lands-Division of NH Department of Natural & Cultural Resources (DNCR)

**This Plan is an update to the prior Sugar Hill Hazard Mitigation Plan, approved on February 27, 2012.**

### Approval Notification Dates for 2017 Update

Approved Pending Adoption (APA):..... July 31, 2017  
 Jurisdiction Adoption: ..... July 31, 2017  
 CWPP Approval: ..... August 16, 2017  
 Plan Approval Date (FEMA):..... August 1, 2017  
 Plan Distribution (MAPS): ..... September 1, 2017

## Town of Sugar Hill Hazard Mitigation Planning Team

The Town of Sugar Hill would like to thank the following people for the time and effort spent to complete this Plan; the following people have attended meetings and/or been instrumental in completing this Plan:

- Allan Clark ..... Sugar Hill EMD & Fire Chief
- Doug Glover ..... Sugar Hill Highway Department
- Gordie Johnk ..... Lafayette Regional Elementary
- Jennifer Gaudette ... Sugar Hill Admin. Assistant
- David Wentworth .... Sugar Hill Police Chief
- Jennifer Gilbert .... NH OSI
- Brad Simpkins ..... DNCR
- Paul Hatch ..... HSEM
- June Garneau ..... MAPS
- Olin Garneau ..... MAPS

Many thanks for all the hard work and effort given by each and every one of you. This Plan would not exist without your knowledge and experience. The Town of Sugar Hill also thanks the Federal Emergency Management Agency and NH Homeland Security and Emergency Management as the primary funding sources for this Plan.

Acronyms Associated with the above list:

EMD:..... Emergency Management Director  
 Admin.: ..... Administrative (Assistant)  
 HSEM: ..... Homeland Security and Emergency Management  
 MAPS: ..... Mapping and Planning Solutions  
 NOTE:..... *Two NH Departments have recently changed their names:*

- NH OEP is now the NH Office of Strategic Initiatives (NH OSI)
- NH DRED is now the NH Department of Natural & Cultural Resources (DNCR)

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## Executive Summary

The Sugar Hill Hazard Mitigation Plan Update 2017 was compiled to assist the Town of Sugar Hill in reducing and mitigating future losses from natural or human-caused hazardous events. The Plan was developed by participants of the Town of Sugar Hill Hazard Mitigation Planning Team, interested stakeholders, the general public and Mapping and Planning Solutions (MAPS). The Plan contains the tools necessary to identify specific hazards and aspects of existing and future mitigation efforts.



*Carolina Crapo Building (Town Offices)*  
Photo Credit: MAPS

This Plan is an **update** to the 2012 Sugar Hill Hazard Mitigation Plan. In an effort to produce an accurate and current planning document, the Planning Team used the 2012 Plan as a foundation, building upon that Plan to provide more timely information.

**This Plan addresses the following natural hazards and human-caused hazards.**

### Natural Hazards

- |   |                                     |
|---|-------------------------------------|
| 1) Flooding (heavy rain, road flooding, culverts, etc.) | 8) Severe Thunderstorms & Lightning |
| 2) Flooding (riverine & ice jams)                       | 9) Hailstorm                        |
| 3) High Winds (windstorms)                              | 10) Wildfire (5+ acres)             |
| 4) Erosion, Mudslide & Landslide                        | 11) Hurricane & Tropical Storm      |
| 5) Tornado & Microburst                                 | 12) Earthquake                      |
| 6) Severe Winter Weather & Ice Storms                   | 13) Drought                         |
| 7) Extreme Temperatures (hot & cold)                    |                                     |

### Human-Caused Hazards

- |                                     |                        |
|-------------------------------------|------------------------|
| 1) Extended Power Failure (5+ days) | 3) Epidemic & Pandemic |
| 2) Hazardous Materials – Transport  | 4) Terrorism           |

Some hazards that are listed in the 2013 NH Hazard Mitigation Plan were not included in this Plan as the Team felt they were extremely unlikely to occur in Sugar Hill or not applicable. These include: *Coastal Flooding, Radon, Dam Failure, Radiological, Fire & Hazardous Materials and Snow Avalanche*. The Team does acknowledge that radon exists but felt that mitigation for radon was the responsibility of the individual homeowner. Fire & Hazardous Materials are covered under the hazard categories of Wildfire, Hazardous Material-Transport and Hazardous Material-Fixed Location.

This Plan also provides a list of Critical Infrastructure and Key Resources (CIKR) categorized as follows: Necessary for Emergency Response Facilities (ERF), Not Necessary for Emergency Response Facilities (NERF), Facilities and Populations to Protect (FPP) and Potential Resources (PR). In addition, this plan addresses the Town's involvement in the National Flood Insurance Program (NFIP).

This hazard mitigation plan was designed to include a detailed study and analysis of wildfires. The original goal was to produce separate plans but that concept produced excessive overlap and cost. To streamline the process, the Community Wildfire Protection Plan (CWPP) was fully integrated into this hazard mitigation plan as were risks from human-caused hazards.

Mitigation action items are the main focus of this Plan. Some communities, when faced with an array of natural hazards, are able to adequately cope with the impact of these hazards. For example, although Severe Winter Weather is often a common hazard in New Hampshire and more often than not considered to be the most likely to occur, most New Hampshire communities handle two to three foot snow storms with little or no disruption of services. On the other hand, an unexpected ice storm can have disastrous effects on a community. Mitigation for this type of sudden storm is difficult to achieve; establishing warming and cooling centers, establishing notification systems, providing public outreach, tree trimming, opening shelters and perhaps burying overhead power lines are just a few of the action items that may be put in place.

In summary, finding mitigation action items for every hazard that affects a community is at times difficult. In addition, with today's economic constraints, cities and towns are less likely to have the financial ability to complete some mitigation action items, such as burying power lines. In preparing this Plan, the Sugar Hill Planning Team has considered a comprehensive list of mitigation action items that could diminish the impact of hazards but has also decided to maintain a list of preparedness action items for future reference and action.

To simplify the language in the Plan, the following abbreviations and acronyms will be used:

Sugar Hill Hazard Mitigation Plan Update 2017 .....	the Plan or this Plan
Sugar Hill.....	the Town or the Community
Hazard Mitigation Planning Team.....	the Team
Hazard Mitigation Plan.....	HMP
Emergency Operations Plan .....	EOP
Community Wildfire Protection Plan .....	CWPP
Mapping and Planning Solutions .....	MAPS
Mapping and Planning Solutions Planner.....	the Planner
NH Homeland Security & Emergency Management .....	HSEM
Federal Emergency Management Agency .....	FEMA

*For more acronyms, please refer to Appendix F: Acronyms*

**Mission Statement:**

To make Sugar Hill less vulnerable to the effects of hazards through the effective administration of hazard mitigation planning, wildfire hazard assessments, and a coordinated approach to mitigation policy and planning activities.

**Vision Statement:**

The community of Sugar Hill will reduce the impacts of natural hazards and other potential disasters through implementing mitigation measures, public education and deliberate capital expenditures within the community. Homes and businesses will be safer and the community's ISO rating may be improved.



## Chapter 1: Hazard Mitigation Planning Process

### A. Authority & Funding

The Sugar Hill Hazard Mitigation Plan Update 2017 was prepared in accordance with the Disaster Mitigation Act of 2000 (DMA), Section 322 Mitigation Planning, signed into law by President Clinton on October 30, 2000. This hazard mitigation plan was prepared by the Sugar Hill Hazard Mitigation Planning Team under contract with New Hampshire Homeland Security & Emergency Management (HSEM) operating under the guidance of Section 206.405 of 44 CFR Chapter 1 (10-1-97 Edition) and with the assistance and professional services of Mapping and Planning Solutions. This Plan was funded by HSEM through grants from FEMA (Federal Emergency Management Agency); matching funds for team members' time were also part of the funding formula.

### B. Purpose & History of the FEMA Mitigation Planning Process

*The ultimate purpose of Disaster Mitigation Act of 2000 (DMA) is to:*

*"...establish a national disaster hazard mitigation program -*

- To reduce the loss of life and property, human suffering, economic disruption and disaster assistance costs resulting from natural disasters; and*
- To provide a source of pre-disaster hazard mitigation funding that will assist States and local governments (including Indian tribes) in implementing effective hazard mitigation measures that are designed to ensure the continued functionality of critical services and facilities after a natural disaster".<sup>1</sup>*

DMA 2000 amends the Robert T. Stafford Disaster Relief and Emergency Assistance Act by, among other things, adding a new section "322 – Mitigation Planning" which states:

*"As a condition of receipt of an increased Federal share for hazard mitigation measures under subsection (e), a State, local, or tribal government shall develop and submit for approval to the President a mitigation plan that outlines processes for identifying the natural hazards, risks, and vulnerabilities of the area under the jurisdiction of the government."<sup>2</sup>*

HSEM's goal is to have all New Hampshire communities complete a local hazard mitigation plan as a means to reduce future losses from natural or human-caused events before they occur. HSEM outlined a process whereby communities throughout the state may be eligible for grants and other assistance upon completion of this hazard mitigation plan.

The Sugar Hill Hazard Mitigation Plan Update 2017 is a planning tool to use to reduce future losses from natural and human-caused hazards as required by the Disaster Mitigation Act of 2000; this plan does not constitute a section of the Town's Master Plan, however mitigation action items from this Plan may be incorporated into future Master Plan updates.

The DMA places new emphasis on local mitigation planning. It requires local governments to prepare and adopt jurisdiction-wide hazard mitigation plans as a condition to receiving Hazard Mitigation Grant Program (HMGP) project grants. Local governments must review this plan yearly and update this plan every five years to continue program eligibility.

<sup>1</sup> Disaster Mitigation Act (DMA) of 2000, Section 101, b1 & b2

<sup>2</sup> Disaster Mitigation Act (DMA) of 2000, Section 322a

### C. Jurisdiction

This Plan addresses one jurisdiction – the Town of Sugar Hill, NH.

### D. Scope of the Plan & Federal & State Participation

A community's hazard mitigation plan often identifies a vast number of natural hazards and is somewhat broad in scope and outline. The scope and effects of this plan were assessed based on the impact of hazards and wildfire on: *Critical Infrastructure and Key Resources (CIKR); current residential buildings; other structures within the Town; future development; administrative, technical and physical capacity of emergency response services; and response coordination between federal, state and local entities.*

In seeking approval as a Hazard Mitigation Plan and a Community Wildfire Protection Plan (CWPP), the planning effort included participation of Homeland Security and Emergency Management, the US Forest Service, NH Forests & Lands, part of the Department of Natural & Cultural Resources (DNCR), the NH Office of Strategic Initiatives (OSI) as well as routine notification of upcoming meetings to the state and federal entities above. Designation as a CWPP will allow a community to gain access to federal funding for hazardous fuels reduction and other mitigation projects supported by the US Forest Service. By merging the two federal planning processes (hazard and wildfire), duplication is eliminated and the Town has access to a larger pool of resources for pre-disaster planning.

The Healthy Forest Restoration Act (HFRA) of 2003 includes statutory incentives for the US Forest Service to give consideration to local communities as they develop and implement forest management and hazardous fuel reduction projects. For a community to take advantage of this opportunity, it must first prepare a CWPP. This hazard mitigation planning process not only satisfies FEMA's criteria regarding wildfires and all other hazards but also addresses the minimum requirements for a CWPP:

- **Collaboration:** *A CWPP must be collaboratively developed by local and state government representatives, in consultation with federal agencies and other interested parties.*
- **Prioritized Fuel Reduction:** *A CWPP must identify and prioritize areas for hazardous fuel reduction treatments and recommend the types and methods of treatment that will protect one or more at-risk communities and essential infrastructure.*
- **Treatment of Structural Ignitability:** *A CWPP must recommend measures that homeowners and communities can take to reduce the ignitability of structures throughout the area addressed by the plan.<sup>3</sup>*

Finally, as required under Code of Federal Regulations (CFR), Title 44, Part 201.6(c) (2) (ii) and 201.6(c) (3) (ii), the Plan must address the Community's participation in the National Flood Insurance Program (NFIP), its continued compliance with the program and as part of vulnerability assessment, the Plan must address the NFIP insured structures that have been repetitively damaged due to floods.

<sup>3</sup> Healthy Forest Restoration Act; HR 1904, 2003; Section 101-3-a.b.c; [http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=108\\_cong\\_bills&docid=f:h1904enr.txt.pdf](http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=108_cong_bills&docid=f:h1904enr.txt.pdf)

## E. Public & Stakeholder Involvement

Public and stakeholder involvement was stressed during the initial meeting and community officials were given a matrix of potential team members (page 17). Community officials were urged to contact as many people as they could to participate in the planning process, including not only residents but also officials and residents from surrounding communities; the Town of Sugar Hill understands that natural hazards do not recognize corporate boundaries.

There are no schools in Sugar Hill; students in grades (K-6) attend the Lafayette Regional Elementary School in Franconia and students in grades (7-12) attend the Profile School in Bethlehem. The Principal of Lafayette Regional Elementary School, who is also a Sugar Hill Firefighter, held meetings with the Emergency Management Director.

A Press Release (see below) was posted at the Carolina Crapo Building (Town Offices) and at the Post Office.

*Mapping and Planning Solutions  
105 Union Street, Suite 1  
Whitefield, NH 03598*

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**Press Release**

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**FOR IMMEDIATE RELEASE**  
Updated: April 25, 2017

Contact: June Gameau  
603-837-7122

**TOWN OF SUGAR HILL COMMENCES  
HAZARD MITIGATION PLANNING**

The Sugar Hill Emergency Management Director met with June Gameau, of Mapping and Planning Solutions, to begin work on the required five-year update to the 2012 Sugar Hill Hazard Mitigation Plan. As a result of this meeting, the director and Mapping and Planning Solutions are conducting a series of meetings on the Hazard Mitigation Plan over the next few months.

Through this series of public meetings, the Team will address issues such as flooding, hurricanes, drought, landslides and wildfires, and determine efforts the Town can undertake to mitigate the effects of both natural and human-caused hazards. The Team will also examine potential shelter sites and the need for generators at those sites.

By examining critical infrastructure and key resources, along with past hazards, the team will establish priorities for future mitigation projects and steps that can be taken to increase public awareness of hazards in general.

As mandated by the Disaster Mitigation Act of 2000, all municipalities are required to complete a local Hazard Mitigation Plan in order to qualify for Federal Emergency Management Administration funding should a natural disaster occur. The planning processes are made possibly by grants from FEMA.

The Hazard Mitigation Planning Team is currently being formed; Sugar Hill citizens and any interested stakeholders are invited to participate. All interested parties should contact Chief Allan Clark, 494-1491, if they wish to be included in the process.

The next meeting is scheduled for Thursday, July 13, 9:00 AM at the Carolina Crapo Building. The general public is encouraged to attend all meetings, regardless of whether they are a part of the Planning Team.

More information on the hazard mitigation planning process is available from June Gameau at Mapping and Planning Solutions, 603-837-7122.

The Hazard Mitigation Plan Update was also mentioned in the 2016 Annual Report.<sup>4</sup> See “snip” below.

We are currently working with both the Federal and State governments to obtain permission to dredge the river near the Crane Hill Bridge to prevent ice jams. We are hopeful that if we can gain the required approvals that we can obtain a grant to mitigate this hazard. We are also updating the 5-year Hazardous Mitigation plan which is a requirement to obtain Federal grants. This will be the fourth mitigation plan that I have personally been involved with.

Lastly, the Planner sent a monthly calendar to NH EMD's, Police Chiefs, Fire Chiefs, Rangers and other State, Federal and Private Officials throughout the State, including stake-holders for the Town (see below).



**Upcoming Emergency Operations & Hazard Mitigation Plan Meetings**  
(Highlighted by "Counties" as of April 3, 2017)



Day	Date	Time	Town/Location	Plan Type	HSEF Field Rep	County
Monday	Apr 10	8:30 AM	Bartlett/Hart's Location (Glen Fire Station)	HMP	Heldi Lawton	Carroll
Friday	Apr 14	10:00 AM	Millford Fire Station	EOP	Heather Dunkerley	Hillsboro
Monday	Apr 17	10:00 AM	Piermont Old Church	HMP	Paul Hatch	Grafton
Tuesday	Apr 18	9:00 AM	Haverhill Town Offices	HMP	Paul Hatch	Grafton
Wednesday	Apr 19	9:00 AM	Littletton Opera House	HMP	Paul Hatch	Grafton
Monday	Apr 24	7:00 PM	Boscawen Fire Station (firefighter night)	EOP	Shawna-Leigh Morton	Merrimack
Tuesday	Apr 25	10:00 AM	Alton (tbd)	EOP	Shawna-Leigh Morton	Belknap
Wednesday	Apr 26	10:00 AM	Sugar Hill Fire Station	HMP	Paul Hatch	Grafton
Monday	May 1	1:00 PM	Madison Fire Station	EOP	Heldi Lawton	Carroll
Wednesday	May 3	6:00 PM	Carroll Fire Station	EOP	Heldi Lawton	Coos
Thursday	May 4	2:30 PM	Salem Town Hall	HMP	Alex Marinaccio	Rockingham
Tuesday	May 9	2:00 PM	Clarksville Town Hall	HMP	Heldi Lawton	Coos
Tuesday	May 9	6:00 PM	Stewartstown Town Hall	HMP	Heldi Lawton	Coos
Wednesday	May 10	6:00 PM	Dalton Town Offices	HMP	Heldi Lawton	Coos
Monday	May 15	10:00 AM	Grafton Fire Station	HMP	Paul Hatch	Grafton
Tuesday	May 16	9:00 AM	Haverhill Town Offices	HMP	Paul Hatch	Grafton

It was noted that Team composition is expected to be lower in smaller communities because of the small population base and the fact that many people “wear more than one hat”. It is often very difficult to attract individual citizens to participate in town government and those that do generally hold full-time jobs and work as volunteers in a variety of town positions. With very small populations, the percent of interested citizens in the rural towns’ planning processes is extremely small. Due to the availability of jobs and other economic factors, the Town has a relatively high elderly population and a dwindling amount of young people with interest in politics.

<sup>4</sup> Sugar Hill Annual Report, Emergency Management, Allan R. Clark, EMD, page 45

A great deal of quality work was done by those that attended meetings. In addition, the EMD/Fire Chief held other meetings with town officials including the Fire Department, Police Department and the Road Agent. No non-official members of the Community took the opportunity to attend meetings; had citizens of the Community attended meetings, their comments would have been integrated into the narrative discussion and incorporated into the essence of the document.

§201.6(b) requires that there be an open public involvement process in the formation of a plan. This process shall provide an opportunity for the public to comment on the Plan during its formation as well as an opportunity for any neighboring communities, businesses, and others to review any existing plans, studies, reports, and technical information and incorporation of those in the Plan, to assist in the development of a comprehensive approach to reducing losses from natural disasters.

### ***F. Incorporation of existing plans, studies, reports and technical information***

The planning process included a complete review of the Sugar Hill Hazard Mitigation Plan of 2012 for updates, development changes and accomplishments. In addition, as noted in the Bibliography and in footnotes located throughout the Plan many other documents were used to create this mitigation plan. Some, but not all, of those plans and documents are listed as follows:

The Sugar Hill Hazard Mitigation Plans of 2005 and 2012.....	Compare & Contrast
Sugar Hill Master Plan 2014 .....	Community Information
Sugar Hill Annual Report, 2016 .....	Fire Report & Development
Area Hazard Mitigation Plans (Whitefield, Easton, Lyme).....	Formats & Mitigation Ideas
The Sugar Hill Subdivision Regulations.....	New Development Regulations
The Sugar Hill Floodplain Ordinance .....	Floodplain Regulations
Census 2010 Data .....	Population Data
The NH DRA Summary of Inventory of Valuation MS-1 2016 for Sugar Hill .....	Structure Evaluation
The Economic & Labor Market Information Bureau Community Response .....	Population Trends
The American Community Survey (ACS 2011-2015) .....	Population Trends
NH Forest Forests & Lands (DNCR) .....	Fire Report
NH Office of Energy & Planning .....	Flood Losses
The NH Department of Revenue property tax valuation by property type.....	Property Information



Other technical manuals, federal and state laws as well as research data were combined with these elements to produce this integrated hazard mitigation plan. Please refer to the Bibliography in *Appendix A: Bibliography* and the Plan's footnotes.

## G. Hazard Mitigation Planning Process & Methodology

The planning process consisted of twelve specific steps; some steps were accomplished independently while other areas were interdependent. Many factors affected the ultimate sequence of the planning process such as the number of meetings, community preparation, attendance and other community needs. The planning process resulted in significant cross-talk regarding all types of natural and human-caused hazards by team members.



All steps were included but not necessarily in the numerical sequence listed. The list of steps is as follows:

### PLANNING STEPS

Step 01: Team Formation and Orientation, Goal Identification

Step 02: Formulate Hazards List, Hazards Description and Threat Matrix

*Table 3.1 – Hazard Risk Analysis*

Step 03: Profile, List and Map Historic and Potential Hazards, Wildfire, Natural and Human-Caused

*Table 3.2 – Historic and Potential Hazards*

Step 04: Profile, List and Map Critical Infrastructure and Key Resources

*Tables 4.1 to 4.4 – Critical Infrastructure & Key Resources*

Step 05: Assess Community's participation in National Flood Insurance Program

*Chapter 3, Section C*

Step 06: Prepare an Introduction to the Community, discuss Emergency Service capabilities, discuss Development Trends and review the Town Statistics

*Chapter 2, Sections A, B and C and Table 2.1, Town Statistics*

Step 07: List Existing Mitigation Strategies & Brainstorm to Identify Potential Mitigation Strategies

*Table 6.1 – Current Plans, Policies and Mutual Aid*

Step 08: Examine the mitigation strategies from the prior plan

*Table 7.1 – Accomplishments since the Prior Plan Approval*

Step 09: Evaluate and Categorize Potential Mitigation Action Items

*Tables 8.1 - Potential Mitigation Strategies & the STAPLEE*

Step 10: Prioritize Mitigation Action Items to Determine Action Plan

*Table 9.1 – The Mitigation Action Plan*

Step 11: Team Review of Plan Contents for Submission to HSEM/FEMA

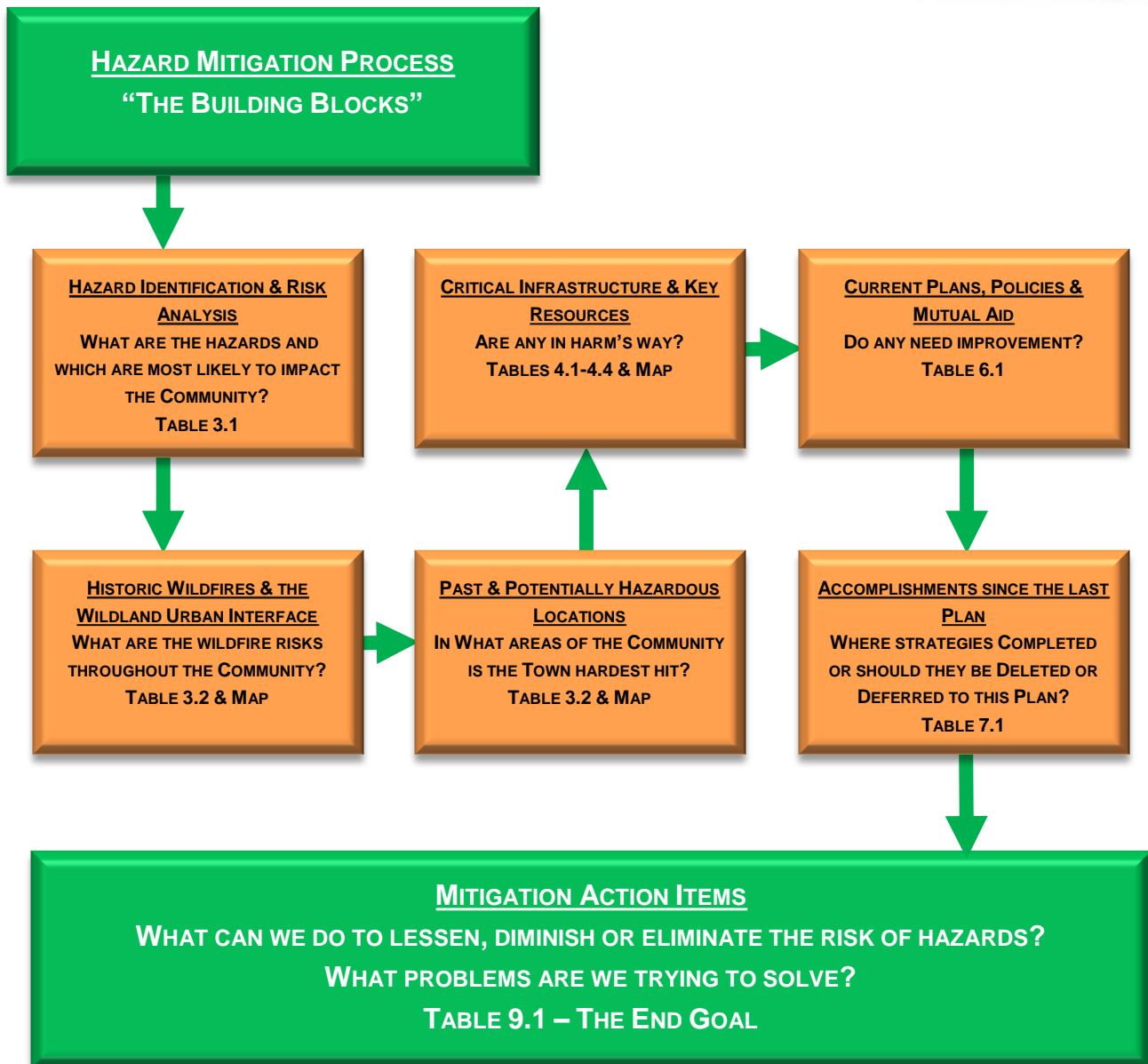
Step 12: Adopt and Monitor the Plan



## H. Hazard Mitigation Building Blocks & Tables

Using a “building block” approach, the base, or foundation, for the mitigation plan update was the prior plan. Each table that was completed had its starting point with the last hazard mitigation plan completed by the Community.

Ultimately, the “building blocks” lead to the final goal, the development of prioritized mitigation “action items” that when put into an action plan, would lessen or diminish the impact of natural hazards on the Town.



## ***I. Hazard Mitigation Goals***

Before identifying new mitigation actions, the Team established and adopted the following broad hazard mitigation goals. The goals that are in the 2013 State of New Hampshire Multi-Hazard Mitigation Plan were reviewed as were the goals that were in the 2012 Sugar Hill Hazard Mitigation Plan. After discussing these goals, the current Sugar Hill Hazard Mitigation Team agreed to the following goals for this Plan.

### **Community & Resource Protection**

- To improve upon the protection of the general population, the citizens of Sugar Hill and visitors, from all natural and human-caused hazards.
- To reduce Sugar Hill's potential exposure to risk with respect to natural and human-caused hazards.
- To minimize the damage and public expense which might be caused to public and private buildings and infrastructure due to natural and human-caused hazards.

### **Coordination & Communication**

- To improve the Town of Sugar Hill's:
  - *Emergency preparedness and communication network.*
  - *Disaster response and recovery capability.*
- To identify, introduce and implement improvements to establish and maintain a reliable communication system.
- To improve communication capabilities so that the citizens of Sugar Hill can be notified in the most efficient manner as possible.
- To ensure that regular communication occurs between various departments and with local, regional and state officials and to have up-to-date plans in place to address various emergency situations and ensure that those involved are aware of their responsibilities.

### **Outreach & Education**

- To build an awareness of public responsibility for hazard mitigation.
- To raise the awareness and acceptance of hazard mitigation opportunities through public education and outreach programs.
- To increase public awareness of the fire risk and the Town's potential liability with respect to wildfires.

### **Damage Prevention & Reduction**

- To reduce the potential impact of natural and human-caused disasters on the Town of Sugar Hill's:
  - *Emergency Response Capability*
  - *Critical Infrastructure & Key Resources*
  - *Private property*
  - *Economy*
  - *Natural environment*
  - *Historic treasures and interests, as well as other tangible and intangible characteristics that add to the quality of life of the citizens and visitors to Sugar Hill.*
- To identify, introduce and implement cost effective hazard mitigation measures so as to accomplish the Town's goals and objectives.
- To reduce the occurrence of road closures and road erosion due to localized flooding within the Town of Sugar Hill.



## J. Narrative Description of the Process

The Plan was developed with substantial local, state and federal coordination; completion of this new hazard mitigation plan required significant planning preparation. All meetings were geared to accommodate brainstorming, open discussion and an increased awareness of potentially hazardous conditions in the Town.

The planning process included a complete review of the 2012 Sugar Hill Hazard Mitigation Plan. Using the 2012 Plan as a base, each element of the old plan was examined and revised to reflect changes that had taken place in development and in the priorities of the Community. In addition, referring to the 2012 Plan, strategies from the past were reassessed and improved upon for the future.

The following narrative explains how the 2012 Sugar Hill Hazard Mitigation Plan was used during each step of the planning process to make revisions that resulted in this Plan.

In the course of developing this Plan, Allan Clark (Emergency Management Director/Fire Chief) held meetings with town and school officials to discuss hazard mitigation planning. Attendees who attended these meetings were: Gordie Johnk (Lafayette Elementary School Principal), David Wentworth (Police Chief), Jennifer Gaudette (Administrative Assistant) and the Officers of the Sugar Hill Fire Department. These meetings, facilitated by Allan Clark, were in addition to the meetings detailed below.

### Meeting 1, April 25, 2017 (2 hours)

The first full meeting for the Sugar Hill Hazard Mitigation Plan Update was held. Meeting attendance included Allan Clark (Fire Chief & Emergency Management Director) and June Garneau (Mapping and Planning Solutions).

To introduce the planning process, June reviewed the evolution of Hazard Mitigation Plans, the funding, the 12 Step Process (handout), the collaboration with other agencies and the Hazard Mitigation Goals (handout). June also explained the need to sign-in, track time (handout) and to provide public notice to encourage community involvement. June provided Chief Clark with a press release that was to be posted at the Town Offices and the Post Office. The “match” was also discussed.

It was noted that the last Sugar Hill Hazard Mitigation Plan Update in 2012 was the first plan that was completed by Mapping and Planning Solutions. As very little in the Plan has changed since the prior plan, it was expected that work on this update should go fairly quick and meetings would be kept at a minimum. It was also noted that the EMD would be working with other town officials separately.

### HAZARDS MITIGATION POTENTIAL TEAM MEMBERS

#### FEDERAL

US Forest Service

#### STATE

Department of

Transportation

DRED

RC&D (Non-Profit)

#### LOCAL

Selectmen (Past/Present)

Town Manager/Administrator

Town Planner

Police Chief

Fire Chief

EMD

Emergency Services

Fire Warden

Health Services

Education/School

Recreation Directors

Public Works Director

Road Agent

Water Management

Public Utilities

Waste Management

Dam Operators

Major Employers

#### LOCAL - SPECIAL INTEREST

Land Owners

Home Owners

Forest Management

Timber Management

Tourism & Sportsman's

Groups

Developers & Builders

Work then began on *Table 2.1, Town Statistics*. Much of the work on this table was complete with the exception of a few items that June would either determine through GIS or get at a later date. In general, it was felt that the data that had been obtained from the prior plan, the Census Bureau and the Economic and Labor Department Bureau's Community Profile accurately represented the Town's population; some discussion was had about the change in seasonal populations. It was ultimately decided that the seasonal increase in population is approximately 300% for both the winter and summer months.

Next on the Agenda were hazard identification and the completion of *Table 3.1, Hazard Threat Analysis*. Using the 2012 hazards as a benchmark and including them with hazards from the 2013 NH State Hazard Mitigation Plan, hazards that had a likelihood of impacting Sugar Hill were identified.

After the hazards had been identified, the risk severity and probability were assessed by ranking each hazard on a scale of 1-5 (5 being very high); then the hazards were assessed based on the following:

The Human Impact ..... Probability of Death or Injury  
 The Property Impact ..... Physical Losses and Damages  
 The Business Impact .... Interruption of Service  
 The Probability ..... Probability of Occurrence

The rankings were then calculated to reveal the hazards which pose the greatest risks to the community; 13 natural hazards and four human-caused hazards were identified. After analyzing these hazards using *Table 3.1*, flooding (heavy rain, road flooding, culverts, etc.), flooding (riverine and ice jams) and high winds (windstorms) were designated as the primary concerns.

Work then began on *Tables 4.1-4.4, Critical Infrastructure & Key Resources (CIKR)*; these tables had been pre-populated with the CIKR from the 2012 Plan. It was determined which CIKR were still available in the Town, a list that had virtually no changes from the prior plan.

Next, the Team then began working on *Table 6.1, Current Plans, Policies & Mutual Aid*; like other tables, this table was also pre-populated with information from the 2012 Plan. Looking closely at the existing policies from the last plan and current mechanisms that are in place, the Team was able to determine whether the existing policies were effective or in "Need of Improvement". It was explained that those items that needed improvement would become new "Action Items" for this Plan and be discussed again and re-prioritized when we got to our final table, *Table 9.1, The Mitigation Action Plan*.

#### Meeting 1 – April 26, 2017

##### 1) Introduction

- a) Evolution of Hazard Mitigation Plans & Community Wildfire Protection Plans
- b) Reasons for Hazard Mitigation and Update
- c) Community involvement to solicit input on how to mitigate the effects of hazards
- d) Devise a plan that lessens, diminishes or completely eliminates the threat of Hazards to the Town

##### 2) The Process

- a) Funding
- b) Review of 12 Step Process & The Team (handout)
- c) Collaboration with other Agencies (HSEM, WMNF)

##### 3) Meetings

- a) Community Involvement - Public Notice, Press Release
- b) Stakeholders
- c) Signing In, Tracking Time, Agendas, Narrative (handout)

##### 4) Today's Topics

- a) Table 2.1, Town Information
- b) Table 3.1, Hazard Identification & Analysis
- c) Hazard Descriptions
- d) Table 4.1-4.1, Critical Infrastructure & Key Resources
- e) Table 3.2, Historic Hazard Identification (time allowing)

##### 5) Homework

- a) Critical Infrastructure & Key Resources
- b) Digital Photos – contributions welcome

##### 6) Future Meetings

- a) \_\_\_\_\_
- b) \_\_\_\_\_

For Table 6.1, it was determined if each plan, policy or mutual aid system should be designated as “No Improvements Needed” or “Improvements Needed” based on the following “Key to Effectiveness”:

**KEY TO EFFECTIVENESS:**

**Excellent**..... The existing program works as intended and is exceeding its goals.

**Good** ..... The existing program works as intended and meets its goals.

**Average** ..... The existing program does not work as intended and/or does not meet its goals.

**Poor** ..... The existing program does not work as intended, often falls short of its goals and/or may present unintended consequences.

As agenda items were progressing nicely, it was decided that we would continue with additional work. *Table 7.1, Accomplishments since the Prior Plan Approval*, also pre-populated with data from the 2012 Plan, was the next agenda item. June went through each strategy to determine which of these was “Completed” should be “Deleted” or should be “Deferred” to this Plan as a new mitigation action item. Many of the action items from the 2012 Plan had been completed by the Town and others were “deferred” for consideration as new “Action Items” for this Plan. None of the strategies from the prior plan were “deleted”, although it is noted that several were both “completed” and “deferred”.

June then provided handout with a comprehensive list of mitigation strategies that was derived from the FEMA document “Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards, January 2013” (see Chapter 8 and Appendix E). June asked Chief Clark to review this handout with other town officials and the Road Agent for additional mitigation action items. The link to the FEMA “Mitigation Ideas” booklet was also provided on the agenda for the meeting.

**Link to explore – FEMA Mitigation Ideas**

[https://www.fema.gov/media-library-data/20130726-1904-25045-0186/fema\\_mitigation\\_ideas\\_final508.pdf](https://www.fema.gov/media-library-data/20130726-1904-25045-0186/fema_mitigation_ideas_final508.pdf)

With time running out, June promised to write statements to support the Team’s concepts and ideas for both Table 6.1 and Table 7. The next meeting was set for July 13, 2017.

**Meeting 2 – July 13, 2017 (3 hours)**

Meeting attendance included Allan Clark, Doug Glover (Road Agent), Olin Garneau (MAPS) and June Garneau.

On July 1-2, 2017, an unusually heavy rain storm struck Grafton County, leaving enough damage county-wide to most likely warrant a Presidential Disaster Declaration. This prompted a phone call from the NH Director of Homeland Security and Emergency Management (HSEM) to both Allan Clark and June Garneau regarding the status of the Sugar Hill Hazard Mitigation Plan Update 2017. Although the grant expiration for the project wasn’t until October 31, 2018, the prior plan had already gone past the plan expiration of February 27, 2017. Time was now of the essence; the new update needed to be done as soon as possible in order to ensure the availability of FEMA funding should this rain event be designated as a Presidential Disaster Declaration.

Based on this urgency, June and Allan held an emergency meeting to attempt to wrap up the Plan. More information can be found on this disaster in Table 3.2 and Chapter 5, Section C. The Road Agent, Doug Glover, and Olin Garneau also attended this meeting.

Next on the agenda was a review of the work that was done at the prior meeting, including a review of the language in Tables 6.1 & 7.1. Then, using a scale of 1-3, with 1 representing “little or no risk”, the Team ranked the “hazard risk” for each CIKR that had been previously identified for Tables 4.1-4.4. Table 3.1 was reviewed to see if the hazards that were listed still appeared to be in the correct order based on risk and probability. One change was made, moving flooding (riverine and ice jams) so that it was portrayed as a higher overall threat than high wind (windstorms).

After this review, Chief Clark went on to provide descriptions of each hazard that was identified in Table 3.1 and how they could, or do, impact the Town of Sugar Hill specifically. In order to gain more knowledge of the impact of these hazards, June asked Chief Clark to describe each hazard as it relates to Sugar Hill.

For example, some of the questions asked were:

- How often do these hazards occur?
- Do the hazards damage either the roads or structures?
- Have the hazards resulted in loss of life?
- Are the elderly and functional needs populations particularly at risk?
- What has been done in the past to cope with the hazards?
- Was outside help requested?
- Are the hazards further affected by an extended power failure?

In addition to bringing more awareness to the hazards, these questions provided information to further analyze the impact of the hazards on the Community. June noted that these descriptions would be used in Chapter 5. June also asked the Team about current development trends; this effort helped the Team consider what new construction or infrastructure may be within hazardous areas of the Community.

June introduced *Table 3.2, Historic Hazard Identification*, a list of past and potentially hazardous locations and/or events. Using projection, June and the Team looked at the hazards that were listed in the last Plan and determined which they would like to see kept in this Plan. Some of the hazards listed in the prior plan were non-descript and geographically broad in nature, discussing events on a state or region wide basis; these non-specific hazards, those which were not specific to Sugar Hill, were deleted. Other hazards from the 2012 Plan that specifically detailed events in Sugar Hill remained in the Plan and were noted as having come from either the 2005 or the 2012 Hazard Mitigation Planning Teams.

#### Meeting 2 – July 13, 2017

##### **1) Last Meeting**

- a) Introduction
- b) Worked on...
  - i) Table 2.1, Town Information
  - ii) Table 3.1, Hazard Threat Analysis
  - iii) Table 4.1, Critical Infrastructure & Key Resources
  - iv) Table 6.1, Current Plans, Policies & Mutual Aid
  - v) Table 7.1, Accomplishments since the Prior Plan

##### **2) Review**

- a) Table 2.1, Town Information
- b) Table 3.1, Hazard Identification & Analysis
- c) Table 4.1, Critical Infrastructure & Key Resources
- d) Table 6.1, Current Plans, Policies & Mutual Air
- e) Table 7u.1 Accomplishments since the Prior Plan

##### **3) Today's Topics**

- a) Table 3.2, Historic Hazard Identification
- b) Hazard Descriptions
- c) Hazard Risk – Table 4.1-4.4, Critical Infrastructure & Key Resources
- d) Review status of damage done on July 1-2, 2017
- e) Work on Hazard Mitigation Action Items

##### **4) Homework**

- a) Digital Photos – contributions welcome

##### **5) Future Meetings**

- a) \_\_\_\_\_
- b) \_\_\_\_\_

While going over past hazards and wildfires, June took the opportunity to explain the Wildland Urban Interface (WUI) and the Base Risk Analysis. Using GIS projection, June showed the Team *Map 1, Fire Base Risk Analysis*, and explained the process that was used to develop the map. June explained that slope, type of fuel (i.e., softwood or hardwood) and exposure (southwest being the most susceptible) were analyzed in GIS to determine where the high, medium and low risk areas of the Town were.

Next, June discussed the Wildland Urban Interface (WUI) and projected a map of the WUI over the Sugar Hill base layer and topography. The WUI was determined using GIS analysis to create a 300 foot buffer from the center line of all Class I-V roads and then an additional 1320 foot buffer from the first buffer (see *Map 2, Historic Wildfires & the Wildland Urban Interface (WUI)*). This area is determined to be the area in which the urban environment interfaces with the wildland environment and the area that is most prone to the risk of wildfires. Using GIS analysis and 1-foot aerial imagery (2015), June explained how she would determine the number of CIKR in the defined WUI. It should be noted that although the “WUI” was defined for the purpose of this Plan, many rangers and firefighters believe that towns with substantial wooded land, such as Sugar Hill, are almost entirely within the Wildland Urban Interface.

Mitigation strategies were discussed to protect structures and to educate the Town’s citizens about the risk in the high risk and WUI areas. It was determined that the Town would acquire Firewise materials to have available at the Town Offices, continue fire education at the local schools and continue the maintenance of fire hydrants throughout the Community to increase their effectiveness.

The record of Presidential Disaster Declarations (see *Appendix D, NH Presidential Disaster & Emergency Declarations*) that have taken place in recent years, in the State, the County and in Sugar Hill was next on the agenda; this record shows a substantial increase over past decades. The impact the event had in Sugar Hill was provided for each Presidential Disaster or Emergency Declaration. The rain and flooding event of July 1-2, 2017 was also added to Table 3.2.

Finally, after a quick break to populate our next tables with action items from prior tables, work began on *Table 8.1, Potential Mitigation Action Items & the STAPLEE* and *Table 9.1, The Mitigation Action Plan*.

Having pre-populated Table 9.1 (half of which would become Table 8.1) with the action items that had been deferred from Tables 6.1 and 7.1, the Team looked carefully at each “Action Item” to assign responsibility, the time frame for completion, the type of funding that would be required and the estimated cost of the action.

The time frame was based on the following key for completion:

- **Short Term** .....Ongoing for the life of the Plan
- **Short Term** .....Less than 1 year (0-12 months)
- **Medium Term** .....2-3 years (13-36 months)
- **Long Term:** .....4-5 years (37-60 months)

Then additional mitigation items were considered and added to Table 9.1. After much discussion and a careful review, ultimately, the Team settled on 16 “Mitigation Action Items” that they felt were achievable and that would help to diminish the impact of natural hazards in the future.

Using handouts (see Chapter 8, Section A), the Team was then able to go through the STAPLEE process for each of the action items. It was explained that the STAPLEE process is a systematic method used to gauge the quality of each of the action items. The Social (S), Technical (T), Administrative (A), Political (P), Legal (L), Economic (E) and Environmental (E) impact for each action item were discussed; this analysis would then become *Table 8.1, Potential Mitigation Action Items & the STAPLEE*. The ranking and prioritizing of these action items was also completed.

After reviewing the finalized STAPLEE numerical ratings, the Team prepared to develop *Table 9.1, The Mitigation Action Plan*. To do this, team members created four categories into which they would place the potential mitigation action items.

- **Category 0** was to include those items which are being done and will continue to be done in the future.
- **Category 1** was to include those items under the direct control of town officials, within the financial capability of the Town using only town funding, those already being done or planned and those that could generally be completed within one year.
- **Category 2** was to include those items that the Town did not have sole authority to act upon, those for which funding might be beyond the Town's capability and those that would generally take between 13-36 months to complete.
- **Category 3** was to include those items that would take a major funding effort, those that the Town had little control over the final decision and those that would take in excess of 37 months to complete.

Then within each rank, the Team assigned a priority; for example, if seven action items were ranked "1" then the priority rank was 1-7 (see explanation in Chapter 9). In this fashion, the Team was able to determine which action items were the most important within their rankings and in which order the action items would be accomplished.

With Tables 8.1 and 9.1 completed, the Team's work was complete, with the exception of the final review. June agreed to put the final "draft" plan together and email a copy for the Town's review. June explained the process from this point forward and thanked the Team for their hard work. No additional meeting was scheduled but it was stressed to Chief Clark and Doug Glover that due to the recent flood event and the pending Presidential Disaster Declaration, it was important that the review of the Plan be expedited.

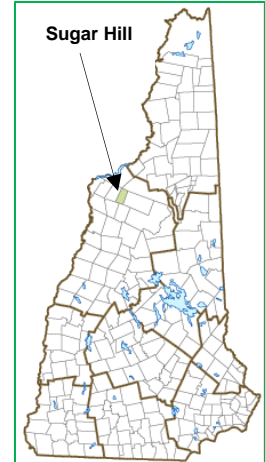
Documentation for the Planning process, including public involvement, is required to meet DMA 2000 (44CFR§201. (c) (1) and §201.6 (c) (1)). The Plan must include a description of the Planning process used to develop the Plan, including how it was prepared, who was involved in the process, and how other agencies participated. A description of the Planning process should include how the Planning team or committee was formed, how input was sought from individuals or other agencies who did not participate on a regular basis, what the goals and objectives of the Planning process were, and how the Plan was prepared. The description can be in the Plan itself or contained in the cover memo or an appendix.



## Chapter 2: Community Profile

### A. Introduction

Sugar Hill is a beautiful community located in Grafton County in the northwest part of New Hampshire. Sugar Hill is bordered to the east by Franconia, to the south by Easton and Landaff, to the north by Bethlehem and to the west by Lisbon. Located in the “White Mountains” tourist region of New Hampshire, Sugar Hill is surrounded by forests and rivers and contains wonderful mountain vistas throughout. Sugar Hill is known as one of the most bucolic and idyllic communities in the North Country and for its annual “Lupine Festival” in June.



### TOWN GOVERNMENT

A three-member Board of Selectmen governs the Town of Sugar Hill. The Town's departments include, but are not limited to, Fire, Police, Highway, Planning, Zoning, Library and Conservation. Although not host to any large commercial facilities, Sugar Hill is home for several tourist-related facilities and home-businesses. Working members of the Community commute to larger nearby communities such as Littleton, Franconia, Bethlehem and Lisbon.

### DEMOGRAPHICS & HOUSING

Over the last 30 years, the population of Sugar Hill has increased drastically; the population change from 1980 (397) to 2010 (563) showed an increase of 166 according to US Census 2010. This represents a growth rate of approximately 41.8%. Sugar Hill's population in 2015 was estimated to be 665.<sup>5</sup>

The American Community Survey (2011-2015) estimates a total of 442 housing units, most of which are single family (416). Multiple-family structures total 19 and mobile homes and other housing units number seven. The median household income is estimated to be \$78,281 and the median age is 55.3 years.<sup>6</sup> Census 2010 estimates that of the 175 vacant housing units, 160 are used for recreational, seasonal or occasional use thus confirming the presence of second home and seasonal residents.

### EDUCATION & CHILD CARE

Sugar Hill students in grades PK-6 attend School at the Lafayette Regional School in Franconia along with students from the neighboring towns of Easton and Franconia.

**Incorporated:** 1962

**Origin:** This town was part of the 1768 charter of Gunthwaite, which was renamed Lisbon in 1824. Though settled about 1789, this town is New Hampshire's youngest, incorporated in 1962. After considerable litigation, it was carved out of Lisbon to be an independent voting unit. The name Sugar Hill comes from a large grove of sugar maples in the hills. In 1929, Austrian Sig Buchmayr established the first organized ski school in the United States near Peckett's-on-Sugar Hill, one of the earliest resorts to promote winter vacationing.

**Villages and Place Names:** unknown

**Population, Year of the First Census Taken:** 336 residents in 1970

**Population Trends:** Sugar Hill was incorporated in 1962, and the first Census for the town was in 1970. Since then, population change totaled 329, from 336 in 1970 to 665 in 2015. The largest decennial percent change was a 24 percent increase between 1990 and 2000. The 2015 Census estimate for Sugar Hill was 665 residents, which ranked 210th among New Hampshire's incorporated cities and towns.

**Population Density and Land Area, 2015 (US Census Bureau):** 38.8 persons per square mile of land area. Sugar Hill contains 17.1 square miles of land area and 0.1 square miles of inland water area.

*Source: Economic & Labor Market Information Bureau, NH Employment Security, April 2017; Received 5/23/16*

<sup>5</sup> Economic & Labor Market Information Bureau, NH Employment Security, April 2017. Community Response 5/23/16.

<sup>6</sup> American Community Survey, 2011-2015; the Census Bureau

Students in grades 7-12 attend the Profile School in Bethlehem along with students from Franconia, Easton and Bethlehem. There are no colleges or universities in Sugar Hill; however there is one licensed child care facility with a capacity of 20 according to the Community Profile provided by the Economic & Labor Market Information Bureau.

### NATURAL FEATURES

Sugar Hill covers approximately 17.1 square miles of land area and 0.1 square miles of inland water. The Village of Sugar Hill is located atop the Sugar Hill Ridge where scenic views are seen in virtually every direction. The entire community is dominated by the mountains and hills of the White Mountains and is home to not only the annual Lupine Festival but also to some of the most beautiful fall foliage vistas. The highest peak is Bronson Hill at 2,078' above sea level. The elevation in the Village is approximately 1,325' above sea level; most of the Community is over 1,000 feet above sea level which leaves it vulnerable to ice storms.



*St. Matthews Church, Sugar Hill*

*Photo Credit: <https://www.pinterest.com/pin/280630620507573420/>*

Vegetation is typical of northern New England including both deciduous and conifer forests, open fields, swamp and riverine areas. The mountainous terrain lends itself to an abundance of small streams, brooks and river, most notably the Gale River, Salmon Hole Brook, Indian Brook and Bowen Brook. Two small ponds can also be found in Sugar Hill, Street Pond and Coffin Pond.

### TRANSPORTATION

There are three major roadways which run through Sugar Hill: NH Route 117 travels from Franconia the eastern side of the Sugar Hill Ridge to Lisbon on the western side; NH Route 18 travels from Bethlehem in the north and through a small portion of Sugar Hill until it reaches Franconia and travels further south to Franconia Notch State Park; and Interstate 93 roughly parallels NH Route 18 but is not accessible in Sugar Hill. The remainders of Sugar Hill's roadways are long, narrow and winding country roads that are beautiful in the spring, summer and fall but can be treacherous during the winter months.

Interstate 93 carries a tremendous amount of traffic, with a good deal of commercial traffic coming and going to Canada. NH Routes 117 and 18 are also well-travelled by tourists, commuting residents and commercial vehicles.

## B. Emergency Services

### EMERGENCY OPERATIONS CENTER & EMERGENCY MANAGEMENT DIRECTOR

The Emergency Management Director (EMD) position in Sugar Hill is held by the Fire Chief who maintains an Emergency Operations Center (EOC) as part of the Town's emergency preparedness program. The EOC is where the EMD, department heads, government officials and volunteer agencies gather to coordinate their response to a major emergency or disaster event. In Sugar Hill the designated EOC is at the Fire Station.



### ***SUGAR HILL FIRE DEPARTMENT & FRANCONIA LIFE SQUAD (EMS)***

The Sugar Hill Fire Department is a volunteer on-call fire department providing quality fire services to the residents and visitors of Sugar Hill, 24 hours a day 365 days a year. The Department staffs a part-time Chief and 21 on-call volunteer firefighters and operates one station within the Community. The Sugar Hill Fire Department provides first response for medical emergencies along with the Franconia Life Squad and participates in the Twin State Mutual Aid Fire Association along with area departments. Emergency Medical Transport is provided by Calnex Ambulance out of Littleton.

### ***SUGAR HILL POLICE DEPARTMENT***

The Sugar Hill Police Department is a full-time department providing law enforcement services to the residents and visitors of Sugar Hill 24 hours a day, 365 days a year. The Department staffs a full-time Chief and one full-time and two part-time sworn officers. The Sugar Hill Police Department has mutual aid agreements with surrounding towns and the NH State Police.

### ***SUGAR HILL HIGHWAY DEPARTMENT***

The Sugar Hill Highway Department operates on a year-round, 24-hour basis as needed. The Department staffs a full-time Road Agent as well as two full-time employees and one part-time employee. The Highway Department's mission is to support the citizens of Sugar Hill through the safe operation, proper maintenance and future development of highway, supporting infrastructure and utilities in a manner that is cost conscience without sacrificing quality. The Department belongs to NH Public Works Mutual Aid.

### ***MEDICAL FACILITIES***

Sugar Hill's closest medical facility is Littleton Regional Healthcare in Littleton (12 miles, 25 beds). If the need arises, alternative medical facilities could be Cottage Hospital in Woodsville, Weeks Memorial in Lancaster and Speare Memorial Hospital in Plymouth.

### ***EMERGENCY SHELTER(S)***

The primary shelter is the location to which evacuees are directed at the time of an emergency. In Sugar Hill, the designated primary shelter is the Carolina Crapo Building (Town Offices) which offers a large sleeping area, bathrooms, showers and kitchen facilities as well as a permanent generator.



***Sugar Hill Meeting House***  
***Photo Credit: MAPS***

### C. Sugar Hill's Current & Future Development Trends

Over the last 17 years development in Sugar Hill has been consistent with development trends in the rest of northern New Hampshire. Nearly every community in northern New Hampshire has experienced a significant drop in new home construction since the mid-2000s; this trend is only now beginning to change.

According to City-Data, as shown in the chart to the right<sup>7</sup>, building began to decrease in 2007 and stayed low through 2013; requests for building permits for new home construction have shown some increase, but development continues to be slow. It was reported that there have been very few requests for new subdivisions over the past ten years and that there is currently only one "rework" of an old subdivision on Streeter Pond Road. Current expected growth would be for 5-6 new homes per year. The box below from the 2016 Annual Report shows the activities seen by the Planning Board last year.

#### Single-family new house construction building permits:

- 1997: 8 buildings, average cost: \$171,900
- 1998: 9 buildings, average cost: \$171,900
- 1999: 4 buildings, average cost: \$148,800
- 2000: 4 buildings, average cost: \$127,500
- 2001: 5 buildings, average cost: \$191,000
- 2002: 8 buildings, average cost: \$198,100
- 2003: 7 buildings, average cost: \$239,300
- 2004: 7 buildings, average cost: \$239,300
- 2005: 6 buildings, average cost: \$332,000
- 2006: 12 buildings, average cost: \$221,300
- 2007: 6 buildings, average cost: \$201,300
- 2008: 3 buildings, average cost: \$370,000
- 2009: 2 buildings, average cost: \$370,000
- 2010: 3 buildings, average cost: \$163,300
- 2011: 3 buildings, average cost: \$286,700
- 2012: 3 buildings, average cost: \$358,300
- 2013: 3 buildings, average cost: \$358,300

The Planning Board and the Board of Selectmen will monitor growth in Sugar Hill using existing regulatory documents such as the Floodplain Ordinance, Zoning Ordinances, Subdivision Regulations, the Capital Improvement Plan and the building permit process. As a small community, Planning Board and Board of Selectmen members along with other town officials are almost always aware of building that is taking place.

The Planning Board will follow town building and subdivision regulations to ensure that any building in hazardous areas will be built to minimize vulnerability to the hazards identified in this Plan. It was also noted that no development since the 2012 hazard mitigation plan has occurred in hazard prone areas and no development since 2012 has impacted the Town's hazard vulnerability.

The Town recognizes the importance of growth, but also understands the impact that hazards can have on new facilities and homes if built within hazardous areas of the Community. Town officials will continue to monitor any new growth and development, including new critical facilities, with regards to potentially hazardous events.

#### PLANNING BOARD

The Planning Board meets the first Wednesday of the month at 5:30PM at the Carolina Crapo Memorial Building. The Planning Board approved the following activity for 2016:

Major Subdivisions: 0  
Minor Subdivisions: 2  
Lot Line Adjustments: 2  
Voluntary Merger: 1

Any resident interested in serving on the Planning Board should write a letter of interest to the Select Board. Appreciation is due to all the members who generously volunteer their time and work to maintain the quality and beauty of our Town.

Respectfully Submitted,  
Amy Venezia, Secretary

<sup>7</sup> City-Data.com; <http://www.city-data.com/city/Sugar-Hill-New-Hampshire.html>

TABLE 2.1: TOWN STATISTICS

Table 2.1 - Town Statistics				
Census Population Data	2010	2000	1990	1980
Sugar Hill, NH - Census Population Data	563	564	454	397
Grafton County	89,118	81,826	74,998	65,806
Estimated Population 2015 (*ACS 2011-2015)	665			
Elderly Population-% over 65 (*ACS 2011-2015)	20.1%			
Median Age (*ACS 2011-2015)	55.3			
Median Household Income (*ACS 2011-2015)	\$78,281			
Individuals below the poverty level (*ACS 2011-2015)	5.2%			
Change in Population - Winter %	300%			
Change in Population - Summer %	300%			
Housing Statistics (2010 Census)				
Total Housing Units	429 (254 Occupied; 175 Vacant)			
Occupied Housing Units	254 (206 Owner Occupied, 48 Renter Occupied)			
Vacant Housing Units	175 (160 for Seasonal, Recreational, Occasional Use; 3 other vacant units)			
Assessed Structure Value (2016-MS1) <small>Received from Town; 4/27/17</small>	Value		1% Damage	5% Damage
Residential Buildings	\$83,294,690		\$832,947	\$4,164,735
Manufactured Housing	\$159,700		\$1,597	\$7,985
Commercial Buildings	\$3,828,400		\$38,284	\$191,420
Other Utilities	\$21,310		\$213	\$1,066
Tax Exempt Buildings	\$1,473,900		\$14,739	\$73,695
Utilities	\$3,567,700		\$35,677	\$178,385
Total	\$92,345,700		\$923,457	\$4,617,285
Regional Coordination				
County	Grafton			
Tourism Region	White Mountains			
Municipal Services & Government				
Town Manager	No			
Board of Selectmen	Yes; elected			
Planning Board	Yes; appointed			
School Board	Representatives on Lafayette & Profile School Boards			
Zoning Board of Adjustment	Yes; elected			
Conservation Committee	Yes; appointed			
Master Plan	Yes; 2014			

**Table 2.1 - Town Statistics**

<i>Emergency Operations Plan (EOP)</i>	Yes; 2010
<i>Hazard Mitigation Plan (HMP)</i>	Yes; 2012
<i>Zoning Ordinances</i>	Yes; 1968/15
<i>Subdivisions Regulations</i>	2008 (reviewed annually)
<i>Capital Improvement Plan</i>	Yes
<i>Capital Reserve Funds</i>	Yes
<i>Building Permits Required</i>	Yes
<i>Town Web Site</i>	Yes; www.sugarhillnh.org
<i>Town Insurance Fire Rating</i>	8 (improved since last plan when it was 9/10)
<i>Floodplain Ordinance</i>	Stand-alone ordinance; 2007
<i>Member of NFIP</i>	April 2, 1986
<i>Flood Insurance Rate Maps (DFIRMS)</i>	February 20, 2008
<i>Flood Insurance Rate Study (FIS)</i>	February 20, 2008
<b>Percent of Local Assessed Valuation by Property Type-2015 (NH Department of Revenue)</b>	
<i>Residential Buildings</i>	93.9%
<i>Commercial Land &amp; Buildings</i>	3.4%
<i>Other</i>	2.6%
<b>Emergency Services</b>	
<i>Town Emergency Warning System(s)</i>	CodeRED & the NH Emergency Notification System
<i>School Emergency Warning System(s)</i>	Power School - Alert Solutions
<i>Emergency Page</i>	No
<i>Facebook Page</i>	No
<i>ListServ</i>	No
<i>Local Newspapers</i>	Littleton Courier & The Caledonia Record
<i>Local TV Stations</i>	WMUR (9), WCAX (3)
<i>Local Radio</i>	WLTN, 96.7
<i>Police Department</i>	Yes; full-time Chief, 1 full-time, 2 part-time officers
<i>Police Dispatch</i>	Grafton County Dispatch
<i>Police Mutual Aid</i>	Surrounding Communities & NH State Police
<i>Animal Control Officer</i>	Police Department
<i>Fire Department</i>	Yes volunteer; part-time Chief, 21 paid on-call firefighters
<i>Fire Dispatch</i>	Grafton County Dispatch
<i>Fire Mutual Aid</i>	Twin State Mutual Aid Fire Association
<i>Fire Stations</i>	One
<i>Fire Warden</i>	Yes

**Table 2.1 - Town Statistics**

<i>Emergency Medical Services</i>	Sugar Hill Fire Department & Franconia Life Squad
<i>EMS Dispatch</i>	Grafton County Dispatch
<i>Emergency Medical Transportation</i>	Calex Ambulance (Littleton)
<i>HazMat Team</i>	Central NH HazMat Team
<i>Established EMD</i>	Yes
<i>Established Deputy EMD</i>	No
<i>Public Health Network</i>	North Country Public Health Network
<i>Health Officer</i>	Yes
<i>Building Inspector</i>	Yes
<i>Established Public Information Officer (PIO)</i>	Yes
<i>Nearest Hospital(s)</i>	Littleton Regional Healthcare (12 miles, 25 beds)
<i>Local Humane Society or Veterinarians</i>	Veterinarians in Littleton
<i>Primary EOC</i>	Fire Station
<i>Secondary EOC</i>	Town Office
<i>Primary Shelter</i>	Town Office
<i>Secondary Shelter</i>	Fire Station
<b>Utilities</b>	
<i>Town Sewer</i>	Private septic
<i>Highway Department</i>	Yes; full-time Road Agent, 2 full-time, 1 part-time
<i>Public Works Mutual Aid</i>	Yes
<i>Water Supply</i>	Private wells
<i>Waste Water Treatment Plant</i>	No
<i>Electric Supplier</i>	Eversource Energy & NH Electric Coop
<i>Natural Gas Supplier</i>	None
<i>Pipeline(s)</i>	No
<i>Cellular Telephone Access</i>	Limited
<i>High Speed Internet</i>	Limited
<i>Telephone Company</i>	Fairpoint & Time Warner
<b>Transportation</b>	
<i>Primary Evacuation Routes</i>	NH Route 117 south to NH Route 18 NH Route 117 north to US Route 302 Bickford Hill Road to NH Route 116 Interstate 93 North-Accessible from other towns Interstate 93 South-Accessible from other town
<i>Secondary Evacuation Routes</i>	Center District Road to Crane Hill Road to Streeter Pond Road Streeter Pond Road to US Route 302 South Road to Lafayette Road to NH Route 116 Easton Road to NH Route 116

**Table 2.1 - Town Statistics**

<i>Nearest Interstate</i>	I-93, Exit 38 (4 miles)	
<i>Nearest Airstrip</i>	Franconia Airport, Franconia (2,305 ft. turf runway)	
<i>Nearest Commercial Airport(s)</i>	Lebanon Municipal (64 miles)	
	Manchester-Boston Regional (99 miles)	
<i>Public Transportation</i>	No	
<i>Railroad</i>	No	
Education & Childcare		
<i>Elementary School</i>	Grades K-6 are part of Lafayette Regional with Easton & Franconia	
<i>Middle School</i>	Grades 7-12 are part of Profile with Bethlehem, Easton & Franconia	
<i>High School</i>		
<i>School Administrative Unit</i>	SAU 35	
<i>Licensed Childcare Facilities</i>	1 facilities, 20 capacity	
Conserved Land as a Percent of Land in the Community ( <i>GIS Analysis</i> )		
	Square Miles	Percent of Town Land
<i>Approximate Square Miles (including water)</i>	17.20	100.00%
<i>Approximate Total Un-Conserved Land</i>	14.39	83.68%
<i>Approximate Total Conserved Land (%)</i>	2.81	16.32%
<i>Approximate Federal Owned land (%)</i>	0.00	0.00%
<i>Approximate State Owned Land (%)</i>	0.00	0.00%
<i>Approximate Quasi/Public Owned Land (%)</i>	0.10	0.59%
<i>Approximate Municipal/County Land (%)</i>	0.19	1.13%
<i>Approximate Private Land (%)</i>	2.51	14.59%
Fire Statistics ( <i>NH Forests &amp; Lands Report &amp; the Town of Sugar Hill</i> )		
<i>Wildfire Fire Calls (2015 &amp; 16)</i>	2015 One, 3.5 acre fire (Blake Hill Road); 2016, None	
<i>Grafton County Fire Statistics (2016)</i>	17 fires; 22.6 acres	
<i>State Forest Fires FY (2016)</i>	351 fires; 1090 acres	
*ACS: American Community Survey, Census Bureau		
Information found in Table 2.1, unless otherwise noted, was derived from the Economic & Labor Market Information Bureau, NH Employment Security, April 2017. Community Response Received 5/23/2016; <a href="https://www.nhes.nh.gov/elmi/products/cp/profiles-pdf/sugarhill.pdf">https://www.nhes.nh.gov/elmi/products/cp/profiles-pdf/sugarhill.pdf</a>		

## Chapter 3: Hazard Identification

### A. Description of the Hazards

The first step in hazard mitigation is to identify hazards; the Team determined that thirteen natural hazards have potential to affect the Community. The hazards listed to the right and in Table 3.1 were classified based upon their relative threat score (as calculated in Column F in Table 3.1) and separated into three categories using Jenks' Optimization, which is also known as natural breaks classification. *"The natural breaks classification process is a method of manual data classification that seeks to partition data into classes based upon natural groups within the data distribution."*<sup>8</sup>

By using this grouping process, the Plan demonstrates each hazard's likelihood of occurrence in combination with its potential effect on the Town of Sugar Hill. This process illustrates a comprehensive hazard statement and assists the Town with understanding which hazards should receive the most attention. Determination of the probability of occurrence is contained within Column D in Table 3.1; hazards are assessed based upon the likelihood of the hazard's manifestation within a 25 year period.

Table 3.1 provides estimates of the level of impact each listed hazard could have on humans, property and business and averages them to establish an index of "severity". The estimate of "probability" for each hazard is multiplied by its severity to establish an overall "relative threat" factor.

Based on this analysis, the most likely natural disaster threat to Sugar Hill is flooding (heavy rain, road flooding, culverts, etc.). The second most likely threat is flooding (riverine & ice jams) and the third is high winds (windstorms). Four human-caused hazards were also discussed by the Team and are included in the Hazard Threat Analysis and in Chapter 5. Human-caused hazards include Extended Power Failure, Hazardous Materials – Transport, and Epidemic & Pandemic and Terrorism.

In light of recent events (Tropical Storms Irene and Sandy), it should be noted that hurricanes and/or tropical storms have the potential to cause significant damage in Sugar Hill as a result of both wind strength and flash flooding creating road closures and damage. Tropical Storm Irene significantly impacted Sugar Hill; Tropical Storm Sandy had little or no impact. The Team noted that Category 1 or greater hurricanes have a low probability of affecting Sugar Hill; however there is a high probability that tropical rains could cause damage.

#### THE NATURAL HAZARDS

The natural hazards which are **MOST LIKELY** to affect Sugar Hill include:

- *Flooding (heavy rain, road flooding, culverts, etc.)*
- *Flooding (riverine & ice jams)*
- *High Wind (windstorms)*

The natural hazards which **MAY AFFECT** Sugar Hill include:

- *Erosion, Mudslide & Landslide*
- *Tornado & Microburst*
- *Severe Winter Weather & Ice Storms*
- *Extreme Temperatures (hot & cold)*

The natural hazards which are **LESS LIKELY TO AFFECT** Sugar Hill include:

- *Severe Thunderstorms & Lightning*
- *Hailstorm*
- *Wildfire (5+ acres)*
- *Hurricane & Tropical Storm*
- *Earthquake*
- *Drought*

<sup>8</sup> ESRI, <http://support.esri.com/en/knowledgebase/GISDictionary/term/natural%20breaks%20classification>



**TABLE 3.1: HAZARD THREAT ANALYSIS**

Table 3.1 - Hazard Threat Analysis						
Hazards which are most likely to affect the Community			A natural hazard is a source of harm or difficulty created by a meteorological, environmental or geological event.			
Hazards which may affect the Community						
Hazards which are less likely to affect the Community						
Scoring for Probability (Columns A, B, C & D)	Column A	Column B	Column C	Column D	Columns A+B+C/3	Columns D x E
1=Very Low (0-20%)	What is the probability of death or injury?	What is the probability of physical losses & damage?	What is the probability of interruption of service?	Probability of this occurring within 25 years	Average of Human, Property & Business Impact	Relative Threat
2=Low (21-40%)						
3=Moderate (41-60%)						
4=High (61-80%)	Human Impact	Property Impact	Business Impact	Probability of Occurrence	Severity	Risk Severity x Occurrence
5=Very High (81-100%)						
Natural Hazards						
1) Flooding (heavy rain, road flooding, culverts, etc.)	3	4	4	5	3.7	18.3
2) Flooding (riverine & ice jams)	2	3	4	5	3.0	15.0
3) High Wind (windstorms)	2	3	3	5	2.7	13.3
4) Erosion, Mudslide & Landslide	1	2	3	5	2.0	10.0
5) Tornado or Microburst	2	2	2	4	2.0	8.0
6) Severe Winter Weather & Ice Storms	2	2	2	4	2.0	8.0
7) Extreme Temperatures (hot & cold)	2	1	1	5	1.3	6.7
8) Severe Thunderstorms & Lightning	2	2	2	3	2.0	6.0
9) Hailstorm	2	2	2	3	2.0	6.0
10) Wildfire (5+ acres)	2	3	3	2	2.7	5.3
11) Hurricane & Tropical Storm	3	3	3	1	3.0	3.0
12) Earthquake	1	1	1	1	1.0	1.0
13) Drought	1	1	1	1	1.0	1.0
Human-Caused Hazards						
Extended Power Failure (5+ days)	4	3	4	5	3.7	18.3
Hazard Material - Transport	3	3	3	2	3.0	6.0
Epidemic & Pandemic	4	1	4	1	3.0	3.0
Terrorism	2	2	2	1	2.0	2.0



## B. Risk Assessment

The next step in hazard mitigation planning was to identify the location of past hazard events and if possible, what facilities or areas were impacted. The Team used *Table 3.1, Hazard Threat Analysis*, to identify potential threats and prioritize their threat potential. The Team then used a base map that included the 100-year floodplain, political boundaries, water bodies, the road network and aerial photos to locate many of the past hazard events on the base map. This step in the planning process serves as a stepping stone for predicting where future hazards could potentially occur. The Team identified past events in Sugar Hill, Grafton County and the State and listed them in *Table 3.2, Historic Hazard Identification*.

To assess the fire base risk, a formula based on the following criteria was used:

- **Ignitability** – Using the 2001 NH Land Cover Assessment GIS Layer - A value between 0 and 9 was assigned based on ignitability to 23 land cover categories from open water to pitch pine forest.
- **Slope** - A value of 1-10 was assigned to various gradients of slope.
- **Aspect** - A value of 0-8 was assigned to various aspects from flat to southwest facing slopes.

These criteria were combined using GIS analysis and weighted equally to determine risk levels throughout the Town. Once the analysis and mapping was complete in GIS, a matrix was created showing varying risk levels: low, medium and high. Each risk level was assigned a color and was mapped over a base-map of the Town, see *Appendix G: Map Documents, Map 1: Base Risk Analysis*.

## C. Sugar Hill National Flood Insurance Program (NFIP) Status

Sugar Hill has been a member of the National Flood Insurance Program since April 2, 1986. Sugar Hill has a small flood plain with approximately .56 square miles of land in the 100-year floodplain<sup>9</sup>, 0.1 square miles of which is inland water. The floodplain areas of Sugar Hill are primarily along the Gale River, Bowen Brook, Salmon Hole Brook and Indian Brook. The floodplain is also shown at Streeter Pond, Coffin Pond and in and around swampy areas in the Community. There are many other small streams and brooks throughout the Town that may also experience flooding.

According to the NH Office of Strategic Initiatives, there are two NFIP policies in effect in Sugar Hill, for a total amount of \$292,000 dollars of insurance in force; both policies are for residential structures. No losses have been paid and there have been no reported repetitive losses.<sup>10</sup> The location of Critical Infrastructure & Key Resources (CIKR) that lie within the floodplain as well as the floodplain itself can be seen on *Map 3, Past & Potential Areas of Concern*, located in *Appendix G: Map Documents*, of this Plan. The latest Flood Insurance Rate Studies (FIRS) and Digital Flood Insurance Rate Maps (FIRM) are dated February 20, 2008.



In 1968, although well-intentioned government flood initiatives were already in place, Congress established the National Flood Insurance Program (NFIP) to address both the need for flood insurance and the need to lessen the devastating consequences of flooding. The goals of the program are twofold: to protect communities from potential flood damage through floodplain management, and to provide people with flood insurance.

For decades, the NFIP has been offering flood insurance to homeowners, renters and business owners, with the one condition that their communities adopt and enforce measures to help reduce the consequences of flooding.

Source:  
[http://www.floodsmart.gov/floodsmart/pages/about/nfip\\_overview.jsp](http://www.floodsmart.gov/floodsmart/pages/about/nfip_overview.jsp)

<sup>9</sup> GIS Analysis of Grafton County DFIRM (Digital Flood Insurance Rate Map)

<sup>10</sup> NH Office of Strategic Initiatives; Jennifer Gilbert, January 23, 2017

Sugar Hill established a stand-alone flood ordinance called the “Town of Sugar Hill Floodplain Ordinance”; this ordinance was most recently revised in April 2007. The ordinance begins with the following statement<sup>11</sup>:

*“This ordinance, adopted pursuant to the authority of RSA 674:16, shall be known as the Town of Sugar Hill Floodplain Development Ordinance. The regulations in this ordinance shall overlay and supplement the regulations in the Town of Sugar Hill Zoning Ordinance, and shall be considered part of the Zoning Ordinance for purposes of administration and appeals under state law. If any provision of this ordinance differs or appears to conflict with any provision of the Zoning Ordinance or other ordinance or regulation, the provision imposing the greater restriction or more stringent standard shall be controlling.*

*The following regulations in this ordinance shall apply to all lands designated as special flood hazard areas by the Federal Emergency Management Agency (FEMA) in its Flood Insurance Rate Maps dated 04/02/86 which are declared to be part of this ordinance and are hereby incorporated by reference.”*

Elements of the Sugar Hill Floodplain Ordinance are listed below with a brief description of the item if warranted<sup>12</sup>:

**Item I - Definition of Terms:**

**Item II – Permits:**

*“All proposed development in any special flood hazard shall require a permit”*

**Item III - Construction Requirements:**

Requirement for the building inspector to review of *“all building permit applications for new construction or substantial improvements to determine whether proposed building sites will be reasonably safe from flooding.”* Item III goes on to discuss requirements to prevent flooding.

**Item IV - Water and Sewer Systems:**

Specifications for water & sewer systems, this item states *“...the applicant shall provide the Building Inspector with assurance that these systems will be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters, and on-site waste disposal systems will be located to avoid impairment to them or contamination from them during periods of flooding”*.

**Item V – Certification:**

*“For all new or substantially improved structures located in special flood hazard areas, the applicant shall furnish the following information to the building inspector:*

- a. the as-built elevation (in relation to NGVD) of the lowest floor (including basement) and include whether or not such structures contain a basement.*

<sup>11</sup> Town of Sugar Hill Floodplain Ordinance, Revised 04/07; all italicized words are taken directly from the ordinance

<sup>12</sup> Items in italic are taken directly from the Sugar Hill Floodplain Ordinance

- b. *if the structure has been flood proofed, the as-built elevation (in relation to NGVD) to which the structure was flood proofed.*
- c. *Any certification of flood proofing.*

*The Building Inspector shall maintain for public inspection, and shall furnish such information upon request."*

#### **Item VI – Other Permits:**

*"The Building Inspector shall not grant a building permit until the applicant certifies that all necessary permits have been received from those government agencies from which approval is required by federal or state law, including Section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1334."*

#### **Item VII – Watercourses:**

Item VII details the specifications for riverine situations, floodways and watercourses, and coordination with the Wetlands Board of New Hampshire (DES); among other watercourse-related items, this ordinance states: *"No encroachments, including fill, new construction, substantial improvements, and other development are allowed within the floodway that would result in any increase in flood levels within the community during the base flood discharge".*

#### **Item VIII – Special Flood Hazard Areas:**

Item VIII provides specifications for new construction or substantial improvements in Zone A as well as the determination of the 100-year flood elevation, flood proofing requirements and lowest floor requirements. Manufactured homes and recreational vehicles are also discussed within this Item.

#### **Item IX – Variances and Appeals:**

Item IX includes a description of the variance and appeals process and states, *"Any order, requirement, decision or determination of the building inspector made under this ordinance may be appealed to the Zoning Board of Adjustment as set forth in RSA 676:5".*

As a small and close-knit community, the Board of Selectmen, Planning Board and the Hazard Mitigation Planning Team are most always aware of new construction and/or substantial improvements that take place in town. Although Sugar Hill has a relatively small designated Special Flood Hazard Area, the Team felt that it is worthwhile to post flood information on the Town's website and to add a link to the NFIP to provide public education for current homeowners and potential developers

The Town of Sugar Hill, through its Floodplain Ordinance and other best practices, complies with the National Flood Insurance Program requirements. The Team understands that the benefits of the NFIP also extend to structures that are not in the 100-year floodplain. The Town will continue to work with the Office of Energy and Planning and will carefully monitor its continued compliance with the NFIP.

**Severe Repetitive Loss (SRL) Properties**--NFIP-insured buildings that, on the basis of paid flood losses since 1978, meet either of the loss criteria described on page SRL 1. SRL properties with policy effective dates of January 1, 2007, and later will be afforded coverage (new business or renewal) only through the NFIP Servicing Agent's Special Direct Facility so that they can be considered for possible mitigation activities.

Source: <http://www.fema.gov/national-flood-insurance-program/definitions#R>

### ***D. Profile of Past, Present & Potential Wildfire Events in Sugar Hill***

Historic fires can serve to help residents determine where future fires may occur, understand how the landscape and land use may have changed over time and assist with determining priorities for future mitigation strategies.

The Sugar Hill Planning Team noted that very few significant wildfires have occurred in Sugar Hill in the recent past, but that many of the Community's residences are located in the Wildland Urban Interface (WUI). It was noted that if the right conditions were in place, a large wildfire could occur. Sugar Hill's forested lands include many of the factors associated with potential wildfire including steep terrain, a significant softwood forest and large areas where clear cuts and blow downs have occurred. In addition, there is no municipal water supply in Sugar Hill so the fire department must rely on static water sources to fight fires in some areas.

### ***E. Probability of Future Potential Disasters***

Overall, the Town of Sugar Hill is fairly safe from the effects of natural hazards. However, due to Sugar Hill's geographic location, forested lands, steep hills, heavy snow pack and topography, there is always a possibility of future disasters in Sugar Hill. The Town of Sugar Hill has been impacted in the past by natural disasters, including flooding, lightning, severe winter storms and severe wind. Fortunately, many residents have generators and/or heat with wood stoves.

The top three hazards that are most likely to occur in Sugar Hill, based on analysis done in *Table 3.1, Hazard Threat Analysis*, are described below.

#### **FLOODING (HEAVY RAIN, ROAD FLOODING, CULVERTS, ETC.)**

Road flooding, washouts and closures are significant in Sugar Hill. With increased intensity of storms and logging operations that have affected the rate of storm water flow down the mountains, it is expected that future road flooding will occur. As storm water flows into ditches, debris that is picked up along the way often jams up culverts thus causing the storm water to find other routes, going around culverts and across roads. It is hoped that with the most recent flood event on July 1, 2017, FEMA funding will be available to mitigate road flooding for the future.

Three storms in the last seven years have created flooding in much the same locations throughout the Community, one in October 2010, another in April 2011 and most recently on July 1, 2017. Twenty-six specific locations that have caused flooding were identified and can be seen in *Map 3, Past & Potential Areas of Concern*. As a result of the 2017 storm, the Emergency Management Director has submitted the following list of roads to FEMA, should the event be declared as a Presidential Disaster Declaration.

Emergency Management Status of Roads as of July 1, 2017 – Roads that received damage:

- |                      |                   |                      |
|----------------------|-------------------|----------------------|
| • Bickford Hill Road | • Easton Road     | • Pearl Lake Road    |
| • Birches Road       | • Grandview Road  | • Post Road          |
| • Blake Road         | • Hadley Road     | • Presby Road        |
| • Carpenter Road     | • Jericho Road    | • South Road         |
| • Crane Hill Road    | • Kathy Rae Drive | • Streeter Pond Road |
| • Creamery Pond Road | • Lafayette Road  | • Sunset Hill Road   |
| • Dyke Road          | • Lovers Lane     | • Toad Hill Road     |
|                      |                   | • Valley Vista Road  |

There is a high probability that future local road flooding will occur. However, the Town hopes that as a result of the damage done on July 1, 2017, most of the primary culvert issues can be mitigated with disaster funding. For more information on local road flooding, refer to Chapter 5.

### FLOODING (RIVERINE & ICE JAMS)

Riverine flooding along the Gale River, Indian Brook, Bowen Brook and Salmon Hole Brook are common occurrences in Sugar Hill, whenever the Town experiences heavy rain, rapid snowmelt or ice jams. The Gale River often fills its banks and overflows onto Streeter Pond Road. This is further exasperated by silt in the river bed that increases the risk of flooding from either abnormally high waters or ice jams.

The probability that riverine flooding and ice jams will occur in Sugar Hill is good. See Chapter 5 for more information on severe winter weather and ice storms in Sugar Hill.

### HIGH WIND (WINDSTORMS)

Due to the topography and elevations in Sugar Hill and the weather patterns that bring winds in from the west, over the mountains and down into the valleys, high winds are very frequent in Sugar Hill. Winds have taken down trees and power lines and have damaged roofs.

The probability that high winds will occur in Sugar Hill is good. For more information on the impact of high winds see Chapter 5.

### CLIMATE CHANGE

Although not identified as a natural hazard in this Plan, no Plan can be considered complete today without some discussion of the impact that climate change has had on weather patterns. *"The challenges posed by climate change, such as more intense storms, frequent heavy precipitation, heat waves, drought, extreme flooding, and higher sea levels, could significantly alter the types and magnitudes of hazards impacting states in the future"*, FEMA stated in its new State Mitigation Plan Review Guide<sup>13</sup>. By including climate change in the new hazard mitigation guide for state planners, FEMA is recognizing the reality of climate change. Communities in New Hampshire, such as Sugar Hill, should become increasingly aware of the effects of climate change on the natural hazards that are already being experienced.



***Flooding, April 2011, Grandview Road  
Photo Credit: Town of Sugar Hill***

<sup>13</sup> State Mitigation Plan Review Guide, FEMA, Released March 2015, Effective March 2016, Section 3.2, page 13

### STATE HAZARD MITIGATION PLAN

The NH State Hazard Mitigation Plan includes many of the same potential hazards that have been identified in Sugar Hill. Several of the State’s hazards however were excluded from this Plan. These include the following:

<u>State Hazard</u>	<u>Reason for exclusion from Sugar Hill’s Plan</u>
Coastal Flooding .....	Distance away from the sea
Dam Failure .....	No dams in Sugar Hill whose failure would cause damage
Radon .....	Felt to be an individual homeowner’s responsibility
Radiological .....	Distance away from a nuclear power plant
Fire & Hazardous Materials .....	Addressed with “Wildfire” and “Hazardous Materials Transport & Fixed”
Snow Avalanche .....	No known areas of avalanche that would impact people or structures

### HAZARD PROBABILITY COMBINED WITH POWER FAILURE

Any potential disaster in Sugar Hill is particularly impactful if combined with power failure, as would most likely be the case with severe winter storms, blizzards and ice storms, hurricanes, tropical storms and windstorms. The food supply of individual citizens could become depleted quickly should a power failure last for a week or more. In addition, there are no major grocery stores or pharmacies located in Sugar Hill. An outage during the winter months could result in frozen pipes and the lack of water and heat, a particular concern for the Town’s elderly citizens. In addition, winter in New England commonly brings very low temperatures, while high temperatures can be experienced in the summer.

### HAZARD PROBABILITY COMBINED TRANSPORTATION

Interstate 93 serves as the major north-south highway for those travelling from Canada to the north to the economic centers of southern New Hampshire and the rest of New England. I-93 runs through Sugar Hill in the northeastern part of the Community and although it is not directly accessible from Sugar Hill, it can be accessed through neighboring communities. NH Route 18 travels from Littleton and Bethlehem to the north, through northeastern Sugar Hill, travelling parallel to I-93, and into Franconia. NH Route 117 travels from Franconia in the east, uphill to the village center of Sugar Hill and then back downhill to Lisbon in the west. All of Sugar Hill’s roadways are very well travelled not only by tourists and local traffic but also by large trucks and tractor trailers, some hoping to take a “short-cut” through Sugar Hill to avoid traffic and congestion in Littleton.

Many of Sugar Hill’s other roads are narrow, steep and winding and subject to severe winter weather. All of these roads are beautiful in the spring, fall and summer months, but when affected by flooding, winter snow conditions and ice they become treacherous. In these conditions, vehicular accidents, wildlife collisions and truck accidents involving hazardous materials are always a possibility. A major ice storm or other significant event can make egress and access difficult for individuals and first responders.

**Table 3.1, Table 3.2 and Chapter 5, Section B  
provide more information on past and potential  
hazards in Sugar Hill.**



**TABLE 3.2: HISTORIC HAZARD IDENTIFICATION**

2005 HMPT = 2005 Hazard Mitigation Planning Team

2012 HMPT = 2012 Hazard Mitigation Planning Team

2017 HMPT = 2017 Hazard Mitigation Planning Team

DR Presidential Disaster Declarations (DR) since 1953

EM Emergency Declarations (EM) since 1953

Type of Event	Date	Location	Impact	Source
<b>Past Flooding Hazards including Riverine, Heavy Rainfall, Rapid Snowmelt, Ice Jam Flooding &amp; Local Road Flooding:</b> Riverine flooding is the most common disaster event in the State of NH. Significant riverine flooding in some areas of the State occurs in less than ten year intervals and seems to be increasing with climate change. The entire State of NH has a high flood risk. Most areas in Sugar Hill that are prone to flooding and road erosion were mapped and can be seen on <b>Map 3, Past &amp; Potential Areas of Concern</b> ; flood events have the potential to impact the Community on a town wide basis.				
Severe Rain Storm Flooding	Multiple Dates	Bowen Brook	Bowen Brook has flooded three times in the past causing flooding in three structures; floods during every significant storm; Bowen Brook also causes flooding on NH Route 117.	2005 HMPT & 2017 HMPT
Flooding (ice jam)	Early 1970s	Streeter Pond Road at Gale River	Section of Street Pond Road washed out; state estimate of \$100,000 in damage.	2005 HMPT
Severe Rain Storm Flooding	March 15, 1979	Sugar Hill	<b>Presidential Emergency Declaration EM-3073:</b> Pearl Lake Road flooded; a culvert was lost in the flood and the road was completely washed out and closed for a few days.	FEMA & 2017 HMPT
Flooding (ice jam)	Late 1980's	Streeter Pond Road at Gale River	Streeter Pond Road washout; one person tried to drive through it; caused by ice jam in Gale River that took out part of the road and flooded a farmhouse; a .5-.75 mile stretch of Streeter Pond was flooded.	2005 HMPT & 2017 HMPT
Flooding (ice jam)	1992	Streeter Pond Road at Gale River	Once again, a section of Streeter Pond Road washed out near the Gale River; road flooding and washouts.	2005 HMPT
Severe Rain Storm Flooding	October 7-18, 2005	Belknap, Cheshire, Grafton, Hillsborough, Merrimack & Sullivan	<b>Presidential Disaster Declaration DR-1610:</b> State and federal disaster assistance reached more than \$3 million to help residents and business owners in New Hampshire recover from losses resulting from the severe storms and flooding in October; Sugar Hill experienced heavy autumn rains and flooding in all of the usual places ( <i>see Map #3 and events of October 2010 below</i> )	FEMA & 2017 HMPT

Type of Event	Date	Location	Impact	Source
Severe Rain Storm Flooding Extended Power Failure	May 12-23, 2006	Belknap, Carroll, Grafton, Hillsborough, Merrimack, Rockingham & Strafford	<b>Presidential Disaster Declaration DR-1643:</b> Flooding in most of southern NH, May 12-23, 2006. (aka: Mother's Day Storm); mostly in southern Grafton County; Sugar Hill experienced high wind & heavy rain that caused numerous roads to erode; the Town was without power for up to eight days in some locations.	FEMA & 2012 HMPT & 2017 HMPT
Nor'easter Severe Rain Storm Flooding Extended Power Failure	April 15-23, 2007	All Ten NH Counties	<b>Presidential Disaster Declaration DR-1695:</b> Flood damages; FEMA & SBA obligated more than \$27.9 million in disaster aid following the April nor'easter. (aka: Tax Day Storm); in this April storm, Sugar Hill lost parts of Lafayette and Carpenter Roads; received FEMA money to rebuild these two roads; downed trees and some power outages.	FEMA & 2012 HMPT & 2017 HMPT
Severe Rain Storm Flooding	July 24-August 14, 2008	Belknap, Carroll & Grafton & Coos	<b>Presidential Disaster Declaration DR-1787:</b> Severe storms, tornado and flooding on July 24, 2008; Sugar Hill received heavy rain during this period and minor flooding in typical locations. <i>(see Map #3 and events of October 2010 below)</i>	FEMA & 2017 HMPT
Flood (ice jam)	January 23, 2010	Streeter Pond & Crane Hill Roads & Gale River	Ice jam on Gale River created flooding of sections of Streeter Pond and Crane Hill Roads; roads closed; damage to two structures and damage to Crane Hill Bridge; ice chunks as big as six feet where found on Streeter Pond Road.	2012 HMPT & 2017
Severe Rain Storm Flooding (road washouts) & Extended Power Failure	October 1, 2010 & Future Potential	Town Wide; 75% of Sugar Hill's roads	<b>(Map 3: #'s 1-19)</b> Eight inches of rain fell in a short time creating overburdened culverts and drainage ditches; NH Route 117 and NH Route 18 closed; this flooding caused erosion on most of the Town's roads (see circles on maps); went over top of culvert at intersection of Pearl Lake Road and Creamery Pond Road eroding 1/2 of Crane Hill Road sending it into the Gale River; Grandview Road went into Salmon Hole Brook. Effected roads include: 1) Streeter Pond Road @ Gale River, 2) Streeter Pond Drive, 3) Streeter Pond Road @ Indian Brook, 4) South Road, 5) Crane Hill Road, 6) NH Route 117 @ Bowen Brook, 7) Creamery Pond Road, 8) Dyke Road, 9) Blake Road, 10) Lafayette Road, 11) Carpenter Road, 12) Center District Road, 13) Bickford Hill Road, 14) Hadley Road @ Salmon Hole Brook, 15) Easton Road @ Salmon Hole Brook, 16) Toad Hill Road, 17) Presby Road, 18) Sunset Hill Road and 19) Grand View Road; flooding also occurred on NH Route 18; Beaver Pond Trail, Birches Road, widespread power outages.  <b>Note: these are the same areas that habitually flood in Sugar Hill - see April 11, 2011 and July 1, 2017 below</b>	2012 HMPT & 2017 HMPT
Severe Rain Storm Flooding (road washouts)	April 11, 2011 & Future Potential	Six Roads within Sugar Hill	<b>(Map 3: #'s 14-19)</b> Heavy rain and saturated ground lead to flood damage to six roads and the overnight closing of three. The roads affected were: 14) Hadley Road @ Salmon Hole Brook, 15) Easton Road @ Salmon Hole Brook, 16) Toad Hill Road, 17) Presby Road, 18) Sunset Hill Road and 19) Grand View Road; Damage was estimated in the \$25,000 to \$50,000 range.	2012 HMPT & 2017 HMPT



Type of Event	Date	Location	Impact	Source
Severe Rain Storm Flooding & Hailstorm	May 26-30, 2011	Coos & Grafton County	<b>Presidential Disaster Declaration DR-4006:</b> May Flooding Event, May 26th-30th 2011 Coos & Grafton County. (aka: Memorial Day Weekend Storm); Sugar Hill received heavy rain and some hail, but did not receive as much damage as other northern NH communities, particular Dalton and Lancaster along the Connecticut River. Affectionately called a "Vermont coastal storm" as the weather pattern marched up the Connecticut River.	FEMA & 2012 HMPT & 2017 HMPT
Severe Rain Storm Flooding	July 9-10, 2013	Cheshire, Sullivan & Grafton	<b>Emergency Declaration DR-4139:</b> Severe storms, flooding and landslides during the period of June 26 to July 3, 2013 in Cheshire, Sullivan and southern Grafton Counties; minor flooding occurred in Sugar Hill but more damaging weather was in southern Grafton County, Sullivan and Cheshire Counties.	FEMA & 2017 HMPT
Severe Rain Storm Flooding	July 1-2, 2017	Grafton County & Sugar Hill	<p><b>(Map 3: #'s 20-26)</b> Heavy rain produced significant road damage in the usual locations throughout Sugar Hill (see October 1, 2010 above for usual locations); Sugar Hill anticipates approximately \$500,000 worth of damage from this unusually heavy rain event; heavy rains (up to 4.5 inches in some locations) caused flash flooding in much of central New Hampshire and Grafton County; numerous road washouts were reported in Haverhill, Bath, Bethlehem, Woodstock, Benton, Campton and Sugar Hill. (expected Presidential Disaster Declaration)</p> <p><b>Note: Virtually every area that flooded in October 2010 and April 2011 flooded again in this July rain storm; seven additional areas were added for the July 2017 event: 20) Pearl Lake to Creamery, 21) Birches Road, 22) Jericho Road, 23) Lovers Lane, 24) Post Road, 25) Valley Vista Road and 26) Kathy Rae Drive</b></p>	2017 HMPT
<p><b>Past Wildfire Hazards:</b> New Hampshire is heavily forested and is therefore vulnerable to wildfire, particularly during periods of drought. The proximity of many populated areas to the State's forested land exposes these areas to the potential impact of wildfire. Wildfires were not mapped; however, the Wildland Urban Interface (WUI) can be seen in <b>Map 2, Historic Wildfires &amp; the Wildland Urban Interface</b>; wildfires have the potential to impact the Community on a town wide basis.</p>				
Wildfire	July 2, 1953	Shaw Mountain; Carroll County	<b>Presidential Disaster Declaration DR-11:</b> Top of Shaw Mountain which contains the towns of Moultonborough and Tuftonboro in Carroll County; did not reach Grafton County or Sugar Hill.	FEMA & Former Ranger
<p><b>No significant wildfires were reported by the 2017 Hazard Mitigation Planning Team since the last hazard mitigation plan.</b></p>				

Type of Event	Date	Location	Impact	Source
<b>Past High Wind Hazards including Hurricanes, Tropical Storms, Tornadoes, Downbursts &amp; Windstorms:</b> Tornadoes are spawned by thunderstorms and occasionally by hurricanes; tornadoes may occur singularly or in multiples. A downburst is a severe localized wind blasting down from a thunderstorm. Downburst activity is prevalent throughout NH and is becoming more common with climate change; most downbursts go unrecognized unless significant damage occurs. Hurricanes develop from tropical depressions which form off the coast of Africa. New Hampshire's exposure to direct and indirect impacts from hurricanes is real, but modest, as compared to other states in New England. A hurricane that is downgraded to a Tropical Storm is more likely to have an impact in New Hampshire. These hazards were not mapped; tornadoes and other wind events have the potential to impact the Community on a town wide basis.				
Hurricane	September 21, 1938	Region Wide	<b>The Great New England Hurricane:</b> Statewide there were 12 (or 13) deaths; damages in NH were about \$12.3 million dollars in 1938 dollars (about \$200 million now); in New England, 20,000 structures were damaged, 26,000 automobiles lost, 6,000 boats, 325, 000 sugar maples were lost and 80% of the people lost power (Source <a href="http://nhpr.org/post/75th-anniversary-new-englands-greatest-hurricane">http://nhpr.org/post/75th-anniversary-new-englands-greatest-hurricane</a> ); like the rest of New England, damage occurred in Sugar Hill but no local anecdotes where available.	2017 HMPT
Hurricane	August 31, 1954	Region Wide	<b>Hurricane Carol:</b> Hurricane Carol resulted in an extensive amount of trees blown down and property damage; large crop loss; localized flooding; winds measured at over 100 mph; followed by Hurricane Edna just 12 days later, which caused already weakened trees to fall. (Source: <a href="http://www.wmur.com/Timeline-History-Of-NH-Hurricanes/11861310">http://www.wmur.com/Timeline-History-Of-NH-Hurricanes/11861310</a> ); like the rest of New England, damage occurred in Sugar Hill but no local anecdotes where available.	2017 HMPT
Hurricane Bob, Severe Storm	August 18-20, 1991	Sugar Hill	<b>Presidential Disaster Declaration DR-917:</b> Sugar Hill received heavy rain some minor flooding in the usual places.	FEMA & 2017 HMPT
Tropical Storm Floyd	September 16-18, 1999	Belknap, Cheshire & Grafton	<b>Presidential Disaster Declaration DR-1305:</b> The declaration covers damage to public property from the storm that spawned heavy rains, high winds and flooding over the period of September 16-18; the worst of this storm occurred in lower Grafton County; Sugar Hill received some minor flooding in the usual places.	FEMA & 2017 HMPT
Hurricane Katrina Evacuation	August 29-October 1, 2005	All Ten NH Counties	<b>Emergency Declaration EM-3258:</b> Assistance to evacuees from the area struck by Hurricane Katrina and to provide emergency assistance to those areas beginning on August 29, 2005 and continuing; The President's action makes Federal funding available to the State and all 10 counties of the State of New Hampshire; no people or pets were evacuated to Sugar Hill.	FEMA & 2017 HMPT
Microburst Extended Power Failure	September 30, 2010	Sugar Hill	In September 2010, a microburst downed trees and power lines affecting Grandview, Blake, South, Carpenter, Birches, Lafayette and Toad Hill Roads.	2012 HMPT & 2017 HMPT

Type of Event	Date	Location	Impact	Source
Hurricane & Tropical Storm Irene & Extended Power Failure	August 26-September 6, 2011	<b>EM 3333:</b> All Ten NH Counties <b>DR-4026:</b> Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, & Sullivan	<b>Emergency Declaration EM-3333 &amp; Presidential Disaster Declaration DR-4026:</b> Tropical Storm Irene Aug 26th- Sept 6, 2011 Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, & Sullivan Counties; Emergency Declaration for all ten counties; during Tropical Storm Irene, significant damage was done to many of Sugar Hill's roads; several overwhelmed culverts in the usual places; some of these culverts had been fixed with FEMA funding according to DES specifications which turned out to not be enough to prevent future flooding (same areas flooded again in 2017); also some minor basement flooding and parts of Sugar Hill lost power for a couple days.	FEMA & 2017 HMPT
Hurricane & Tropical Storm Sandy	October 26-November 8, 2012	<b>EM 3660:</b> All Ten NH Counties <b>DR-4095:</b> Belknap, Carroll, Coos, Grafton & Sullivan	<b>Emergency Declaration EM-3660 &amp; Presidential Disaster Declaration DR-4095:</b> The declaration covers damage to property from the storm that spawned heavy rains, high winds, high tides and flooding over the period of October 26-November 8, 2012; Sugar Hill received heavy rains, but like the rest of northern NH, there was no significant impact.	FEMA & 2017 HMPT
<b>Past Severe Winter Weather Hazards including Nor'easters, Blizzards &amp; Ice Storms:</b> Severe winter weather in NH may include heavy snow storms, blizzards, Nor'easters and ice storms, particularly at elevations over 1,000 feet above sea level. Generally speaking, NH will experience at least one of these hazards during any winter season; however, most NH communities are well prepared for such hazards. These hazards were not mapped; severe winter weather and ice storms have the potential to impact the Community on a town wide basis.				
Severe Winter Storm	Winter of 1968-69	New Hampshire including Sugar Hill	The winter of 1968-69 brought record amounts of snow to all of NH; Pinkham Notch at the base of Mount Washington recorded more than 75" of snowfall in a four day period at the end of February 1969 in addition to snow that had already fallen; all of NH experienced difficulty with snow removal because of the great depths that had fallen from December 1968 to April 1969; the Sugar Hill Road Agent remembered "sliding off the porch roof" as a result of the very high accumulations that were found throughout the State; heavy equipment was used to remove snow due to the accumulations.	2017 HMPT
High Winds, Tidal Surge, Coastal Flooding & Snow	February 6, 1978	New England including Sugar Hill	<b>Presidential Disaster Declaration DR-549:</b> Blizzard of '78; region-wide Blizzard severely affecting southern New England and leaving high accumulations throughout all of New England and New Hampshire; 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; Sugar Hill, like the rest of inland New Hampshire, received heavy snow but not the dangerous conditions that occurred in coastal areas; the snow accumulation was easily handled by the Sugar Hill Highway Department.	FEMA & 2017 HMPT

Type of Event	Date	Location	Impact	Source
Ice Storm Extended Power Failure	January 7-25, 1998	New Hampshire including Sugar Hill	<b>Presidential Disaster Declaration DR-1199:</b> The 1998 ice storm had a significant effect in Sugar Hill; parts of the community lost power for up to seven days and there was significant forest damage; no significant structure damage was reported.	FEMA & 2017 HMPT
Severe Winter Storm	March 5-7, 2001	Cheshire, Coos, Grafton, Hillsborough, Merrimack, & Strafford	<b>Emergency Declaration EM-3166:</b> Declaration covers jurisdictions with record and near-record snowfall from the late winter storm that occurred March 2001; Sugar Hill received heavy snow, but the snow accumulation was easily handled by the Sugar Hill Highway Department.	FEMA & 2017 HMPT
Severe Winter Storm	December 6-7, 2003	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack & Sullivan	<b>Emergency Declaration EM-3193:</b> The declaration covers jurisdictions with record and near-record snowfall that occurred over the period of December 6-7, 2003; Sugar Hill received heavy snow, but the snow accumulation was easily handled by the Highway Department.	FEMA & 2017 HMPT
Severe Winter Storms	January, 22-23, 2005 February 10-11, 2005 March 11-12, 2005	<b>EM-3207 (Jan):</b> Belknap, Carroll, Cheshire, Grafton, Hillsborough, Rockingham, Merrimack, Strafford & Sullivan <b>EM-3208 (Feb):</b> Carroll, Cheshire, Coos, Grafton & Sullivan <b>EM-3211 (Mar):</b> Carroll, Cheshire, Hillsborough, Rockingham & Sullivan	<b>Emergency Declaration EM-3207:</b> January storm; more than \$3.5 million had been approved to help pay for costs of the heavy snow and high winds; total aid for the January storm was <b>\$3,658,114.66</b> (Grafton: \$137,118.71); <b>Emergency Declaration EM-3208:</b> February storm; total aid for the February storm was \$1,121,727.20 (Grafton: \$213,539.52) <b>EM 3208-002:</b> The Federal Emergency Management Agency (FEMA) had obligated more than \$6.5 million to reimburse state and local governments in New Hampshire for costs incurred in three snow storms that hit the state earlier this year, according to disaster recovery officials. Total aid for all three storms was \$6,892,023.87 (January: \$3,658,114.66; February: \$1,121,727.20; March: \$2,113,182.01); Grafton County did not receive aid for the March 2005 storm.; Sugar Hill received heavy snow from these storms, but the snow accumulation was easily handled by the Highway Department.	FEMA & 2017 HMPT

Type of Event	Date	Location	Impact	Source
Severe Winter Storm & Ice Storm	December 11-23, 2008	All Ten NH Counties	<b>Presidential Disaster Declaration DR-1812 &amp; Emergency Declaration EM-3297:</b> Damaging ice storms to entire state including all 10 NH counties; fallen trees and large scale power outages; nearly \$15 million in federal aid had been obligated by May 2009; the 2008 Ice Storm caused power outages for 8-9 days in some areas of Sugar Hill; this storm caused massive damage in southern NH creating a delay in restoration to some North Country towns.	FEMA & 2017 HMPT
Severe Winter Storm Rain & Flooding	February 23 - March 3, 2010	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan	<b>Presidential Disaster Declaration: DR-1892:</b> Flood and wind damage to most of southern NH including six counties; 330,000 homes without power; more than \$2 million obligated by June 2010; Sugar Hill received heavy snow, but the snow accumulation was easily handled by the Highway Department.	FEMA & 2017 HMPT
Severe Winter Storm	October 29-30, 2011	All Ten NH Counties	<b>Emergency Declaration EM-3344:</b> Severe storm during the period of October 29-30, 2011; all ten counties in the State of New Hampshire. (aka: Snowtober); Sugar Hill received heavy snow, but the snow accumulation was easily handled by the Highway Department; it was noted that this late autumn storm made it difficult to plow gravel roads as the roads were not yet frozen.	FEMA & 2017 HMPT
Severe Winter Storm	February 8, 2013	All Ten NH Counties	<b>Emergency Declaration DR-4105:</b> Nemo; heavy snow in February 2013; Sugar Hill received snow, but the snow accumulation was easily handled by the Highway Department.	FEMA & 2017 HMPT
Winter Weather & Hazardous Materials-Transport	Winter of 2016-17	Sugar Hill	The winter of 2016-17 in northern New Hampshire was warmer than usual in some locations, bringing icy road conditions throughout communities such as Sugar Hill; the Sugar Hill Road Agent reported that it is a daunting task keeping up with ice on roads and it seemed that last winter brought icy conditions nearly every day.	2017 HMPT
<b>Past Earthquake Hazards:</b> According to the NH State Hazard Mitigation Plan, New Hampshire is considered to lie in an area of "Moderate" seismic activity when compared to other areas of the United States. New Hampshire is bordered to the north and southwest by areas of "Major" activity. Generally, earthquakes in NH cause little or no damage and have not exceeded a magnitude of 5.5 since 1940. These hazards were not mapped; earthquakes have the potential to impact the Community on a town-wide basis.				
Earthquake	12/20/40	Ossipee, NH	Magnitude 5.5	State Hazard Mitigation Plan 2013
Earthquake	12/24/40	Ossipee, NH	Magnitude 5.5	
Earthquake	12/28/47	Dover NH-Foxcroft, ME	Magnitude 4.5	
Earthquake	06/10/51	Kingston, RI	Magnitude 4.6	
Earthquake	04/26/57	Portland, ME	Magnitude 4.7 ; None felt in Columbia	

Type of Event	Date	Location	Impact	Source
Earthquake	04/10/62	Middlebury, VT	Magnitude 4.2	
Earthquake	06/15/73	Quebec Border / NH	Magnitude 4.8	
Earthquake	01/19/82	West of Laconia, NH	Magnitude 4.5	
Earthquake	06/23/10	Ontario-Quebec Border	Magnitude 5.0	
Earthquake	06/26/10	Boscawen, NH	Magnitude 3.1	
Earthquake	08/23/11	Virginia	Magnitude 5.8	
Earthquake	09/18/12	Concord, NH	Magnitude 1.2	
Earthquake	10/16/12	Waterboro, ME	Magnitude 4.0	
<b>Past Drought Hazards:</b> Droughts are generally not as damaging or disruptive as floods and other hazards and they are more difficult to define. A drought is a natural hazard that evolves over months or even years and can last as long as several years to as short as a few months. According to the NH State Hazard Mitigation Plan, New Hampshire has a low probability, severity and overall risk for drought. These hazards were not mapped; however droughts have the potential to impact the Community on a town wide basis.				
Drought	1929-1936	Statewide	Regional	NH Drought Historical Event - NH DES
Drought	1939-1944	Statewide	Severe in southeast and moderate elsewhere	
Drought	1947-1950	Statewide	Moderate	
Drought	1960-1969	Statewide	Regional longest recorded continuous spell of less than normal precipitation	
Drought	2001-2002	Statewide	Third worst drought on record	
Drought	2016	Statewide & Sugar Hill	Severe drought conditions throughout the state, moderating from south to north; although parts of NH were in severe drought conditions during the summer/fall of 2016, Sugar Hill had "dry" conditions and did not experience a significant impact with the exception of bacterial contaminated water well at a well-known inn in Sugar Hill.	2017 HMPT



Type of Event	Date	Location	Impact	Source
<b>Other Past or Potential Hazards:</b> Human-caused hazards and other unusual hazardous events have been noted throughout NH. Among others, one concern is the transport of hazardous material through communities by rail and tractor-trailer. These hazards were not mapped; other natural or human-caused hazards have the potential to impact the Community on a town wide basis.				
High Winds (windstorm) Extended Power Failure	Nov-95	Town Wide	Severe fall storm created high winds which took down trees and caused a widespread power outage; without power for nearly one week.	2005 HMPT
Erosion, Mudslide & Landslide (erosion)	10/1/2010 & Potential	South & Grandview Roads	Loose terrain combined with heavy rain creates erosion that can affect NH Route 117; erosion and subsequent slides on South and Grandview Roads have happened in past and as recent as October 2010.	2012 HMPT
Extreme Temperatures (hot & cold)	Although the Team did not identify specific examples or past occurrences of these hazards, it was felt worthwhile to list them as potential hazards to the Town; these hazards have the potential to impact the Community either locally or on a town wide basis.  <b>See Table 3.1, Hazard Threat Matrix and Chapter 5 for more details on these hazards.</b>			
Severe Thunderstorms & Lightning				
Epidemic & Pandemic				
Terrorism				

\*Historic hazard events were derived from the following sources unless noted otherwise:

- Website for NH Disasters: <http://www3.gendisasters.com/mainlist/newhampshire/Tornadoes>
- FEMA Disaster Information: <http://www.fema.gov/disasters>
- The Tornado Project: <http://www.tornadoproject.com/alltorns/nhtorn.htm>
- The Tornado History Project: <http://www.tornadohistoryproject.com/>
- The Disaster Center (NH): <http://www.disastercenter.com/newhamp/tornado.html>
- Earth Track: <http://www.Earthquaketrack.com>

For more information on state and county-wide past events, see Presidential Disaster and Emergency Declaration, Appendix D, *NH Presidential & Emergency Declarations*.

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## Chapter 4: Critical Infrastructure & Key Resources (CIKR)

With Team discussion and brainstorming, Critical Infrastructure and Key Resources (CIKR) within Sugar Hill were identified and mapped for this Plan. The "ID" number in the following lists is also represented as a CIKR in *Appendix G: Map Documents, Map 4: Critical Infrastructure and Key Resources*. Facilities located in adjacent towns were not mapped (NM). The Hazard Risk rating was based on a scale of 1-3 with 1 indicating little or no risk.

**TABLE 4.1 - EMERGENCY RESPONSE FACILITIES (ERF) & EVACUATION**

Emergency Response Facilities (ERF)				
ERFs are primary facilities and resources that may be immediately needed during an emergency response.				
Map ID	Facility	Expected use of the Facility	Hazard Risk	
1	Sugar Hill Fire Station ( <i>generator</i> )	Primary EOC & Fire Station; Secondary Shelter	All Hazards	1
2	Sugar Hill Town Office ( <i>Crapo Building; generator</i> )	Police Department	All Hazards	1
3	Sugar Hill Town Garage ( <i>generator</i> )	Emergency Fuel Facilities & Highway Equipment	All Hazards & Flooding	2
4	Sugar Hill Town Office ( <i>Crapo Building; generator</i> )	Primary Shelter; Secondary EOC	All Hazards	1
Helicopter Landing Zones				
5	Sugar Hill Little League Field	Heli Landing Zone (N 44 12.810, W 71 47.951)	All Hazards	1
6	Pearl Lake Road near Post Road ( <i>Stone House</i> )	Heli Landing Zone (N 44 12.661, W 71 49.355)	All Hazards	1
7	Pearl Lake Road ( <i>before Brick House</i> )	Heli Landing Zone (N 44 12.399, W 71 49.965)	All Hazards	1
8	Toad Hill Farm Road	Heli Landing Zone (N 44 11.092, W 71 46.913)	All Hazards	1
9	Crane Hill Road ( <i>near Iron Bridge to Streeter Pond</i> )	Heli Landing Zone (N 44 14.926 W 71. 46.754)	All Hazards	1
10	Sunset Hill Golf Course	Heli Landing Zone (N 44 12.651, W 71 47.321)	All Hazards	1
Bridges on the Evacuation Routes				
11	Crane Hill Bridge @ Gale River	Bridge on Evacuation Route	All Hazards & Flooding	3
12	NH Route 18 @ Indian Brook	Bridge on Evacuation Route	All Hazards & Flooding	3
NM	Bickford Hill Road @ Ham Branch ( <i>Franconia</i> )	Bridge on Evacuation Route ( <i>out of Town</i> )	All Hazards & Flooding	2

Emergency Response Facilities (ERF)				
NM	NH Route 117 West @ Ammonoosuc River (Lisbon)	Bridge on Evacuation Route ( <i>out of Town</i> )	All Hazards	1
NM	NH Route 117 East @ Gale River (Franconia)	Bridge on Evacuation Route ( <i>out of Town</i> )	All Hazards	1
Evacuation Routes				
	NH Route 117 East to NH Route 18	Primary Evacuation Route	All Hazards & Flooding	3
	NH Route 117 West to US Route 302	Primary Evacuation Route	All Hazards & Flooding	2
	Bickford Hill Road to NH Route 116	Primary Evacuation Route	All Hazards & Flooding	1
	Interstate 93 Northbound ( <i>accessible from other towns</i> )	Primary Evacuation Route	All Hazards	1
	Interstate 93 Southbound ( <i>accessible from other towns</i> )	Primary Evacuation Route	All Hazards	1
	Center District Road to Crane Hill Road to Streeter Pond Road	Secondary Evacuation Route	All Hazards & Flooding	3
	Streeter Pond Road to US Route 302	Secondary Evacuation Route	All Hazards & Flooding	3
	South Road to Lafayette Road to NH Route 116	Secondary Evacuation Route	All Hazards & Flooding	2
	Easton Road to Easton Road to NH Route 116	Secondary Evacuation Route	All Hazards & Flooding	2

**TABLE 4.2 – NON- EMERGENCY RESPONSE FACILITIES (NERF)**

Non-Emergency Response Facilities (NERF)				
NERFs are facilities, that although they are critical, they are not necessary for the immediate emergency response efforts; this includes facilities to protect public health and safety, utilities, and provide backup to emergency facilities.				
Map ID	Facility	Expected use of the Facility	Hazard Risk	
4	Sugar Hill Town Office ( <i>generator</i> )	Secondary EOC & Records	All Hazards	1
13	Sugar Hill Meeting House	Secondary Shelter	All Hazards	1
14	Community Church	Secondary Shelter	All Hazards	1
15	The Inn at Sunset Hill ( <i>generator</i> )	Available for Rooms, Food & Showers; Potential Shelter	All Hazards	1

**TABLE 4.3 – FACILITIES & POPULATIONS TO PROTECT (FPP)**

Facilities & People to Protect (FPP)				
FPPs are facilities that need to be protected because of their importance to the Town and to residents who may need help during a hazard event.				
Map ID	Facility	Expected use of the Facility	Hazard Risk	
16	Sugar Hill Inn	Tourist Population - Inn & Restaurant	All Hazards	1
17	Hilltop Inn	Tourist Population - Inn & Restaurant	All Hazards	1
15	Inn at Sunset Hill	Tourist Population - Inn & Restaurant	All Hazards	1
18	Polly's Pancake House	Tourist Population - Restaurant	All Hazards	1
13	Sugar Hill Meeting House	Historic Facility	All Hazards	1
19	Gale River Preschool (392 Streeter Pond Road)	Child Care	All Hazards & Flooding	3
NM	Oxygen-dependent people	Functional Needs Population	Not applicable	
NM	People on a lifeline	Functional Needs Population	Not applicable	
NM	People assisted by Home Health	Functional Needs Population	Not applicable	
NM	Shut-ins and disabled	Functional Needs Population	Not applicable	
NM	Mentally Challenged	Functional Needs Population	Not applicable	
NM	Elderly	Functional Needs Population	Not applicable	
NM	Hearing Impaired	Functional Needs Population	Not applicable	
NM	Sight Impaired	Functional Needs Population	Not applicable	

**TABLE 4.4 – POTENTIAL RESOURCES (PR)**

Potential Resources (PRs)				
PRs are potential resources that could be helpful for emergency response in the case of a hazard event.				
Map ID	Facility	Expected use of the Facility	Hazard Risk	
1	Sugar Hill Fire Department (823-8415)	Fire Department (ERF)	All Hazards	1
3	Sugar Hill Highway Department (823-8788)	Fuel, Sand, Gravel & Heavy Equipment	All Hazards & Flooding	2
NM	NH DOT Garage (Franconia; 823-5338)	Fuel, Sand, Gravel & Heavy Equipment	All Hazards	1
NM	Presby Construction (Sugar Hill; 823-5298)	Construction; Sand, Gravel & Heavy Equipment	All Hazards	1
NM	Pinkham Construction (Sugar Hill; 823-8506)	Construction; Sand, Gravel & Heavy Equipment	All Hazards	1
For additional resources, please refer to the Town's Emergency Operations Plan (EOP)				

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## Chapter 5: Hazard Effects in Sugar Hill

### A. Identifying Vulnerable Critical Infrastructure & Key Resources (CIKR)

Because damages from floods and wildfires are more predictable than damages from other disasters, it is important to identify the Critical Facilities and Key Resources (CIKR) and that are most likely to be damaged by these events. Using GIS analysis and aerial imagery, at-risk CIKR were identified throughout the Town.

All CIKR in Sugar Hill were identified in GIS; this list was then narrowed by those CIKR that were located in the FEMA floodplain. A total of three CIKR were found in the flood zone as seen in the chart to the right and in *Map #3, Past & Potential Areas of Concern*. One CIKR

**Critical Infrastructure & Key Resources in the Floodplain**

9	ERFH	Crane Hill Road	Heli Landing Site
19	FPP	Preschool on Streeter Pond Rd	Childcare
11	ERFB	Crane Hill Bridge @ Gale River	Evac Bridge

is a helicopter landing zone (there are several in town) and another is an evacuation bridge. The third CIKR that is located in the floodplain is the Preschool on Streeter Pond Road. No other CIKR were found to be in the designated FEMA floodplain although it is expected that many non-CIKR structures are within the FEMA floodplain. Town officials should keep these CIKR and susceptible residences in mind when a flood hazard is likely. Fortunately, Sugar Hill's emergency services and town government buildings are not in the FEMA floodplain.

Using the same methodology that was used for flooding, structures falling within the Wildland Urban Interface (WUI) were reviewed. Identifying these structures, if any, assists the Team in creating wildfire mitigation action items and prioritizing those action items; it is important to determine which Critical Infrastructure and Key Resources are most vulnerable to wildfires.

Many structures were evident in the traditional WUI, however, no CIKR were found in the WUI. All of Sugar Hill's CIKR are located within the 300-foot buffer from the center line of all Class I-V roads, thus allowing for accessibility by fire apparatus and hoses. The Wildland Urban Interface as well as the defined CIKR are shown in *Map #2, Historic Wildfires & the Wildland Urban Interface*.



July 2017 Storm Damage in Sugar Hill  
Photo Credit: Town of Sugar Hill

Although no CIKR were found in the defined WUI, it should once again be noted, as stated elsewhere in this Plan, that the entire town of Sugar Hill, including many structures, is thought to be in the WUI because it is so heavily forested; therefore, all structures in Town can be assumed to be in the WUI.

**Table 3.1, The Hazard Threat Analysis, is used to evaluate the probability and the potential impact of all hazards.**

## B. Calculating the Potential Loss

It is difficult to ascertain the amount of damage that could be caused by a natural or human-caused hazard because the damage will depend on the hazard's extent and severity, making each hazard event somewhat unique. Therefore, we have used the assumption that hazards that impact structures could result in damage to either 0-1% or 1-5% of Sugar Hill's structures, depending on the nature of the hazard and whether or not the hazard is localized.

Based on this assumption, the potential loss from any of the identified hazards would range from **\$0 to \$923,457** or **\$923,457 to \$4,617,285** based on the 2015 Sugar Hill town valuations which lists the assessed value of all structures in Sugar Hill to be **\$92,345,700** (see chart to right).

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.

MS-1 Assessed Value of All Structures			
2016	Value	1% Damage	5% Damage
Residential	\$83,294,690	\$832,947	\$4,164,735
Manufactured Housing	\$159,700	\$1,597	\$7,985
Commercial	\$3,828,400	\$38,284	\$191,420
Other Utilities	\$21,310	\$213	\$1,066
Tax Exempt	\$1,473,900	\$14,739	\$73,695
Utilities	\$3,567,700	\$35,677	\$178,385
Total	\$92,345,700	\$923,457	\$4,617,285
Provided by the Town, 4/27/17			

## C. Natural Hazards

Descriptions below represent the **"local impact"** to the Community for the hazards that were identified by the Team. For the **"extent"** of these hazards, please refer to *Appendix C, The Extent of Hazards*, which includes charts such as the Saffir-Simpson Hurricane Wind Scale, the Beaufort Wind Scale, the National Weather Service Heat Index, the Sperry-Piltz Ice Accumulation Index and the Enhanced Fujita Scale for tornadoes. The numbers preceding the hazard name in this section, correspond to the numbers in *Table 3.1, Hazard Threat Analysis*.

### 1) Flooding (heavy rain, road flooding, culverts, etc.) ..... \$0 to \$923,457

Heavy rain, rapid snowmelt and stream flooding often cause culverts to be overwhelmed and roads to wash out. Today, with changes in land use, aging roads, designs that are no longer effective and undersized culverts, the risk of flooding is a serious concern.

Inadequate and aging storm water drainage systems create local flooding of approximately 75% of Sugar Hill's roads. Culverts and drainage ditches are often overwhelmed resulting in frequent road closures, debris covered roads and general road erosion town wide. It is estimated that the Town experiences some sort of storm water problem whenever there is one or more inches of rain in a short period of time. Sugar Hill's approximate 27 miles of roads (4.0 miles of which are gravel)<sup>14</sup> are well-maintained by the Highway Department, although unusual and sudden heavy rain events in October 2010, April 2011 and most recently in July 2017 created flooding along many roads in Sugar Hill. Roads were flooded and/or washed out and several homes experienced flooded driveways and basements.



<sup>14</sup> Sugar Hill Road Agent

In April 2011, several roads including Sunset Hill Road, Grandview Road, Presby Road, Hadley Road, Creamery Pond Road, Jericho Road and Trumpet Round Road were closed due to heavy rains; three remained closed overnight. The estimated damage for the April 2011 storm was estimated in the \$25,000-\$50,000 range. Also, heavy rains in October 2010 resulted in water issues on virtually every road in town.

The chart to the right shows the “usual” areas that flood during periods of heavy rain, ice jams, and rapid snow melt. The locations in the chart represent areas that have seen significant damage in October 2010, April 2011 and most recently July 2017.

On July 1, 2017, another heavy rain storm wreaked havoc on Sugar Hill’s Roads causing approximately \$500,000 worth of damage. Virtually all of Grafton County experienced damage from this storm; a Presidential Disaster Declaration for the County is expected. Map items ID #20-26 in the chart represent additional roads that were damaged in the July 2017 storm that had not been damaged in earlier storms. All hazard locations in this chart can be seen in *Map #3, Potential Areas of Concern*.

MAPS_Past_Hazards	
Id	Location
1	Streeter PndRd @ Gale R.
2	Streeter Pond Drive
3	Streeter PndRd @ Ind. Bk
4	South Rd
5	Crane Hill Rd @ Gale R.
6	Rte 117 @ Bowen Brook
7	Creamery Rd
8	Dyke Rd
9	Blake Rd
10	Lafayette Rd
11	Carpenter Rd
12	Cntr Dist Rd/Grnd View Rd
13	Bickford Hill Rd
14	Hadley Rd/Salmon Hole Bk
15	Easton Rd/Salmon Hole Brk
16	Toad Hill Rd
17	Presby Rd
18	Sunset Hill Rd
19	Grand View Rd
20	Pearl Lake to Creamery
21	Birches Road
22	Jericho Road
23	Lovers Lane
24	Post Road
25	Valley Vista Road
26	Kathy Rae Drive

The Sugar Hill Emergency Management Director provided this Planner with the list of town roads that received damage as a result of the July 2017 storm, as of July 1, 2017. This list below does not include NH Route 18 and NH Route 117.

- |                             |                          |                             |
|-----------------------------|--------------------------|-----------------------------|
| • <i>Bickford Hill Road</i> | • <i>Easton Road</i>     | • <i>Pearl Lake Road</i>    |
| • <i>Birches Road</i>       | • <i>Grandview Road</i>  | • <i>Post Road</i>          |
| • <i>Blake Road</i>         | • <i>Hadley Road</i>     | • <i>Presby Road</i>        |
| • <i>Carpenter Road</i>     | • <i>Jericho Road</i>    | • <i>South Road</i>         |
| • <i>Crane Hill Road</i>    | • <i>Kathy Rae Drive</i> | • <i>Streeter Pond Road</i> |
| • <i>Creamery Pond Road</i> | • <i>Lafayette Road</i>  | • <i>Sunset Hill Road</i>   |
| • <i>Dyke Road</i>          | • <i>Lovers Lane</i>     | • <i>Toad Hill Road</i>     |
|                             |                          | • <i>Valley Vista Road</i>  |

The expected loss value from local road flooding would be based primarily on the economic impact on Community, the loss of accessibility and the time and cost of road repair. Therefore, the estimated loss value due to road flooding was determined to be between 0% and 1% of the total structure.

**2) Flooding (riverine & ice jams) ..... \$0 to \$923,457**

Flooding is often associated with hurricanes, heavy rains, ice jams and rapid snowmelt in the spring. Based on the Grafton County Floodplain Map, Sugar Hill has a small 100-year floodplain primarily in the vicinity of the Gale River, Indian Brook, Bowen Brook and Salmon Hole Brook. Gale River is of most concern, however the Team noted that in reality, only six homes are affected by flooding of the Gale River. Due to Sugar Hill’s location in the mountains, flash flooding from the higher peaks frequently creates problems. It is not unusual for rainfall amounts to be considerably higher on the tops of New Hampshire’s mountain peaks than in the valleys.

An additional and perhaps larger concern is that when the Gale River floods Streeter Pond Road, part of the Town is effectively cut off from the rest of the Town. In this case, fire and other emergency responders would have to come to the cut off part of Town from Lisbon, approximately 11 miles away.

Flooding along the Gale River is generally caused by ice jams and/or heavy rains and snowmelt. Damage to Crane Hill Bridge and closures of Streeter Pond Road, both of which are designated evacuation routes, often occur. To further increase the potential for flooding, several portions of the Gale River take a sharp turn which causes silt to buildup and adds to the likelihood of ice jams.



*Gale River and Crane Hill Bridge (lower right corner)  
Photo Credit: GIS snip*

The silt build up in the Gale River is a serious concern for the Town. A sand bar has developed in the river bed which further exasperates the problem and causes ice to back up the Gale River spilling not only water but large chunks of ice across both Streeter Pond Road and NH Route 18. To make matters worse, Crane Hill Bridge is experiencing scouring as a result of ice flow and heavy storm water flow. The bridge is not yet undermined, but the Town has had to lower the weight limit on the bridge, thus some trucks, including fire trucks, cannot cross.

Part of the solution for flooding of the Gale River is to dredge the river to eliminate the existing sand bar(s). In addition, the replacement and raising of the Crane Hill Road Bridge at an estimated cost of \$250,000, would further mitigate the problem.

Riverine flooding and possible ice jams are potential problems if the right set of circumstances were to occur. However, based on the localized nature of this type of flooding, the potential loss value was determined to be 0-1% of the total assessed structure value in Town.

### 3) High Winds (windstorm) ..... \$0 to \$923,457

Due to the location of Sugar Hill, the Town's proximity to some of New Hampshire's highest peaks and the effect of wind in the river valleys, isolated high winds and down drafts often occur. These wind events are unpredictable; winds of this magnitude could fall timber, which in turn could block roadways, down power lines and impair emergency response. The Team reported common occurrences of high and damaging winds. Sugar Hill is designated as a "Special Wind Region" according to the American Society for Civil Engineers (ASCE)<sup>15</sup>; building requirements based on this wind region are outlined as part of the building process.

Winds in Sugar Hill can gust to 120 mph because of the mountainous topography. Damage to roof shingles, fallen trees and downed power lines have all resulted from isolated high wind storms. The effect of isolated high winds would most likely be localized in nature; therefore, the potential loss value due to hazards of this type was determined to be between 0% and 1% of the total assessed structure value.

<sup>15</sup><http://windspeed.atcouncil.org/>

**4) Erosion, Mudslide & Landslide ..... \$0 to \$923,457**

Erosion, landslides and mudslides are often associated with heavy rains, steep terrain and the overflow of river banks. Erosion and the subsequent loss of land along the river banks, eroded ditches, road washouts, overburdened culverts and changes in the course of rivers and have been some of the erosion issues in Sugar Hill. *(See Flooding (heavy rain, road flooding, culverts, etc. earlier in this chapter)*

Steep terrains combined with heavy rain and loose or saturated groundcover creates the conditions for erosion which can lead to minor landslides. South Road, Grand View Road, Crane Hill Road and Carpenter Road have been impacted by erosion and landslide events in the past. Areas along Route 117 were impacted by erosion and landslides in October 2010. In addition, first responder accessibility becomes severely hampered when banks along the sides of roads fall onto roadways.

The cost of these types of events is difficult to calculate as any cost would primarily result from road damage and closures rather than structure damage. In addition, damage would most likely be localized; therefore, the potential loss value due to erosion, mudslide and landslide was estimated to be 0% to 1% of the total assessed structure value.

**5) Tornado & Microburst ..... \$0 to \$923,457**

A tornado generally covers a large area, perhaps even several miles. It has winds that blow in a circular fashion leaving behind downed trees that lie in a swirling pattern. Straight-line winds and winds that burst downward are indicative of a microburst; the fallen trees that are left behind lay in roughly the same direction. A microburst must be 2.5 miles in width or less, whereas a macroburst is a similar wind event that is greater than 2.5 miles wide and generally lasts longer than a microburst.

A tornado touched down in Carroll County in July 2008, but it did not reach Sugar Hill. Additionally, in recent years a tornado was spotted in Berlin, but there has been no reported tornado activity in Sugar Hill in the past ten years. More common in Sugar Hill would be a microburst event; these are becoming more and more common in the North Country and could result in damage. A microburst occurred in Sugar Hill in areas along Grandview, Blake, South, Carpenter, Birches, Lafayette and Toad Hill Roads in September 2010.

Like high winds, the affects would be primarily power outages and blow downs; however, if a tornado, microburst or macroburst were severe enough, property damage could also occur. Due to the rareness of these events in New Hampshire and Sugar Hill's geography, the likelihood of an event of this type is low and the affects would be localized. Therefore, the potential loss value was determined to be between 0% and 1%.

**6) Severe Winter Weather & Ice Storms ..... \$923,457 to \$4,617,285**

Heavy snowstorms typically occur from December through April. New England usually experiences at least one or two heavy snow storms with varying degrees of severity each year. Power outages, extreme cold and impacts to infrastructure are all effects of winter storms that have been felt in Sugar Hill in the past. The ability to get in and out of town and emergency service access can be hindered



All of these impacts are a risk to the Community, including isolation, particularly of the elderly and increased traffic accidents. Damage caused by severe winter snowstorms varies according to wind velocity, snow accumulation, duration and moisture content. Seasonal accumulation can also be as significant as an individual snowstorm. Heavy overall winter accumulations can impact the roof-load of some buildings. Storms with accumulation of three or more feet have occurred; blizzards of this type could diminish food supplies within two days.

Of more concern in Sugar Hill than 2-4' snow storms are ice storms, though the probability of the occurrence of a major ice storm is lower than that of a major snowstorm. A significant ice storm can inflict several million dollars' worth of damage to forests and structures.

The 1998 Ice Storm had a significant impact in Sugar Hill as it did in many other northern New Hampshire communities. This ice storm downed trees, closed roads and caused power and phone outages for seven days in some parts of Sugar Hill, but there was no significant structure damage.

The 2008 Ice Storm was also destructive in Sugar Hill, although most of the very significant damage from this storm took place in southern New Hampshire. Like 1998, downed trees, closed roads and power outages for up to nine days were experienced in 2008. The prolonged time without power was partly due to the extreme damage that the southern part of the state experienced; overwhelmed utility crews did their best to reach Sugar Hill in a timely fashion. The elevation at the Town Offices is 1,325' above sea level and the highest point is on the summit of Bronson Hill at 2,078' above sea level.<sup>16</sup> Damage from ice storms tend to be more significant at elevations above 1,000', however, it was noted that during the 2008 ice storm, colder weather fell into the valleys and created more damage at lower elevations.

Winter snow and ice storms often cause trees to fall, creating widespread power outages by downing power lines. They can also cause widespread damage to forested areas. Future ice storms in Sugar Hill could be expected to cause damage ranging from a few thousand dollars to several million, depending on the severity of the storm. Due to the widespread nature of severe winter storms, particularly ice storms, the potential loss value is estimated to be between 1% and 5% of the total assessed value of all structures in town.

## 7) Extreme Temperatures (hot & cold)..... Structure loss value was not estimated

For those who are familiar with Northern New England weather, it is obvious that temperature extremes are very common. Winter temperatures can fall below -30°F and summer temperatures, laden with high humidity can soar to nearly 100°F; it is not unusual for the temperature to be below zero for as many as 30 days in a single winter season. In the past, there was more concern about extreme cold temperatures, but with improved heating systems and local communications, most New Hampshire residents are able to cope with extreme cold.

Also of concern today are extreme heat conditions. Few residents, particularly the elderly and vulnerable populations, have air conditioners and are less able to cope with extreme heat. In Sugar Hill the population over 65 years of age is estimated to be 20.1% of the total population according to the American Community Survey, 2011-2015. It was felt by the Team that over the past 15 years, humidity levels during extended heat waves have increased as have the number of 90 degrees days, making it more dangerous for vulnerable populations. Town

<sup>16</sup> Wikipedia; [https://en.wikipedia.org/wiki/Sugar\\_Hill,\\_New\\_Hampshire](https://en.wikipedia.org/wiki/Sugar_Hill,_New_Hampshire)



officials remain proactive during times of extreme temperatures by opening the Carolina Crapo Building as a cooling or warming center and going house to house in extreme conditions, particular during power failures (Fire Department).

Extreme temperatures when combined with power failure are of the most concern; power failure would result in no water, heat and air conditioning for the Town's vulnerable population. Both town officials and the Community as a whole should be concerned and should look after its citizens to ensure that extreme temperatures do not create a life or property threatening disaster.

The cost of extreme temperatures is difficult to calculate as it is not based on the loss of structures. The expected loss value would be primarily on the economic impact on the Community and the time and cost of emergency response; based on the assumption that damage would not occur to structures, the structure loss value due to extreme temperatures was not estimated.

**8) Severe Thunderstorms & Lightning ..... \$0 to \$923,457**

Severe lightning as a result of summer and mountain storms or as a residual effect from hurricanes and tornadoes has occurred in Sugar Hill. Many of the Town's structures are older buildings and most structures are surrounded by forest. Dry timber on the forest floor and the age of many buildings and out-buildings combined with lightning strikes can pose a significant disaster threat. Lightning could do damage to specific structures or injure or kill an individual, but the direct damage would not be widespread.

Although lightning is a potential problem, the Town reported few occurrences, none of which were severe. Weather patterns bring storm systems from the west, often arriving very quickly and thus surprising outdoor recreationists who had not planned for severe weather. The threat of exposure creates a challenge for first responders. In addition, with elevation, lightning appears to be more frequent. There is one golf course in Sugar Hill, but there have been no reported lightning strikes on individuals playing the course.

Lightning is a potential problem, although the affects would likely be localized. Based on the localized nature of lightning strikes, the potential loss value was determined to be 0-1% of the total assessed structure value in Town.

**9) Hailstorms ..... \$0 to \$923,457**

Hailstorm events, although not common in Sugar Hill, can occur at any time. In recent years, other communities in northern New Hampshire have experienced hailstones as part of severe thunder and lightning storms; fortunately, Sugar Hill has not experienced any significant hailstorm damage. On Memorial Day Weekend in 2011, the nearby town of Lancaster experienced significant car and roof damage from an isolated hailstorm; Sugar Hill reported minor hail during this event.

Damage from hail could result in failed crops and structure and vehicular damage, thus creating an economic impact for individual citizens. Overall it was felt that a significant hailstorm event would be unlikely and would cause minimal damage; therefore the potential loss value is estimated at 0% and 1% of the assessed value.

## 10) Wildfire (5+ acres).....

Due to the abundance of slash on the forest floor left by logging operations, blow downs and storms, there is potential for fast burning fuels. In addition, the recreational use of woods-trails by snowmobilers, ATV operators, campers and other outdoor enthusiasts creates an opportunity for sparks and out-of-control fires to ignite Sugar Hill's forested areas. To help combat fire, Sugar Hill has installed dry hydrants in critical locations and has added a mitigation action item in this Plan to add several more. Without Town water, the fire department has to rely on dry hydrants, drafting sites, fire ponds and other water sources to combat wildfire.

The Fire Department reported that over the last five years, there have been no wildfires of significance (5+ acres). The 2016 Annual Report (see below) shows only two brush/grass fires in 2016 and even fewer in the years prior.

The Team described the forests of Sugar Hill as consisting of primarily a combination of softwoods and northern hardwoods. With a low probability of drought and high humidity, it was felt that most fires are "duff" fires, the burning of *"the layer of decomposing organic materials lying below the litter layer of freshly fallen twigs, needles, and leaves and immediately above the mineral soil"*.<sup>17</sup> Burn permits are required in Sugar Hill, as they are throughout the State, but often burning takes place without the proper permits. The steep terrain and heavily forested areas of town are difficult to monitor, therefore the occasional unauthorized burn will take place.

In the mid-2000s, the Wildland Urban Interface (WUI) was determined in collaboration with the NH Division of Forests & Lands and the US Forest Service; the WUI represents the area in which the forest and human habitation intersect. It was defined to be a 1/4 mile buffer located 300 feet off the centerline of Class I-V roads. All structures within the WUI are generally assumed to be at some level of risk and therefore, vulnerable to wildfire. It should be noted that in communities that are heavily forested, like Sugar Hill, many Rangers feel that the entire community is in the WUI and therefore the extent of a wildfire could potentially be the entire community.

Large wildfires in New Hampshire are uncommon; however, given the right set of conditions (drought, lightning, human interface) and the necessary fuels (duff, slash, downed timber) the potential for large wildfires is good. Because the Town of Sugar Hill is so heavily forested, the potential loss value was determined to be between 1% and 5% of the total assessed structure value.

The Fire Department responded to the following:

<u>TYPE</u>	<u>2016</u>	<u>2015</u>	<u>2014</u>	<u>2013</u>
Brush/Grass Fires	2	1	0	1
Chimney Fires	0	1	0	1
Alarm Activations	12	19	13	15
Furnace Problems	0	2	0	0
Hazardous Conditions	10	5	1	12
Hazardous Materials	0	0	0	0
Motor Vehicle Accidents	7	10	12	1
Mutual Aid – Cover	1	3	2	7
Mutual Aid – Scene	11	9	9	3
Rescues/Medical	3	2	5	0
Service Calls	7	1	6	7
Smoke Investigations	2	1	1	1
Structure Fires	1	0	3	1
Vehicle Fires	1	1	0	0
<b>TOTAL</b>	<b>57</b>	<b>55</b>	<b>52</b>	<b>49</b>

<sup>17</sup> <http://www.fs.fed.us/nwacfire/home/terminology.html>

**11) Hurricanes & Tropical Storms ..... \$923,457 to \$4,617,285**

Wind damage due to hurricanes is a consideration because of the forest and valley floors in Sugar Hill. Like the 1938 hurricane and hurricane Carol in 1954, major forest damage could occur. Although hurricanes could fit into several different categories (wind and flooding), the Team considered hurricanes to be separate events. Hurricanes are rare in New Hampshire, but they should not be ruled out as potential hazards. In most cases, hurricanes have been down-graded to tropical storms by the time they reach northern New Hampshire.

Tropical Storm Irene, the remnants of Hurricane Irene, brought heavy rain to Sugar Hill and several partial road washouts. Ditch and culvert issues caused flooding in the usual places in Sugar Hill, but fortunately the damage was not as significant as in other parts of New Hampshire and Vermont. It was noted that some residents in Sugar Hill lost power for a couple of days and there was some minor basement flooding. Although some underperforming culverts were replaced with FEMA funding, the replacement culverts once again failed in July 2017. Tropical Storm Sandy had no impact in Sugar Hill, with the exception of heavy rain.

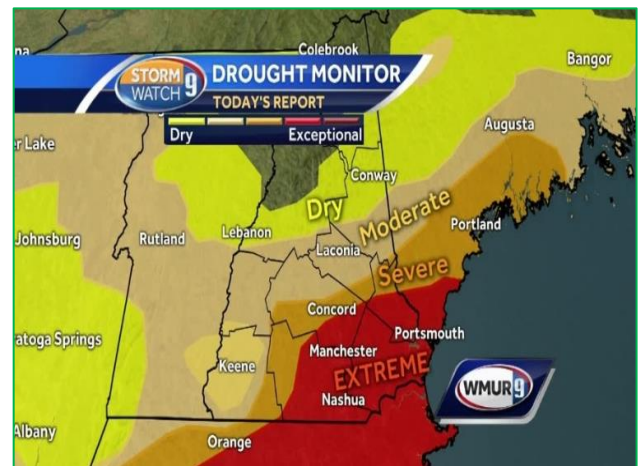
The probability that a hurricane would remain a Category 1 or better in this part of the State is low. However, the potential does remain that a Category 1 or higher hurricane could reach New Hampshire and could cause devastation to a wide area in Sugar Hill. Therefore, the potential loss value due to hurricanes was determined to be between 1% and 5% of the total assessed structure value.

**12) Drought ..... \$0 to \$923,457**

The cost of drought in Sugar Hill is difficult to calculate as any cost would primarily result from an associated fire risk and diminished water supply which, in Sugar Hill, is supplied both by the Town and by private wells. An extended period without precipitation could elevate the risk for wildfire and blow-downs in the forest and with an extreme drought, the water supply and aquifer levels could be threatened.

Fortunately, significant droughts rarely occur in New Hampshire or Sugar Hill. The 2016 brought extreme and severe drought conditions to southern New Hampshire, but Sugar Hill remained in the “dry” category (see map to the right). Extreme droughts in northern New Hampshire are particularly rare and have no significant effect on structures, unless wildfire events occur.

According to the NH Department of Environmental Services, five significant droughts have occurred since 1929<sup>18</sup>, not including the 2016 drought. An extended period without precipitation could elevate the risk for wildfire and blow-downs in the forest and with an extreme drought, the water supply and aquifer levels could be threatened.



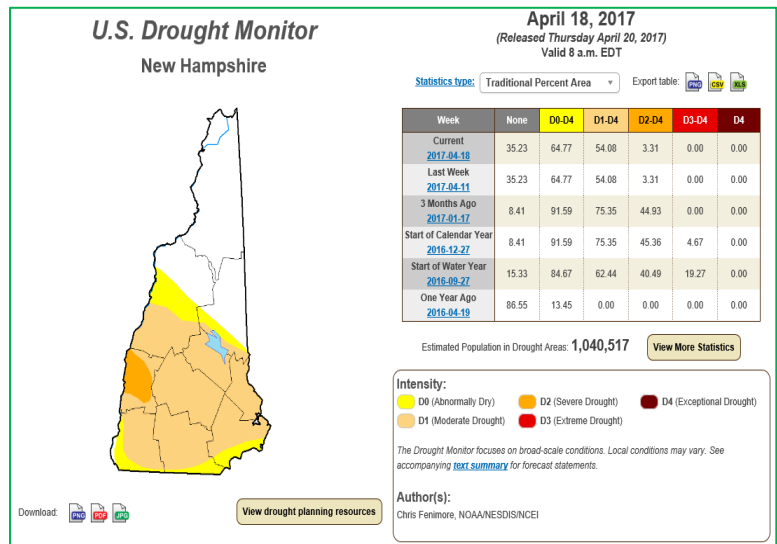
WMUR Archives; September 15, 2016

<sup>18</sup> NH DES; <http://des.nh.gov/organization/divisions/water/dam/drought/documents/historical.pdf>

The residents of Sugar Hill were by and large not impacted by the 2016 drought. One lodging facility experienced higher than normal bacteria levels as a result of the drought but no dry wells or other water issues were reported.

The 2016 drought has abated, although recovery is still taking place in some areas of the State. Recent drought monitoring depicts drought conditions in New Hampshire and shows no drought to be currently present in Sugar Hill (see chart to right).<sup>19</sup>

If it were to occur, a significant drought in Sugar Hill would impact the forested lands of the Town and could potentially cause wells to dry up, a considerable concern as all residents in Sugar Hill rely on well water. The estimated loss value above, based on a 0-1% risk reflects the potential for not only lost woodlands and the potential for wildfire but also the economic impact to the Community.



## D. Human-caused Hazards

The following human-caused hazards were also considered while developing this hazard mitigation plan. Though these hazards are not analyzed in more detail as part of this Plan, they are none-the-less worth mentioning as real and possible hazards that could occur in Sugar Hill.

### 1) Extended Power Failure (5+ days)

Extended power failure is a concern, particularly when combined with any of the natural hazards detailed in this Plan. Extended power outages have occurred in Sugar Hill, both as a result of local line damage from high winds and storms and problems with the power grid. If a major and/or extended power outage occurs and lasts for more than a week, a significant hardship on individual residents could result, particularly those citizens who are elderly, handicapped or poor.

Approximately one-half of the Town is supplied by Eversource while others receive power from the NH Electric Coop. Depending on the scope of the hazard, work crews from utility companies do their best to restore power, but often it is the more highly populated areas of the state that receive the quickest response, leaving Sugar Hill waiting for power restoration.

The Team felt that many residents are somewhat self-sufficient; many residences are equipped with generators and many others have woodstoves. The biggest impact from an extended power failure would be the inconvenience caused by the inability to pump water as all residents rely on wells. It is also noted that Sugar Hill is a somewhat difficult place for senior citizens to live; not only is the driving difficult due to weather conditions and steep terrain, but most services including pharmacies and grocers are located out of town.

<sup>19</sup> US Drought Monitor-New Hampshire, April 18, 2017; <https://www.drought.gov/drought/new-hampshire>

Sugar Hill is a remarkably prepared community. After the devastation caused by the 2008 Ice Storm in southern New Hampshire and based on the implementation of strategies from the 2005 and 2012 Hazard Mitigation Plans, Fire Chief Allan Clark wrote to the property owners of Sugar Hill as follows:

*“...the largest natural disaster threat that we face in Sugar Hill is the loss of power for an extended period of time. This threat has been identified and a plan to mitigate that hazard has been in place since 2005 and is now fully implemented.*

*The plan consisted of the following:*

- ❖ *Identifying the location of all NH Cooperative and Eversource Power Lines*
- ❖ *Installing a generator at the Fire Station*
- ❖ *Installing a generator at the Highway Garage*
- ❖ *Installing a generator at the Crapo Town Office Building*
- ❖ *Training the Fire Department on dealing with power lines*
- ❖ *Acquiring traffic cones, barricades & signage*
- ❖ *Joint training with the Fire, Highway and Police Departments.*<sup>20</sup>

In summary, generators are located in all of the Town buildings including the Crapo Building (designated primary shelter) the Highway Garage (designated staging area) and the Fire Station (primary EOC). The Town also maintains a functional needs list to track those that are more susceptible to hazards such as individuals on oxygen and the physically handicapped.

As a small close-knit community, town officials are generally aware of those residents who may need assistance during power outages and will assist them accordingly. Nonetheless, an extended power failure causing frozen pipes and a lack of heat and water is potentially a serious hazard for the community. Due to the localized and individual nature of the effects of an extended power failure, the potential loss value is estimated to be between 0% and 1% of the total assessed value of all structures in town.

## 2) Hazardous Material - Transport

The possibility of vehicular accidents involving hazardous materials is identified as a “good” in Sugar Hill. The Town has several well-travelled roadways including a portion of Interstate 93, NH Route 117 and NH Route 18. Large and small vehicles make deliveries to the Town’s citizens often travelling at fast speeds; the contents of some these vehicles are unknown while other vehicles, such as trucks hauling fuel and propane are common.



Hazardous material transport is a particular concern because of the Town’s steep, winding and narrow roads and the possibility that drivers are unaware of the terrain. The village center is located at the top of a very steep stretch of Route 117 which travels east into Franconia and west into Lisbon. Although an accident within the village would be rare, the roads to and from the village are potentially very dangerous, particularly in winter conditions. Trucks

<sup>20</sup> December 31, 2008 letter to Sugar Hill Property Owners, regarding Power Outages & Emergencies; Chief Allan Clark

often take Route 117 as a “short cut” to I-93 and to avoid traffic in nearby Littleton. Because of the bucolic and scenic nature of this beautiful town, tour busses also often travel through the village, thus increasing the possibility for accidents and perhaps mass casualty events.

### 3) Epidemic/Pandemic

Sugar Hill's unique geography provides hikers and summer and winter recreation enthusiasts many opportunities to visit the Town; this small community's population can increase by 300% on summer and winter weekends. In addition, Sugar Hill's children attend school in the neighboring towns of Franconia and Bethlehem, thus enabling infection and viruses to be transmitted from elsewhere.

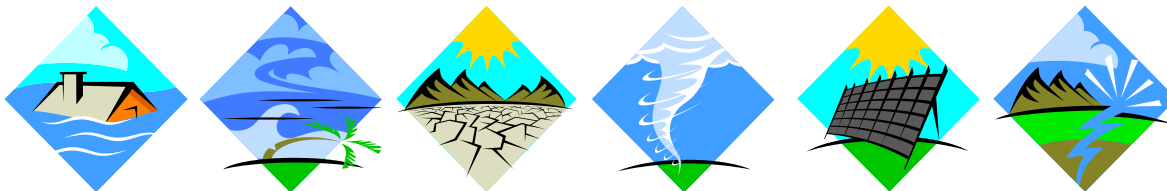


Because of these factors, the Team decided that an epidemic or pandemic could present a possible threat to Sugar Hill. With the occurrence of world-wide pandemics such as SARS, H1N1, the Zika Virus and Avian Flu, Sugar Hill could be susceptible to an epidemic and subsequent quarantine.

### 4) Terrorism

Terrorism is a fear throughout our country and the world, but Sugar Hill is an unlikely target. With no large businesses in Town, there are few likely “targets” for a terrorist attack. Possible targets, although unlikely, could be Interstate 93 and the power lines that travel through Town. Nonetheless, terrorism is identified as a remote, although possible hazard for Sugar Hill.

Terrorism is identified as a relatively low risk, however if it were to occur, the affects, although probably localized, could significantly impact the community. As with many small towns, the terrorism threat is minimal; if a terrorist incident were to occur, it would most likely be a home-grown terrorist event.





## Chapter 6: Current Policies, Plans & Mutual Aid

After researching historic hazards, identifying CIKR and determining potential hazards, the Team determined what is already being done in Town to protect its citizens and structures.

Once identified, the Team addressed each current policy or plan to determine its effectiveness and to determine whether or not improvements were needed. This analysis became one of the tools the Team used to identify mitigation action items for this Plan.



With the knowledge of what regulations Sugar Hill currently had in place, creating new action items was less difficult. This process was helpful in identifying current plans and policies that were working well and those that should be addressed as a new “action item” as well as the responsible departments. The table that follows, *Table 6.1, Policies, Plans & Mutual Aid*, shows the analysis that resulted from discussion with the Team.

Existing policies, plans and mutual aid that were designated as “Improvements Needed” were added to **Table 9.1, Mitigation Action Items** as new strategies and were reprioritized to meet the current needs of the Town.

**TABLE 6.1: CURRENT POLICIES, PLANS & MUTUAL AID**

**KEY TO EFFECTIVENESS:**

- Excellent** ..... The existing program works as intended and is exceeding its goals.  
**Good** ..... The existing program works as intended and meets its goals.  
**Average** ..... The existing program does not work as intended and/or does not meet its goals.  
**Poor** ..... The existing program does not work as intended, often falls short of its goals, and/or may present unintended consequences.

Current Program or Activity	Description	Area of Town	Responsible Department	Effectiveness	Improvements Needed or Not Needed
CodeRED & ENS	CodeRED through Graton County reverse calling; door-to-door notification; supplementing the EOP are PA systems in all Fire & Police vehicles; the NH Alert phone app also available.	Town Wide	Emergency Management Director	Excellent	<b>Improvements Needed:</b> CodeRED and NH ENS are excellent warning systems but they only store resident phone numbers that are listed in the phone book; the Town has continuously provided information to residents on CodeRED & ENS but it should continue to provide public outreach to encourage all residents to contact CodeRED & ENS to add cell numbers, email, unlisted numbers and to verify information; use the website, a possible brochure or a sign up at Town Meeting. <b>Action Item #5 (also in Table 7.1)</b>



Current Program or Activity	Description	Area of Town	Responsible Department	Effectiveness	Improvements Needed or Not Needed
Emergency Operations Plan (2010)	This plan offers all members of the emergency management team a better understanding of procedures in case of a disasters; recently held table talk to determine effectiveness	Town Wide	Emergency Management Director	Good	<b>Improvements Needed:</b> The Sugar Hill Emergency Operations Plan was updated in 2010 and is need of a recommended 5-year update; deferred to this Plan for that update in 2017-18. <b>Action Item #13</b>
NIMS & ICS Training	Ensure effective command, control, and communications during emergencies	Town Wide	Emergency Management Director	Good	<b>Improvements Needed:</b> NIMS & ICS training has been done by most first responders; although this is preparedness, this is deferred to this plan to continue to provide NIMS (IS-700) & ICS (ICS 100 & ICS 200) training to new first responders and to new Town officials as they become elected and/or appointed. <b>Action Item #1</b>
Land Subdivision Regulations (2008)	The Town has adopted subdivision regulations to provide for the orderly present and future development of the Town by promoting public health, safety and welfare of the Town's residents.	Town Wide	Planning Board	Good	<b>Improvements Needed:</b> The Town's Subdivision Regulations work well and are reviewed annually; the Town has been very proactive with regards to regulations; regulations address fire suppression in new subdivisions but do not address the steep slope of driveways; deferred to consider adding regulations on the slope of driveways to better enable access by emergency responders. <b>Action Item #6</b>
Flood Ordinance (2007)	Enrolled in NFIP program since April 2, 1986. Update ordinance regularly; meets state's standards	Floodplain	Board of Selectmen	Good	<b>Improvements Needed:</b> The Town's Floodplain Ordinance works well to successfully prohibit or force compliance to the ordinance for building and substantial improvements to structures within the FEMA flood zone; the Floodplain Ordinance was last amended in 2007 and meets the standards set by the State and by the National Flood Insurance Program (NFIP); deferred to replenish the supply of NFIP brochures at the Town Office and to promote flood awareness through public outreach. <b>Action Items #8 (also in Table 7.1)</b>

Current Program or Activity	Description	Area of Town	Responsible Department	Effectiveness	Improvements Needed or Not Needed
Tree Maintenance	Eversource & NH Electric Coop have a tree maintenance program to remove trees and tree limbs from around the power lines. In addition, the Sugar Hill Highway Department and State DOT have a tree maintenance program to clear trees and hanging limbs from roadways.	Town Wide	Highway Department	Good	<b>Improvements Needed:</b> Although NH Electric Coop, Eversource, NH DOT and the Sugar Hill Highway Department do a good job maintaining brush and tree removal, this is deferred to this Plan to continue these efforts into the future. <b>Action Item #2</b>
Bridge Maintenance Program	There are currently three bridges on the state Red List. Inspection and clean-up occur annually. The state inspects all bridges every other year and maintain their bridges	Town Wide	Board of Selectmen	Good	<b>Improvements Needed:</b> There are three red-listed bridges in Sugar Hill, Crane Hill Road Bridge, Streeter Pond Road Bridge and Route 18 @ Indian Brook; Route 18 is expected to be replaced this summer; Streeter Pond Road Bridge soon and Crane Hill Road Bridge in a couple of years; deferred to get Streeter Pond Bridge and Crane Hill Road Bridge replace. <b>Action Items #11 &amp; 15</b>
Public Education & Awareness	The Town of Sugar Hill is very well situated to provide public information and outreach to its citizens through a variety of means.	Town Wide	Emergency Management Director & Other Departments	Excellent	<b>Improvements Needed:</b> Although the Town has an active website, there is no Emergency Webpage; using an Emergency Page is great way to provide outreach to residents on not only emergency preparedness but also mitigation techniques property owners can use to reduce or eliminate the impact of natural hazards; deferred to this Plan to provide robust information and links on the Town's website, perhaps using an Emergency Webpage, to educate the public on general and seasonal mitigation techniques. <b>Action Item #7</b>
Life safety and fire codes	Provides guidance for all buildings for life safety and fire codes; state codes are adopted	Town Wide	Fire Department	Good	<b>No Improvements Needed:</b> State and National Fire Protection Association (NFPA) life safety and fire codes are monitored by the Fire Department; the system that is in place works well.

Current Program or Activity	Description	Area of Town	Responsible Department	Effectiveness	Improvements Needed or Not Needed
Mutual Aid Agreements (Fire, Police, Highway & EMS)	Mutual Aid agreements provide communications capabilities and cooperative assistance between area cities and towns; mutual aid provides access to resources that are appropriate to the scope of the emergency.	Town Wide	Fire, Police, EMS & Highway	Excellent	<b>No Improvements Needed:</b> The Fire Department has a mutual aid agreement with the Twin State Mutual Aid Fire Association; the Police Department has agreements with the NH State Police and neighboring towns; the Highway Department has an agreement with NH Public Works Mutual Aid Association; EMS is provided by the Sugar Hill Fire Department and the Franconia Life Squad; Ambulance transport is provided by the Calnex Ambulance in Littleton; all mutual aid systems in Sugar Hill work very well.
State Health Department Public Health Plan	State plan, "Influenza, Pandemic, Public Health Preparedness and Response Plan" written by state health department to be prepared for any public health emergency; the Town is part of the North Country Regional Public Health Region	Town-wide	North Country Regional Public Health Network	Excellent	<b>No Improvements Needed:</b> The Public Health Plan does what it is meant to do; the Town participates in regional public health meetings whenever possible.
Fire Department Training	Fire Department personnel receive yearly training addressing wildfire attack strategies	Town Wide	Fire Chief & State Fire Warden	Excellent	<b>No Improvements Needed:</b> The Sugar Hill Fire Department personnel receive yearly training addressing wildfire attack strategies and all other fire suppression techniques; Fire Department training is preparedness and it continues on a regular basis.
Master Plan (2014)	Includes goals, objectives and expectations for future development of the town	Town Wide	Planning Board	Good	<b>No Improvements Needed:</b> The Sugar Hill Master Plan was most recently updated in 2014; the next recommended complete update would be in 2024 which falls beyond the scope of this Plan.
Local Road Design Standards	Provides local road design standards to ensure the safety of the citizens of Sugar Hill.	Town Wide	Board of Selectmen & Road Agent	Excellent	<b>No Improvements Needed:</b> The Sugar Hill Road Design Standards are outlined in the Town's Subdivision Regulation; new roads are reviewed by the Town's "Road Committee"; new roads that are petitioned to become "Town Roads" must meet the Town's regulations and be accepted at Town Meeting; the Town will not assume ownership of substandard roads.

Current Program or Activity	Description	Area of Town	Responsible Department	Effectiveness	Improvements Needed or Not Needed
Zoning Ordinances (2015)	Regulations dealing with land use including rural, residential, agriculture and timber management	Town Wide	Board of Selectmen & Planning Board	Good	<b>No Improvements Needed:</b> The Sugar Hill Zoning Ordinance, most recently updated in 2015, is reviewed and updated annually or when there is a need; the Zoning Ordinance does what it is meant to do; the Zoning Ordinance is constantly updated and is considered current.
Emergency Generators	Emergency generators (obtained through grants) are located at EOC/Fire Station, the Highway Garage and the Crapo Building which houses the Town Offices and the Police Station and is the designated Primary Shelter.	Town Wide	Emergency Management Director	Good	<b>No Improvements Needed:</b> The Town has proactively installed generators at their key facilities including the Crapo Building (Primary Shelter, Town Office & Police Department), the Highway Garage and the Fire Station (Primary EOC); an agreement for potential shelter is also in place with the Inn at Sunset Hill which has a generator.
E-911	Entire Town has 911 markers at driveway entrances	Town Wide	Fire & Police	Excellent	<b>No Improvements Needed:</b> The Town provided and installed 911 driveway markers for its residence; the Town is now about 95% compliant and signs are replaced if needed every spring.
Capital Reserve Funds	A type of account on a town's balance sheet that is reserved for long-term capital projects or any other large and anticipated expense(s) that will be incurred in the future; reserve funds are set aside to ensure adequate funding to at least partially finance future projects, equipment and other expenditures.	Town Wide	Board of Selectmen, Planning Board & Department Heads	Good	<b>No Improvements Needed:</b> The Town's Capital Reserve Funds set funds are aside each year at budget time to assist the Town's departments with planned purchases of equipment and supplies or in emergency situations; the Sugar Hill Capital Reserve Funds work well.
Tri-Town Mutual Aid	Fire mutual aid including Towns of Sugar Hill, Franconia and Easton	Town Wide	Fire Department	Excellent	<b>No Improvements Needed:</b> Towns of Sugar Hill, Franconia and Easton maintain a mutual aid agreement for fire and EMS services that is separate from the regional mutual aid agreements that are in place; the tri-town mutual aid system works well.

Current Program or Activity	Description	Area of Town	Responsible Department	Effectiveness	Improvements Needed or Not Needed
State Division of Forest and Lands/Fire Permits	State regulations for open burning and permits	Town Wide	NH Forests & Lands permit but local fire wardens issue	Good	<b>No Improvements Needed:</b> System that is in place with NH Forests & Lands (NHFL) and the local fire warden works well; the public is aware of fire permitting requirements.
Building Code & Permits	The Town abides by the State adopted International Building Codes (IBC) and International Residential Codes (IRC); the Town requires builders to follow these codes for new construction so that national standards for flood, wind, earthquake, fire and snow load are met.	Town Wide	Planning Board	Excellent Good Average Poor	<b>No Improvements Needed:</b> The Town of Sugar Hill has a part-time Building Inspector; the permitting process requires builders to abide by the International Building Codes (IBC) and the International Residential Codes (IRC) which have been adopted by the State of New Hampshire; the building permit process works well.
Burning Index	New Hampshire Forests & Lands (DNCR) has a burning index, which measures the risk for wildfires; how likely they are to start on a given day. It also evaluates the potential damages wildfires can create, the number of people that will be needed to fight it and the type of equipment that might be needed as well.	Town Wide	NH Forests & Lands (DNCR)	Excellent	<b>No Improvements Needed:</b> The Fire Department receives regular notification of the burning index via fax and email from NH Forests & Lands; this notification is made daily during the fire danger season.

## Chapter 7: Prior Mitigation Plan(s)

### A. Date of Prior Plan

Sugar Hill has participated in the development of prior Hazard Mitigation Plans, based on the Disaster Mitigation Act (DMA) of 2000, the most recent of which was formally approved on February 27, 2012. This Plan, the “Sugar Hill Hazard Mitigation Plan Update 2017” is an update to the 2012 Plan.

Below are the action items that were identified in the 2012 Plan. The Team identified the current status of each strategy based on three questions:

#### Completed

- Has the strategy been completed?
- If so, what was done?

Strategies “deferred” from the prior plan, were added to **Table 9.1, Mitigation Action Plan** as new strategies and were reprioritized to meet the current needs of the Town.

#### Deleted

- Should the strategy be deleted?
- Is the strategy mitigation or preparedness?
- Is the strategy useful to the Town under the current circumstances?

#### Deferred

- Should the strategy be deferred for consideration in this Plan?
- If the strategy was not completed, should this strategy be reconsidered and included as a new action item for this Plan?

**TABLE 7.1: ACCOMPLISHMENTS SINCE PRIOR PLAN(S) APPROVAL**

**NOTE:** Items in **red** were extracted word-for-word from the 2012 Hazard Mitigation Plan and do not represent a time frame for this plan.

Rank	New Mitigation Project	Responsibility and/or Oversight	Funding and/or Support	Time Frame	Completed, Deleted or Deferred
0-1	(3) Maintain and update existing special needs list of community members	Fire Chief	Local	Annually 2011-2016	<b>Completed &amp; Deferred:</b> A list of the functional needs population has been developed in Sugar Hill; this list is maintained on an annual basis in order to serve as an effective tool during an emergency; deferred to continue to maintain and update this important list. <b>Action Item #4</b>

Rank	New Mitigation Project	Responsibility and/or Oversight	Funding and/or Support	Time Frame	Completed, Deleted or Deferred
0-2	(2) Obtain and have available Firewise or state wildfire information brochures for community members	Fire Chief & Administrative Assistant	Local	9/30/2011	<b>Completed &amp; Deferred:</b> Firewise brochures were obtained and kept in the Fire Station and Town Offices, but the supply has dwindled; deferred to this Plan to obtain more brochures to provide to citizens of the Community so that the public is aware of not only the risks of wildfire but also specific mitigation actions that can be taken to better protect homes and businesses from the effects of wildfire; provide Firewise brochures to individuals seeking burn permits and to provide information on the Town's website. <b>Action Item #9</b>
0-3	(1) Obtain and have available NFIP brochures for community members and developers	Administrative Assistant	Local	9/30/2011	<b>Completed &amp; Deferred:</b> The Town had acquired NFIP materials after the last hazard mitigation plan, but the supply has dwindled; deferred to this Plan to obtain new NFIP materials, provide more education to current and potential homeowners; add important flood mitigation techniques/ideas to the Town's website including appropriate links. <b>Action Item #8 (also in Table 6.1)</b>
1-1	(7) Obtain funding and appropriate approvals to dredge Gale River in areas where silt build up creates flooding problems	Road Agent & Town Engineer	Local & Grants	8/31/2011	<b>Partially Completed &amp; Deferred:</b> Sugar Hill has taken active steps to complete this strategy from the prior plan; the Town has met with the Army Corp of Engineers, the Cold Regions Research & Engineering Laboratory (CRREL), NH DES and NH Fish & Game; project is awaiting final approvals and is otherwise ready to go; deferred to dredge the Gale River when final approvals are received. <b>Action Item #14</b>
1-2	(4) Assess culvert capacity in Town and seek funding to replace undersized culverts	Road Agent & Town Engineer	Local & Grants	9/30/2011	<b>Completed &amp; Deferred:</b> The Town actively assesses culverts and ditches and takes action when there is a need; this strategy is deferred for the development of a written Stormwater Maintenance Plan, to ensure continuity of maintenance and to help reduce the impact of natural hazards, particularly flooding; include an inventory of culverts, drains, etc. along with a record of size, type and expected length of service. <b>Action Item #12</b>
1-3	(5) Assess ditch capacity in Town and seek funding to repair ditches that are not adequately directing the flow of rain water and snow melt	Road Agent & Town Engineer	Local & Grants	9/30/2011	
3-2	(6) Improve overall storm water drainage and maintenance	Road Agent & Town Engineer	Local & Grants	9/30/2013	



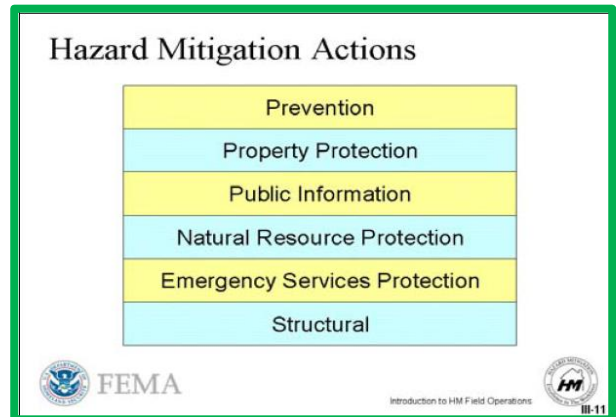
Rank	New Mitigation Project	Responsibility and/or Oversight	Funding and/or Support	Time Frame	Completed, Deleted or Deferred
2-1	(11) Update the Town's Master Plan	Planning	Local	7/1/2012	<b>Completed:</b> The Sugar Hill Master Plan was most recently updated in 2014 and it includes a natural hazard section; the next recommended complete update would be in 2024 which falls beyond the scope of this Plan.
2-2	(9) Add information to the Town's website to educate homeowners regarding Code Red and the need to contact Code Red to update and/or add contact numbers	EMD/Fire Chief	Local	3/31/2012	<b>Completed &amp; Deferred:</b> CodeRED & NH ENS are excellent warning systems but they only store resident phone numbers that are listed in the phone book; the Town has continuously provided information to residents on CodeRED & ENS but it should continue to provide public outreach to encourage all residents to contact CodeRED & ENS to add cell numbers, email, unlisted numbers and to verify information; use the website, a possible brochure or a sign up at Town Meeting. <b>Action Item #5 (also in Table 6.1)</b>
3-1	(10) NIMS and ICS training to be completed by Town officials	EMD/Fire Chief	Local	3/31/2013	<b>Completed &amp; Deferred:</b> Although most police officers, EMTs, and firefighters have received NIMS & ICS Training, not all of Sugar Hill's town officials have; deferred to encourage all town officials and new hires to take at a minimum, NIMS 700 and ICS100 and 200. <b>Action Item #1 (also in Table 6.1)</b>
3-3	(8) Complete action items and obtain funding for Fire Pond Plan which includes identification of new fire ponds and dry hydrants and fire pond maintenance	Fire Chief	Local	4/30/2014	<b>Completed &amp; Deferred:</b> A Fire Pond Plan has been completed which identifies the locations of needed fire ponds; deferred to this Plan to seek funding and install fire ponds in several locations in town. <b>Action Item #16</b>

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## Chapter 8: New Mitigation Strategies & STAPLEE

### A. Mitigation Strategies by Type

The following list of mitigation categories and comprehensive possible strategy ideas was compiled from a number of sources including the USFS, FEMA, other Planners and past hazard mitigation plans. This list was used during a brainstorming session to discuss what issues there may be in Town. Team involvement and the brainstorming sessions proved helpful in bringing new ideas, better relationships and a more in depth knowledge of the Community.



#### Prevention

- Forest fire fuel reduction programs
- Special management regulations
- Fire Protection Codes NFPA 1
- Firewise landscaping
- Culvert and hydrant maintenance
- Planning and zoning regulations
- Building Codes
- Density controls
- Driveway standards
- Slope development regulations
- Master Plan
- Capital Improvement Plan
- Rural Fire Water Resource Plan
- NFIP compliance

#### Public Education & Awareness

- Hazard information centers
- Public education and outreach programs
- Emergency website creation
- "Firewise" training
- NFIP awareness
- Public hazard notification
- Defensible space brochures

#### Emergency Service Protection

- Critical facilities protection
- Critical infrastructure protection
- Emergency training for town officials
- Ongoing training for first responders

#### Property Protection

- Current use or other conservation measures
- Transfer of development rights
- Firewise landscaping
- Water drafting facilities
- High risk notification for homeowners
- Structure elevation
- Real estate disclosures
- Flood proofing
- Building codes
- Development regulations

#### Natural Resource Protection

- Best management practices within the forest
- Forest and vegetation management
- Forestry and landscape management
- Wetlands development regulations
- Watershed management
- Erosion control
- Soil stabilization
- Open space preservation initiatives

#### Structural Projects

- Structure acquisition and demolition
- Structure acquisition and relocation
- Bridge replacement
- Dam removal
- Culvert up-size and/or realignment

## B. Potential Mitigation Strategies by Hazard

In order to further promote the concept of mitigation, the Town was provided with a flier that was developed by Mapping and Planning Solutions and used to determine what additional mitigation action items might be appropriate for the Town. The mitigation action items from that flier are listed on the following two pages; each item from this comprehensive list of possible mitigation action items was considered by the Planning Team to determine if any of these action items could be put in place for Sugar Hill with special emphasis on new and existing buildings and infrastructure.

### Strategies that may apply to more than one hazard

### Type of Project

- Community Outreach and Education .....Public Awareness
- Changes to Zoning Regulations .....Prevention
- Changes to Subdivision Regulations .....Prevention
- Steep Slopes Ordinance .....Prevention
- Density Controls .....Prevention
- Driveway Standards .....Prevention
- Emergency Website Creation.....Public Awareness
- Critical Infrastructure & Key Resources .....Emergency Service Protection
- Emergency Training for Town Officials .....Emergency Service Protection
- High Risk Notification to Homeowners .....Property Protection
- Master Plan Update or Development .....Prevention
- Capital Improvement Plan .....Prevention

### Flood Mitigation Ideas

### Type of Project

- Storm Water Management Ordinances.....Prevention
- Floodplain Ordinances .....Prevention
- Updated Floodplain Mapping .....Prevention
- Watershed Management.....Natural Resource Protection
- Drainage Easements.....Prevention
- Purchase of Easements .....Prevention
- Wetland Protection .....Natural Resource Protection
- Structural Flood Control Measures .....Prevention
- Bridge Replacement.....Structural Project
- Dam Removal.....Structural Project
- NFIP Compliance .....Prevention
- Acquisition, Demolition & Relocation .....Structural Project
- Structure Elevation .....Structural Project
- Flood Proofing .....Property Protection
- Erosion Control.....Natural Resource Protection
- Floodplain/Coastal Zone Management .....Prevention
- Building Codes Adoption or Amendments .....Prevention
- Culvert & Hydrant Maintenance .....Prevention
- Culvert & Drainage Improvements .....Structural Protection
- Transfer of Development Rights .....Property Protection

**Natural Hazard Mitigation Ideas**

**Type of Project**

**Landslide**

- Slide-Prone Area Ordinance..... Prevention
- Drainage Control Regulations..... Prevention
- Grading Ordinances..... Prevention
- Hillside Development Ordinances..... Prevention
- Open Space Initiatives..... Prevention
- Acquisition, Demolition & Relocation..... Structural Project
- Vegetation Placement and Management..... Natural Resource Protection
- Soil Stabilization..... Natural Resource Protection

**Thunderstorms & Lightning**

- Building Construction..... Property Protection

**Tornado & Severe Wind**

- Construction Standards and Techniques..... Property Protection
- Safe Rooms..... Prevention
- Manufactured Home Tie Downs..... Property Protection
- Building Codes..... Property Protection

**Wildfire**

- Building Codes..... Property Protection
- Defensible Space..... Prevention
- Forest Fire Fuel Reduction..... Prevention
- Burning Restriction..... Property Protection
- Water Resource Plan..... Prevention
- Firewise Training & Brochures..... Public Awareness
- Woods Roads Mapping..... Prevention

**Extreme Temperatures**

- Warming & Cooling Stations..... Prevention

**Winter Weather Snowstorms**

- Snow Load Design Standards..... Property Protection

**Subsidence**

- Open Space..... Natural Resource Protection
- Acquisition, Demolition & Relocation..... Structural Project

**Earthquake**

- Construction Standards and Techniques..... Property Protection
- Building Codes..... Property Protection
- Bridge Strengthening..... Structural Project
- Infrastructure Hardening..... Structural Project

**Drought**

- Water Use Ordinances..... Prevention

### C. STAPLEE Methodology

Table 8.1, *Potential Mitigation Items & the STAPLEE*, reflects the newly identified potential hazard and wildfires mitigation action items as well as the results of the STAPLEE evaluation as explained below. It should also be noted that although some areas are identified as “All Hazards”, many of these would apply indirectly to wildfire response and capabilities. Many of these potential mitigation action items overlap.

The goal of each proposed mitigation action item is “to reduce or eliminate the long-term risk to human life and property from hazards”. To determine the effectiveness of each mitigation action item in accomplishing this goal, a set of criteria that was developed by FEMA, the STAPLEE method, was applied to each proposed action item.

The STAPLEE method analyzes the Social, Technical, Addministrative, Political, Legal, Economic and Environmental aspects of a project and is commonly used by public administration officials and planners for making planning decisions. The following questions were asked about the proposed mitigation action items discussed in Table 8.1.

**Social:** ..... Is the proposed action item socially acceptable to the Community? Is there an equity issue involved that would result in one segment of the Community being treated unfairly?

**Technical:** ..... Will the proposed action item work? Will it create more problems than it solves?

**Administrative:** ..... Can the Community implement the action item? Is there someone to coordinate and lead the effort?

**Political:** ..... Is the action item politically acceptable? Is there public support both to implement and to maintain the project?

**Legal:** ..... Is the Community authorized to implement the proposed action item? Is there a clear legal basis or precedent for this activity?

**Economic:** ..... What are the costs and benefits of this action item? Does the cost seem reasonable for the size of the problem and the likely benefits?

**Environmental:** ..... How will the action item impact the environment? Will it need environmental regulatory approvals?

Each proposed mitigation action item was then evaluated and assigned a score based on the above criteria. Each of the STAPLEE categories was discussed and was awarded one of the following scores:

**3 - Good ..... 2 - Average..... 1 - Poor**

An evaluation chart with total scores for each new action item is shown in Table 8.1.

The “Type” of Action Item was also considered (see section A of this chapter for more reference):

- **Prevention**
- **Public Education & Awareness**
- **Emergency Service Protection**
- **Property Protection**
- **Natural Resource Protection**
- **Structural Projects**



### D. Team's Understanding of Hazard Mitigation Action Items

The Team determined that any strategy designed to reduce personal injury or damage to property that could be done prior to an actual disaster would be listed as a potential mitigation action item. This decision was made even though not all projects listed in Table 8.1 and Table 9.1, *The Mitigation Action Plan*, are fundable under FEMA pre-mitigation guidelines. The Team determined that this Plan was in large part a management document designed to assist the Board of Selectmen and other town officials in all aspects of managing and tracking potential emergency planning action items. For instance, the Team was aware that some of these action items are more properly identified as preparedness or readiness issues. As there are no other established planning mechanisms that recognize some of these issues, the Team did not want to “lose” any of the ideas discussed during these planning sessions and thought this method was the best way to achieve that objective.

Also, it should be noted that the Town understands that the “Mitigation Action Items” for a town of 200 are not the same as the “Mitigation Action Items” for a town of 30,000. In addition, the “Mitigation Action Items” for a town in the middle of predominantly hardwood forests, are not the same as the “Mitigation Action Items” for a town on the Jersey Shore. Therefore the Town of Sugar Hill has accepted the “Mitigation Action Items” in Tables 8.1 and 9.1 as the complete list of “Mitigation Action Items” for this Town and only this Town and hereby indicates that having carefully considered a comprehensive list of other possible mitigation action items (see sections A & B of this chapter) for this Plan, there are no additional “Mitigation Action Items” to add at this time.

**TABLE 8.1: POTENTIAL MITIGATION ACTION ITEMS & THE STAPLEE**

- Potential mitigation action items in Table 8.1 on the following page are listed in numerical order and indicate if they were derived from prior tables in this Plan, i.e., (Table 7.1).
- Items in green such as (MU14) represent mitigation action items taken from Mitigation Ideas, A Resource for Reducing Risk to Natural Hazards, FEMA, January 2013; see *Appendix E: Potential Mitigation Ideas*, for more information.

*Action Items are listed in numerical order.*

Potential Mitigation Action Item	Affected Location	Type of Activity	TTL	S	T	A	P	L	E	E
<b>Action Item #1:</b> Encourage all town officials and new hires to take NIMS 700 and ICS 100 and 200. (Tables 6.1 & 7.1)	Town Wide	Prevention Public Education & Awareness Emergency Services Protection	21	3	3	3	3	3	3	3
				No apparent issues with this Action Item						
<b>Action Item #2:</b> Continue program to mow roadsides and cut limbs and branches in an effort to mitigate the effects of wind damage to power lines and structures and to ensure defensible space for mitigating wildfires; continue tree maintenance program to reduce or eliminate the damage that may result during a natural hazard such as a wildfire, windstorm, hurricane or tropical storm. (SW4 & WF7) (Table 6.1)	Town Wide	Prevention Property Protection Natural Resource Protection Emergency Services Protection	20	3	3	3	2	3	3	3
				No apparent issues with this Action Item						

Potential Mitigation Action Item	Affected Location	Type of Activity	TTL	S	T	A	P	L	E	E
<b>Action Item #3:</b> Routinely inspect the functionality of fire hydrants and continue the maintenance of all hydrants and other water resources in Sugar Hill. (WF8) (Table 7.1)	Hydrants & Water Resources Town Wide	Prevention	21	3	3	3	3	3	3	3
				No apparent issues with this Action Item						
<b>Action Item #4:</b> Continue to maintain Sugar Hill's voluntary database of the functional needs population, such as those individuals at high risk of death, the elderly, the homeless, etc.; include next of kin notification or other persons who can assist if needed; maintain functional needs list based on HIPAA. (ET3 & WW6) (Table 7.1)	Town Wide	Prevention Public Education & Awareness Emergency Services Protection	21	3	3	3	3	3	3	3
				No apparent issues with this Action Item						
<b>Action Item #5:</b> Provide continuous public outreach to encourage all residents to contact CodeRED and NH ENS to add cell numbers, emails and unlisted numbers and to verify information; use the website, a possible mailing, the Town Report or a sign-up at Town Meeting. (MU14) (Tables 6.1 & 7.1)	Town Wide	Prevention Public Education & Awareness	21	3	3	3	3	3	3	3
				No apparent issues with this Action Item						
<b>Action Item #6:</b> Review Sugar Hill's subdivision regulations to consider adding regulations to address driveways on steep slopes so that access by emergency responders can be maintained. (MU7, WF3 & F1) (Table 6.1)	Town Wide	Prevention Property Protection Natural Resource Protection Emergency Services Protection	19	3	3	3	1	3	3	3
				<b>Political:</b> Some will not want to add more regulations for the Town						
<b>Action Item #7:</b> Establish an interactive emergency webpage for educating the public on hazard mitigation and preparedness measures (MU14) by adding to the Town's Emergency Management Services a webpage that will include such information as emergency contacts, shelter locations, evacuation routes (SW7, WF11 & T3), methods of emergency alerting, 911 compliance, water saving techniques (D9), earthquake risk and mitigation activities that can be taken in residents' homes (EQ7), steps homeowners can take to protect themselves and their properties when extreme temperatures occur (ET1 & ET4), safety measures that can be taken during hail (HA3) and lightning storms (L2), mitigation techniques for property protection and links to available sources; educate homeowners regarding the risks of building in hazard zones and encourage homeowners to install carbon monoxide monitors and alarms (WW5). (Table 7.1)	Town Wide	Prevention Public Education & Awareness	21	3	3	3	3	3	3	3
				No apparent issues with this Action Item						

Potential Mitigation Action Item	Affected Location	Type of Activity	TTL	S	T	A	P	L	E	E
<b>Action Item #8:</b> Advise the public about the local flood hazard, flood insurance and flood protection measures ( <b>F10</b> ) by obtaining and keeping on hand a supply of NFIP brochures to have available in the Town Offices; give NFIP materials to homeowners and builders when proposing new development or substantial improvements; encourage property owners to purchase flood insurance ( <b>F22</b> ), whether or not they are in the flood zone and provide appropriate links to the NFIP and Ready.gov on the Town's website or provide mailing materials. ( <b>Tables 6.1 &amp; 7.1</b> )	Town Wide	Prevention Property Protection Public Education & Awareness Natural Resource Protection	21	3	3	3	3	3	3	3
				No apparent issues with this Action Item						
<b>Action Item #9:</b> Obtain and have available "Firewise" brochures to educate homeowners on methods to reduce fire risk around their homes ( <b>WF10</b> ); provide "Firewise" brochures to those residents seeking burn permits; advise residents of the importance of maintaining defensible space, the safe disposal of yard and household waste and the removal of dead or dry leaves, needles, twigs, and combustible materials from roofs, decks, eaves, porches and yards. ( <b>WF12</b> ) ( <b>Table 7.1</b> )	Town Wide	Prevention Property Protection Public Education & Awareness Natural Resource Protection	21	3	3	3	3	3	3	3
				No apparent issues with this Action Item						
<b>Action Item #10:</b> Replace the damaged or failed culverts from the July 1, 2017 rain event on the following roads: Bickford Hill Road, Birches Road, Blake Road, Carpenter Road, Crane Hill Road, Creamery Pond Road, Dyke Road, Easton Road, Grandview Road, Hadley Road, Jericho Road, Kathy Rae Drive, Lafayette Road, Lovers Lane, Pearl Lake Road, Post Road, Presby Road, South Road, Streeter Pond Road, Sunset Hill Road, Toad Hill Road and Valley Vista Road to improve the flow of stormwater and mitigate against future flooding; use FEMA Presidential Disaster Declaration funding if it becomes available. ( <b>FU13</b> )	See list of roads that were damaged in column to the left	Structural	17	3	3	3	3	3	1	1
				<b>Economic:</b> Budget constraints <b>Environmental:</b> DES permitting will be required						
<b>Action Item #11:</b> Replace the red-listed Streeter Pond Bridge using FEMA funding as available after the July 1, 2017 flooding event. ( <b>F14 &amp; F17</b> )	Town Wide	Emergency Services Protection Structural	17	3	3	3	3	3	1	1
				<b>Economic:</b> Budget constraints <b>Environmental:</b> DES permitting will be required.						

Potential Mitigation Action Item	Affected Location	Type of Activity	TTL	S	T	A	P	L	E	E
<b>Action Item #12:</b> Develop a written storm water maintenance plan in order to ensure more efficient storm water management; include an inventory of culverts, drains, etc. along with a record of size, type and expected length of service. <b>(F5) (Table 7.1)</b>	Town Wide	Prevention Property Protection Natural Resource Protection Emergency Services Protection	21	3	3	3	3	3	3	3
<b>No apparent issues with this Action Item</b>										
<b>Action Item #13:</b> Update the Emergency Operations Plan (EOP) to increase the Town's ability to respond to disasters and to mitigate future or continued occurrences; consider elements in this hazard mitigation plan when updating the EOP, update the EOP to the 15-Emergency Support Function (ESF) format and make Player Packets for Lead Agencies. <b>(MU6) (Tables 6.1)</b>	Town Wide	Prevention Emergency Services	21	3	3	3	3	3	3	3
<b>No apparent issues with this Action Item</b>										
<b>Action Item #14:</b> Research the possibility of grant funding and arrange for the dredging of the Gale River to clean up the silt build up on the bottom of the Gale River to prevent scouring of the Streeter Pond Bridge and to mitigate flooding on Streeter Pond Road and NH Route 18. <b>(F14, F19 &amp; F20) (Table 7.1)</b>	Town Wide	Prevention Property Protection Natural Resource Protection Emergency Services Protection Structural	16	2	3	3	2	3	1	2
<b>Social:</b> Those who are not affected by this problem may not see the need for it. <b>Political:</b> Some may not want to see money spent on this problem. <b>Economic:</b> Budget constraints <b>Environmental:</b> DES approvals will be needed										
<b>Action Item #15:</b> Replace the red-listed Crane Hill Road Bridge. <b>(F14 &amp; F17)</b>	Town Wide	Emergency Services Protection Structural	17	3	3	3	3	3	1	1
<b>Economic:</b> Budget constraints <b>Environmental:</b> DES permitting will be required.										
<b>Action Item #16:</b> As recommended in the Fire Pond Plan, fire ponds should be constructed/installed at Streeter Pond Road, Toad Hill Road, NH Route 117 @ South Road, Hadley Road and Center District Road in order to better ensure the effectiveness of fire suppression to mitigate and control wildfires; dredge where needed (Route 117 and Birches) in order to install fire ponds and dry hydrants. <b>(WF3) (Table 7.1)</b>	Streeter Pond Road Toad Hill Road NH Route 117 @ South Road Hadley Road Center District Road Birches Road	Prevention Property Protection Natural Resource Protection Emergency Services Protection Structural	20	3	3	3	3	3	2	3
<b>Economic:</b> Budget constraints										

## Chapter 9: Implementation Schedule for Prioritized Action Items

### ***A. Priority Methodology***

After reviewing the finalized STAPLEE numerical ratings, the Team prepared to develop *Table 9.1, The Mitigation Action Plan*. To do this, team members created four categories into which they would place the potential mitigation action items.

- **Category 0** was to include those items which are being done and will continue to be done in the future.
- **Category 1** was to include those items under the direct control of town officials, within the financial capability of the Town using only town funding, those already being done or planned and those that could generally be completed within one year.
- **Category 2** was to include those items that the Town did not have sole authority to act upon, those for which funding might be beyond the Town's capability and those that would generally take between 13-36 months to complete.
- **Category 3** was to include those items that would take a major funding effort, those that the Town had little control over the final decision and those that would take in excess of 37 months to complete.

Each potential mitigation action item was placed in one of these four categories and then those action items were prioritized within each category according to cost-benefit, time frame and capability. Actual cost estimates were unavailable during the planning process, although using the STAPLEE process along with the methodology detailed above and a Low-High estimate (see following page) the Team was able to come up with a general consensus on cost-benefit for each proposed action item.

The Team also considered the following criteria while ranking and prioritizing each action item:

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

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

## B. Who, When, How?

Once this was completed, the Team developed an action plan that outlined who is responsible for implementing each action item, as well as when and how the actions will be implemented. The following questions were asked in order to develop a schedule for the identified mitigation action items.

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

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

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

In addition to the prioritized mitigation action items, *Table 9.1, The Mitigation Action Plan*, includes the responsible party (WHO), how the project will be supported (HOW) and what the time frame is for implementation of the project (WHEN).

Once the Plan is approved, the Community will begin working on the action items listed in *Table 9.1, The Mitigation Action Plan* (see below). An estimation of completion for each action item is noted in the “Time Frame” column of Table 9.1.

Some projects, including most training and education of residents on emergency and evacuation procedures, could be tied into the emergency operations plan and implemented through that planning effort.

### TABLE 9.1: THE MITIGATION ACTION PLAN

*Table 9.1, The Mitigation Action Plan*, located on the next page, includes Problem Statements that were expressed by the Planning Team. These action items are listed in order of priority and indicate if they were derived from prior tables in this Plan.



The estimated cost was determined using the following criteria:

- **Low Cost** ..... \$0 - \$1,000 or staff time only
- **Medium Cost** ..... \$1,000-\$10,000
- **High Cost** ..... \$10,000 or more

The time frame was determined using the following criteria:

- **Short Term** ..... Ongoing for the life of the Plan
- **Short Term** ..... Less than 1 year (0-12 months)
- **Medium Term** ..... 2-3 years (13-36 months)
- **Long Term:** ..... 4-5 years (37-60 months)

Items in green such as **(MU14)** represent mitigation action items taken from *Mitigation Ideas, A Resource for Reducing Risk to Natural Hazards*, FEMA, January 2013; see *Appendix E: Potential Mitigation Ideas*, for more information.



*Mitigation Action Items are listed in order of priority.*

Final Priority	Problem Statement Mitigation Action Item	Hazard Addressed	Responsible Department	Funding or Support	Time Frame	Est. Cost
0-1	<p><b>Problem Statement:</b> <i>Not all of Sugar Hill's town officials, and others who may have to respond to an emergency, have received NIMS &amp; ICS training.</i></p> <p><b>Action Item #1:</b> Encourage all town officials and new hires to take NIMS 700 and ICS 100 and 200. <b>(Tables 6.1 &amp; 7.1)</b></p>	All Hazards	Emergency Management Director	Local	<b>Short Term</b> Ongoing for the life of the Plan	<b>Low Cost</b> \$0 - \$1,000 or staff time only
0-2	<p><b>Problem Statement:</b> <i>In addition to efforts by NH Electric Coop, DOT and Eversource, the Town maintains a program to clear brush, downed trees and other debris and to remove weakened tree limbs in an effort to prevent damage from natural hazards; this work needs to continue; brush along roadsides, hanging limbs and dying trees can damage power lines and structures in severe wind events and can create fuel for wildfires.</i></p> <p><b>Action Item #2:</b> Continue program to mow roadsides and cut limbs and branches in an effort to mitigate the effects of wind damage to power lines and structures and to ensure defensible space for mitigating wildfires; continue tree maintenance program to reduce or eliminate the damage that may result during a natural hazard such as a wildfire, windstorm, hurricane or tropical storm. <b>(SW4 &amp; WF7) (Table 6.1)</b></p>	Severe Wind, Downbursts, Tornadoes, Hurricanes & Wildfire	Highway Department	Local	<b>Short Term</b> Ongoing for the life of the Plan	<p><b>Low Cost</b> \$0 - \$1,000 or staff time only</p> <p><b>Medium Cost</b> \$1,000-\$10,000 (if contractors are hired for large trees or other major projects)</p>
0-3	<p><b>Problem Statement:</b> <i>All hydrants in the community need to be fully inspected and maintained in order to ensure effectiveness for fire suppression.</i></p> <p><b>Action Item #3:</b> Routinely inspect the functionality of fire hydrants and continue the maintenance of all hydrants and other water resources in Sugar Hill. <b>(WF8) (Table 7.1)</b></p>	Wildfire	Fire Department	Local	<b>Short Term</b> Ongoing for the life of the Plan	<b>Medium Cost</b> \$1,000-\$10,000

Final Priority	Problem Statement Mitigation Action Item	Hazard Addressed	Responsible Department	Funding or Support	Time Frame	Est. Cost
0-4	<p><b>Problem Statement:</b> A list of the functional needs population has been developed in Sugar Hill; this list is maintained on an annual basis in order to serve as an effective tool during an emergency; updating and maintenance of this list needs to continue.</p> <p><b>Action Item #4:</b> Continue to maintain Sugar Hill's voluntary database of the functional needs population, such as those individuals at high risk of death, the elderly, the homeless, etc.; include next of kin notification or other persons who can assist if needed; maintain functional needs list based on HIPAA. <b>(ET3 &amp; WW6) (Table 7.1)</b></p>	All Hazards	Fire Chief	Local	<p><b>Short Term</b> Ongoing for the life of the Plan</p>	<p><b>Low Cost</b> \$0 - \$1,000 or staff time only</p>
0-5	<p><b>Problem Statement:</b> CodeRED and the NH Emergency Notification System are excellent warning systems but they only store resident phone numbers that are listed in the phone book; residents may not be aware that they can add cell numbers, emails and unlisted numbers to both CodeRED and NH ENS.</p> <p><b>Action Item #5:</b> Provide continuous public outreach to encourage all residents to contact CodeRED and NH ENS to add cell numbers, emails and unlisted numbers and to verify information; use the website, a possible mailing, the Town Report or a sign-up at Town Meeting. <b>(MU14) (Tables 6.1 &amp; 7.1)</b></p>	All Hazards	Emergency Management Director	Local	<p><b>Short Term</b> Ongoing for the life of the Plan</p>	<p><b>Low Cost</b> \$0 - \$1,000 or staff time only</p>
0-6	<p><b>Problem Statement:</b> Sugar Hill's Subdivision Regulations work well and are reviewed annually; the Town has been very proactive with regards to regulations; regulations address fire suppression in new subdivisions but do not address the steep slope of driveways; deferred to consider adding regulations on the slope of driveways to better enable access by emergency responders.</p> <p><b>Action Item #6:</b> Review Sugar Hill's subdivision regulations to consider adding regulations to address driveways on steep slopes so that access by emergency responders can be maintained. <b>(MU7, WF3 &amp; F1) (Table 6.1)</b></p>	Wildfire Flooding	Planning Board & Fire Chief	Local	<p><b>Short Term</b> Ongoing for the life of the Plan</p>	<p><b>Low Cost</b> \$0 - \$1,000 or staff time only</p>

Final Priority	Problem Statement Mitigation Action Item	Hazard Addressed	Responsible Department	Funding or Support	Time Frame	Est. Cost
0-7	<p><b>Problem Statement:</b> Residents may not be aware of emergency procedures or preventative techniques that can be done to protect their lives and property; it is difficult to convey these messages and to provide Public Outreach via mail or personal contact.</p> <p><b>Action Item #7:</b> Establish an interactive emergency webpage for educating the public on hazard mitigation and preparedness measures (MU14) by adding to the Town's Emergency Management Services a webpage that will include such information as emergency contacts, shelter locations, evacuation routes (SW7, WF11 &amp; T3), methods of emergency alerting, 911 compliance, water saving techniques (D9), earthquake risk and mitigation activities that can be taken in residents' homes (EQ7), steps homeowners can take to protect themselves and their properties when extreme temperatures occur (ET1 &amp; ET4), safety measures that can be taken during hail (HA3) and lightning storms (L2), mitigation techniques for property protection and links to available sources; educate homeowners regarding the risks of building in hazard zones and encourage homeowners to install carbon monoxide monitors and alarms (WW5). (Table 7.1)</p>	All Hazards & Severe Wind, Drought, Earthquake, Extreme Temperatures, Hail, Lightning, Severe Winter Weather, Tornado & Wildfire	Emergency Management Director	Local	<b>Short Term</b> Ongoing for the life of the Plan	<b>Low Cost</b> \$0 - \$1,000 or staff time only
0-8	<p><b>Problem Statement:</b> Residents and Builders may not be aware of flood regulations &amp; the availability of flood insurance through the NFIP.</p> <p><b>Action Item #8:</b> Advise the public about the local flood hazard, flood insurance and flood protection measures (F10) by obtaining and keeping on hand a supply of NFIP brochures to have available in the Town Offices; give NFIP materials to homeowners and builders when proposing new development or substantial improvements; encourage property owners to purchase flood insurance (F22), whether or not they are in the flood zone and provide appropriate links to the NFIP and Ready.gov on the Town's website or provide mailing materials. (Tables 6.1 &amp; 7.1)</p>	Flooding	Emergency Management Director	Local	<b>Short Term</b> Ongoing for the life of the Plan	<b>Low Cost</b> \$0 - \$1,000 or staff time only

Final Priority	Problem Statement Mitigation Action Item	Hazard Addressed	Responsible Department	Funding or Support	Time Frame	Est. Cost
1-9	<p><b>Problem Statement:</b> Residents may not be aware of the steps they can take to reduce the risk of fire at their homes.</p> <p><b>Action Item #9:</b> Obtain and have available "Firewise" brochures to educate homeowners on methods to reduce fire risk around their homes (<b>WF10</b>); provide "Firewise" brochures to those residents seeking burn permits; advise residents of the importance of maintaining defensible space, the safe disposal of yard and household waste and the removal of dead or dry leaves, needles, twigs, and combustible materials from roofs, decks, eaves, porches and yards. (<b>WF12</b>) (<b>Table 7.1</b>)</p>	Wildfire	Fire Chief	Local	<p><b>Short Term</b> Ongoing for the life of the Plan</p>	<p><b>Low Cost</b> \$0 - \$1,000 or staff time only</p>
1-1	<p><b>Problem Statement:</b> The aging, undersized and/or overwhelmed culverts on the following roads were damaged or failed during the rain event of July 1, 2017 and need replacement: Bickford Hill Road, Birches Road, Blake Road, Carpenter Road, Crane Hill Road, Creamery Pond Road, Dyke Road, Easton Road, Grandview Road, Hadley Road, Jericho Road, Kathy Rae Drive, Lafayette Road, Lovers Lane, Pearl Lake Road, Post Road, Presby Road, South Road, Streeter Pond Road, Sunset Hill Road, Toad Hill Road and Valley Vista Road.</p> <p><b>Action Item #10:</b> Replace the damaged or failed culverts from the July 1, 2017 rain event on the following roads: Bickford Hill Road, Birches Road, Blake Road, Carpenter Road, Crane Hill Road, Creamery Pond Road, Dyke Road, Easton Road, Grandview Road, Hadley Road, Jericho Road, Kathy Rae Drive, Lafayette Road, Lovers Lane, Pearl Lake Road, Post Road, Presby Road, South Road, Streeter Pond Road, Sunset Hill Road, Toad Hill Road and Valley Vista Road to improve the flow of stormwater and mitigate against future flooding; use FEMA Presidential Disaster Declaration funding if it becomes available. (<b>FU13</b>)</p>	Flooding	Highway Department & Emergency Management Director	Local & Grants	<p><b>Short Term</b> 1 year or less (0-12 Months)</p>	<p><b>High Cost</b> \$10,000 or more (multiple culverts and storm drainage systems Town Wide)</p>
1-2	<p><b>Problem Statement:</b> The Streeter Pond Road Bridge is red-listed and needs to be replaced.</p> <p><b>Action Item #11:</b> Replace the red-listed Streeter Pond Bridge using FEMA funding as available after the July 1, 2017 flooding event.</p>	Flooding & Hazardous Material-Transport	Board of Selectmen & Emergency Management Director	Local & Grants	<p><b>Short Term</b> 1 year or less (0-12 Months)</p>	<p><b>High Cost</b> \$10,000 or more</p>

Final Priority	Problem Statement Mitigation Action Item	Hazard Addressed	Responsible Department	Funding or Support	Time Frame	Est. Cost
2-3	<p><b>Problem Statement:</b> Although the Sugar Hill Highway Department does a good job cleaning and repairing drainage basins and culverts, a written maintenance plan should be developed to ensure continuity of actions and efficient storm water management.</p> <p><b>Action Item #12:</b> Develop a written storm water maintenance plan in order to ensure more efficient storm water management; include an inventory of culverts, drains, etc. along with a record of size, type and expected length of service. <b>(F5) (Table 7.1)</b></p>	All Hazards & Flooding	Highway Department	Local	<b>Short Term</b> 1 year or less (0-12 Months)	<b>Low Cost</b> \$0 - \$1,000 or staff time only
0-4	<p><b>Problem Statement:</b> The Sugar Hill Emergency Operations Plan (2010) is in need of the recommended five-year update; deferred to this Plan for an update in 2017 or 2018.</p> <p><b>Action Item #13:</b> Update the Emergency Operations Plan (EOP) to increase the Town's ability to respond to disasters and to mitigate future or continued occurrences; consider elements in this hazard mitigation plan when updating the EOP, update the EOP to the 15-Emergency Support Function (ESF) format and make Player Packets for Lead Agencies. <b>(MU6) (Tables 6.1)</b></p>	All Hazards	Emergency Management Director	Local & Grants	<b>Short Term</b> 1 year or less (0-12 Months)	<b>Medium Cost</b> \$1,000-\$10,000 (reimbursed through grant)
1-1	<p><b>Problem Statement:</b> Silt buildup in the Gale River creates flooding problems on Streeter Pond Road and NH Route 18; Sugar Hill has taken active steps to mitigate this problem by meeting with the Army Corp of Engineers, the Cold Regions Research &amp; Engineering Laboratory (CRREL), NH DES and NH Fish &amp; Game; final approvals for the project to dredge the river are not yet received.</p> <p><b>Action Item #14:</b> Upon receipt of final approvals, dredge the Gale River to clean up the silt build up on the bottom, to prevent scouring of the Streeter Pond Bridge and to mitigate flooding on Streeter Pond Road and NH Route 18. <b>(F14, F19 &amp; F20) (Table 7.1)</b></p>	Flooding & Erosion	Highway Department & Emergency Management Director	Local & Grants	<b>Medium Term</b> 2-3 years (13-36 Months)	<b>High Cost</b> \$10,000 or more
2-2	<p><b>Problem Statement:</b> The Crane Hill Road Bridge is red-listed and needs to be replaced.</p> <p><b>Action Item #15:</b> Replace the red-listed Crane Hill Road Bridge.</p>	Flooding & Hazardous Material-Transport	Board of Selectmen, Emergency Management Director & Highway Department	Local & Grants	<b>Medium Term</b> 2-3 years (13-36 Months)	<b>High Cost</b> \$10,000 or more

Final Priority	Problem Statement Mitigation Action Item	Hazard Addressed	Responsible Department	Funding or Support	Time Frame	Est. Cost
3-1	<p><b>Problem Statement:</b> A Fire Pond Plan has been completed which identifies the locations of needed fire ponds; the fire ponds need to be constructed at Streeter Pond Road, Toad Hill Road, NH Route 117 @ South Road, Hadley Road and Center District Road. Route 117 and Birches needs dredging to put dry hydrants in all of these, some will need some dredging first.</p> <p><b>Action Item #16:</b> As recommended in the Fire Pond Plan, fire ponds should be constructed/installed at Streeter Pond Road, Toad Hill Road, NH Route 117 @ South Road, Hadley Road and Center District Road in order to better ensure the effectiveness of fire suppression to mitigate and control wildfires; dredge where needed (Route 117 and Birches) in order to install fire ponds and dry hydrants. <b>(WF3) (Table 7.1)</b></p>	Wildfire	Fire Chief	Local	<p><b>Long Term</b> 4-5 years (37-60 Months) as many as possible as money becomes available</p>	<p><b>Medium Cost</b> \$1,000- \$10,000 (each)</p>



Toad Hill Road, Storm Damage, April 2011  
Photo Credit: Town of Sugar Hill



## Chapter 10: Adopting, Monitoring, Evaluating and Updating the Plan

### ***A. Hazard Mitigation Plan Monitoring, Evaluation and Updates***

A good mitigation plan must allow for updates where and when necessary, particularly since communities may suffer budget cuts or experience personnel turnover during both the planning and implementation stages. A good plan will incorporate periodic monitoring and evaluation mechanisms to allow for review of successes and failures or even just simple updates. The Emergency Management Director is responsible for initiating Plan reviews and will consult with members of the hazard mitigation planning team identified in this Plan.

The Sugar Hill Hazard Mitigation Plan Update 2017 is considered a work in progress. There are three situations which will prompt revisiting this Plan:

- First, as a minimum, it will be reviewed annually or after any emergency event to assess whether the existing and suggested mitigation action items were successful. This review will focus on the assessment of the Plan's effectiveness, accuracy and completeness in monitoring of the implementation action item. The review will also address recommended improvements to the Plan as contained in the FEMA plan review checklist and address any weaknesses the Town identified that the Plan did not adequately address.
- Second, the Plan will be thoroughly updated every five years.
- Third, if the Town adopts any major modifications to its land use planning documents, the jurisdiction will conduct a Plan review and make changes as applicable.

In keeping with the process of adopting this hazard mitigation plan, the public and stakeholders will have the opportunity for future involvement as they will be invited to participate in any and all future reviews or updates of this Plan. Public notice before any review or update will be given by such means as: press releases in local papers, posting meeting information on the Town website and at the Town Offices, sending letters to federal, state and local organizations impacted by the Plan and posting notices in public places in the Town. This will ensure that all comments and revisions from the public and stakeholders will be considered. The Emergency Management Director ensures that these actions will be done.

Concurrence forms to be used for post-hazard or annual reviews are available in Chapter 11 of this Plan. The Town is encouraged to use these forms to document any changes and accomplishments since the development of this Plan. Forms are available for years 1-4, with expectation that the five-year annual update will be in process during the fifth year.

### ***B. Integration with Other Plans***

This Plan will only enhance mitigation if balanced with all other town plans. Sugar Hill completed its last hazard mitigation plan in 2012 and has completed many of projects from that Plan. Examples of these can be found in Table 7.1 and include items such as completing the Master Plan, developing a Fire Pond Plan and establishing a list of the functional needs populations. The Town was able to integrate these actions into other town activities, budgets, plans and mechanisms.



The Town will incorporate elements from this Plan into the following documents:

**Sugar Hill Master Plan:**

Traditionally, Master Plans are updated every 5 to 10 years and detail the use of capital reserves funds and capital improvements within the Town. A complete update of the Sugar Hill's Master Plan was completed in 2014 and will not be due for a recommended update until 2024. Although a complete update of the Master Plan does not fall within the life of this Plan, future reviews and updates of the Master Plan will include discussions of Natural Hazards and will integrate concepts, ideas and action items from this Hazard Mitigation Plan.

**Sugar Hill Emergency Operations Plan 2010 (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; EOPs are generally reviewed after each hazardous event and updated on a five-year basis. The last Sugar Hill EOP was completed in 2010; an update for the Emergency Operations Plan is expected to be completed in the next 1-2 years. The new EOP will include elements from this hazard mitigation plan. **(Action Item #13)**

**Town Budget, Capital Improvement Plan & Capital Reserve Funds:**

The Town of Sugar Hill maintains a Capital Improvement Plan and also maintains Capital Reserve Funds for major expenditures; the Capital Reserve Fund is adjusted annually in coordination with the Board of Selectmen and the Town's department heads at budget time. The budget is then voted on at the annual Town Meeting. During the annual budget planning process, specific mitigation actions identified in this Plan that require Town fiscal support will be reviewed for incorporation into the budget. **Refer to those Action Items that require local money or match money.**

**The Sugar Hill Subdivision Regulations:**

As time goes by and the needs of the Town change, the Town's planning mechanisms will be reviewed and updated. In coordination with these actions, the Planning Board will review this Hazard Mitigation Plan and incorporate any changes that help mitigate the susceptibility of the Community and its citizens to the dangers of natural or human-caused disasters. An example of this integration can be seen in this Plan's mitigation action item. **(Action Item #6)**

The local governments will modify other plans and actions as necessary to incorporate hazard and/or wildfire issues; the Board of Selectmen ensures this process will be followed in the future. In addition, the Town will review and make note of instances when this has been done and include it as part of their annual review of the Plan.

### C. Plan Approval & Adoption

The Plan was presented to the This Plan was completed in a series of open meetings beginning on April 25, 2017. The Plan was presented to the Town for review, submitted to HSEM for Conditional Approval (*APA, Approved Pending Adoption*), formally adopted by the Board of Selectmen and resubmitted to HSEM for Final Approval. Once Final Approval from HSEM was met, copies of the Plan were distributed to the Town, HESM, FEMA, DNCR and the USDA-FS; the Plan was then distributed as these entities saw fit. Copies of the Plan remain on file at Mapping and Planning Solutions (MAPS) in both digital and paper format.

Adoption by the local governing body demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in the Plan. Adoption legitimizes the Plan and authorizes responsible agencies to execute their responsibilities. The Plan shall include documentation of the resolution adopting the Plan as per requirement §201.6(c)(5).

*Presby Road, April 11, Storm Damage*  
*Photo Credit: Town of Sugar Hill*



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## Chapter 11: Signed Community Documents and Approval Letters

### A. Planning Scope of Work & Agreement

#### PLANNING SCOPE OF WORK & AGREEMENT

##### HAZARD MITIGATION PLAN

(DATE REVISED)



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#### PARTIES TO THE AGREEMENT

Mapping and Planning Solutions  
Town of Sugar Hill, NH

Current Plan Expiration: February 27, 2017  
PDM15 Grant Expiration: October 31, 2018

This Agreement between the Town of Sugar Hill (the Town) or its official designee and Mapping and Planning Solutions (MAPS) outlines the Town's desire to engage the services of MAPS to assist in planning and technical services in order to produce the 2017 Hazard Mitigation Plan Update (the Plan).

#### **Agreement**

This Agreement outlines the responsibilities that will ensure that the Plan is developed in a manner that involves Town members and local, federal and state emergency responders and organizations. The Agreement identifies the work to be done by detailing the specific tasks, schedules and finished products that are the result of the planning process.

The goal of this Agreement is that the Plan and planning process be consistent with Town policies and that it accurately reflects the values and individuality of the Town. This is accomplished by forming a working relationship between the Town's citizens, the Planning Team and MAPS.

The Plan created as a result of this Agreement will be presented to the Town for adoption once conditional approval is received from FEMA. When adopted, the Plan provides guidance to the Town, commissions, and departments; adopted plans serve as a guide and do not include any financial commitments by the Town. Additionally, all adopted plans should address mitigation strategies for reducing the risk of natural, man-made, and wildfire disasters on life and property and written so that they may be integrated within other Town planning initiatives.

#### **Scope of Work**

##### ***MAPS - Responsibilities include, but are not limited to, the following:***

- MAPS will collect data that is necessary to complete the Plan and meet the requirements of the FEMA Plan Review Tool by working with the Planning Team (the Team) and taking public input from community members.
- With the assistance of the Team, MAPS will coordinate and facilitate meetings and provide any materials, handouts and maps necessary to provide a full understanding of each step in the planning process.
- MAPS will assist the Team in the development of goals, objectives and implementation strategies and clearly define the processes needed for future plan monitoring, educating the public and integrating the Plan with other Town plans and activities.
- MAPS will coordinate and collaborate with other federal, state and local agencies throughout the process.



- MAPS will explain and delineate the Town's Wildland Urban Interface (WUI) and working with the Team, will establish a list of potential hazards and analyze the risk severity of each.
- MAPS will author, edit and prepare the Plan for review by the Team prior to submitting the Plan to FEMA for conditional approval. Upon conditional approval by FEMA, MAPS will assist the planning team as needed with presentation of the Plan to the Sugar Hill Board of Selectmen and/or Planning Board and continue to work with the Town until final approval and distribution of the Plan is complete, unless extraordinary circumstances prevail.
- MAPS shall provide, at its office, all supplies and space necessary to complete the Sugar Hill Hazard Mitigation Plan.
- After final approval is received from FEMA, MAPS will provide the Town with a two copies of the Plan containing all signed documents, approvals and GIS maps along with CDs containing these same documents in digital form, for distribution by the Town as it sees fit. Additional CDs may be requested at no additional cost. CD copies of the Plan will be distributed by MAPS to collaborating agencies including, but not limited to, NH Homeland Security (HSEM) and FEMA.
- MAPS will provide Plan maintenance reminders and assistance on an annual basis leading up to the next five-year plan update at no cost to the Town, if requested by the Town.

***The Town - Responsibilities include but are not limited to the following:***

- The Town shall insure that the Planning Team includes members who are able to support the planning process by identifying available Town resources including people who will have access to and can provide pertinent data. The planning team should include, but not be limited to, such Town members as the local Emergency Management Director, the Fire, Ambulance and Police Chiefs, members of the Board of Selectmen and the Planning Board, the Public Works Director or Road Agent, representatives from relevant federal and state organizations, other local officials, property owners, and relevant businesses or organizations.
- The Town shall determine a lead contact to work with MAPS. This contact shall assist with recruiting participants for planning meetings, including the development of mailing lists when and if necessary, distribution of flyers, and placement of meeting announcements. In addition, this contact shall assist MAPS with organizing public meetings to develop the Plan and offer assistance to MAPS in developing the work program which will produce the Plan.
- The Town shall gain the support of stakeholders for the recommendations found within the Plan.
- The Town shall provide public access for all meetings and provide public notice at the start of the planning process and at the time of adoption, as required by FEMA.
- The proposed Plan shall be submitted to the Board of Selectmen and/or Planning Board for consideration and adoption.
- After adoption and final approval from FEMA is received, the Town will:
  - *Distribute copies of the Plan as it sees fit throughout the local community.*
  - *Develop a team to monitor and work toward plan implementation.*
  - *Publicize the Plan to the Community and insure citizen awareness.*
  - *Urge the Planning Board to incorporate priority projects into the Town's Capital Improvement Plan (if available).*
  - *Integrate mitigation strategies and priorities from the Plan into other Town planning documents.*

## Terms

- **Fees & Payment Schedule:** The contract price is limited to \$6,000; an invoice will be sent to the Town for each payment as outlined below.
  - 1. Initial payment upon signing of this contract and receipt of first invoice ..... \$3,000
  - 2. Second payment upon Plan submittal to FEMA for Conditional Approval..... \$2,800
  - 3. Final payment upon project completion and receipt of final Plan copy ..... \$200
  - Total Fees..... \$6,000

- **Payment Procedures:** The payment procedure is as follows:

- MAPS will invoice the Town
- The Town will pay MAPS
- The Town will forward the MAPS invoice along with an invoice from the Town on letterhead to HSEM
- HSEM will reimburse the Town for the monies paid to MAPS

All payments to MAPS are fully reimbursable to the Town by Homeland Security & Emergency Management.

- **Required Matching Funds:** The Town of Sugar Hill will be responsible to provide and document any and all resources to be used to meet the FEMA required matching funds in the amount of \$2,000. Matching funds are the responsibility of the Town of Sugar Hill, not MAPS. Mapping and Planning Solutions will however assist the Town with attendance tracking by asking meeting attendees to “sign in” at all meetings and to “log” any time spent outside of the meetings working on this project. MAPS will provide the Town with final attendance records in spreadsheet form at project’s end for the Town to use in its match fulfillment.
- **Project Period:** This project shall begin upon signing this Agreement by both parties and continue through a date yet to be determined or whenever the planning process is complete. The project period may be extended by mutual written Agreement between the Town, MAPS and Homeland Security if required. The actual project end date is dependent upon timely adoptions and approvals which may be outside of the control of MAPS and the Town. It is anticipated that five or six two-hour meetings will be required to gather the necessary information to create the updated the Plan.

The grant provided for this project is a Pre-Disaster Mitigation Grant (PDM15); per the grant agreement between the Town and HSEM, all work must be completed by October 31, 2018. It is expected that this project will be completed long before the grant expiration date of October 31, 2018.

- **Ownership of Material:** All maps, reports, documents and other materials produced during the project period shall be owned by the Town; each party may keep file copies of any generated work. MAPS shall have the right to use work products collected during the planning process; however, MAPS shall not use any data in such a way as to reveal personal or public information about individuals or groups which could reasonably be considered confidential.
- **Termination:** This Agreement may be terminated if both parties agree in writing. In the event of termination, MAPS shall forward all information prepared to date to the Town. MAPS shall be entitled to recover its costs for any work that was completed.
- **Limit of Liability:** MAPS agrees to perform all work in a diligent and efficient manner according to the terms of this Agreement. MAPS' responsibilities under this Agreement depend upon the cooperation of the Town of Sugar Hill. MAPS and its employees, if any, shall not be liable for opinions rendered, advice, or errors resulting from the quality of data that is supplied. Adoption of the Plan by the Town and final approval of the Plan by FEMA, relieve MAPS of content liability. Mapping and Planning Solutions carries annual general liability insurance.

- **Amendments:** Changes, alterations or additions to this Agreement may be made if agreed to in writing between both the Town of Sugar Hill and Mapping and Planning Solutions.
- **About Mapping and Planning Solutions:** Mapping and Planning Solutions provides hazard mitigation and emergency operations planning throughout New Hampshire. Mapping and Planning Solutions has developed more than forty Hazard Mitigation Plans, more than fifteen Emergency Operations Plans and has completed the following FEMA courses in Emergency Planning and Operations:
  - Introduction to Incident Command System, IS-100.a
  - ICS Single Resources and Initial Action Incidents, IS-200.a
  - National Incident Management System (NIMS) An Introduction, IS-700.a
  - National Response Framework, An Introduction, IS 800.b
  - Emergency Planning, IS-235
  - Homeland Security Exercise & Evaluation Program (HSEEP)
  - IS-547.a – Introduction to Continuity Operations
  - IS-546.a – Continuity of Operations (COOP) Awareness Course
  - G-318; Preparing & Review Hazard Mitigation Plans

➤ **Contacts:**

**For Mapping & Planning Solutions**

June Garneau  
Mapping and Planning Solutions  
105 Union Street, Unit 1  
Whitefield, NH 03598  
(603) 837-7122; (603) 991-9664 (cell)

**For the Town**

Allan Clark  
Emergency Management Director/Fire Chief  
PO Box 574  
1411 Route 117  
Sugar Hill, NH 03586  
chief@sugarhillfd.org  
(603) 823-8415

**Signature below indicates acceptance of and Agreement to details outlined in this Agreement**

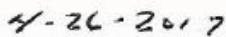
**FOR THE TOWN OF SUGAR HILL, NH**



Signature

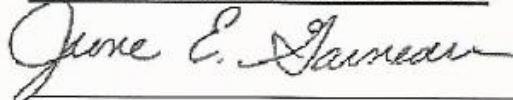


Printed Name/Title



Date

**FOR MAPPING AND PLANNING SOLUTIONS**



Signature

June Garneau, Owner  
April 26, 2017

**Signatures are scanned facsimiles; original signatures are on file.**



## **B. Conditional Approval Letter from FEMA**

### **Sugar Hill, NH - Approvable Pending Adoption**

Hazard Mitigation Planning <HazardMitigationPlanning@dos.nh.gov>

Sent: Mon 7/31/2017 8:19 AM

To: 'June Garneau'

Cc: 'selectmen@sugarhillnh.org'; 'Chief Clark'

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Good morning!

The Department of Safety, Division of Homeland Security & Emergency Management (HSEM) has completed its review of the Sugar Hill, NH Hazard Mitigation Plan and found it approvable pending adoption. Congratulations on a job well done!

With this approval, the jurisdiction meets the local mitigation planning requirements under 44 CFR 201 **pending HSEM's receipt of electronic copies of the adoption documentation and the final plan.**

Acceptable electronic formats include Word or PDF files and must be submitted to us via email at [HazardMitigationPlanning@dos.nh.gov](mailto:HazardMitigationPlanning@dos.nh.gov). Upon HSEM's receipt of these documents, notification of formal approval will be issued, along with the final Checklist and Assessment.

The approved plan will be submitted to FEMA on the same day the community receives the formal approval notification from HSEM. FEMA will then issue a Letter of Formal Approval to HSEM for dissemination that will confirm the jurisdiction's eligibility to apply for mitigation grants administered by FEMA and identify related issues affecting eligibility, if any. If the plan is not adopted within one calendar year of HSEM's Approval Pending Adoption, the jurisdiction must update the entire plan and resubmit it for HSEM review. If you have questions or wish to discuss this determination further, please contact me at [Whitney.Welch@dos.nh.gov](mailto:Whitney.Welch@dos.nh.gov) or 603-223-3667.

Thank you for submitting the Sugar Hill, NH Hazard Mitigation Plan and again, congratulations on your successful community planning efforts.

Sincerely,

Whitney

*Signature is a scanned facsimile; original signatures are on file.*

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***C. Signed Certificate of Adoption***

**CERTIFICATE OF ADOPTION**

**SUGAR HILL, NH**

**BOARD OF SELECTMEN**

**A RESOLUTION ADOPTING THE TOWN OF SUGAR HILL HAZARD MITIGATION PLAN UPDATE 2017**

WHEREAS, the Town of Sugar Hill has historically experienced severe damage from natural hazards and it continues to be vulnerable to the effects of those natural hazards profiled in this plan, resulting in loss of property and life, economic hardship and threats to public health and safety; and

WHEREAS, the Town of Sugar Hill has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its Hazard Mitigation Plan Update 2017 under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held between April 25, 2017 and July 13, 2017 regarding the development and review of the Hazard Mitigation Plan Update 2017 and

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

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the Town of Sugar Hill 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 Sugar Hill eligible for funding to alleviate the impacts of future hazards; now therefore be it

RESOLVED by the Board of Selectmen:

1. The Plan is hereby adopted as an official plan of the Town of Sugar Hill;
2. The respective officials identified in the mitigation action items of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;

**Sugar Hill, Hazard Mitigation Plan Update Certificate of Adoption, page two**

3. Future revisions and Plan maintenance required by 44 CFR 201.6 and FEMA are hereby adopted as a part of this resolution for a period of five (5) years from the date of this resolution;
4. An annual report on the progress of the implementation elements of the Plan shall be presented to the Board of Selectmen by the Emergency Management Director.

Adopted this day, the 3<sup>rd</sup> of July, 2017

**Chairman of the Board of Selectmen**

Richard Bielefield  
Signature

RICHARD BIELEFIELD  
Print Name

**Member of the Board of Selectmen**

Margaret Connors  
Signature

Margaret Connors  
Print Name

**Member of the Board of Selectmen**

John Stusser  
Signature

JOHN STUSSER  
Print Name

**Emergency Management Director**

Alan R. Clark  
Signature

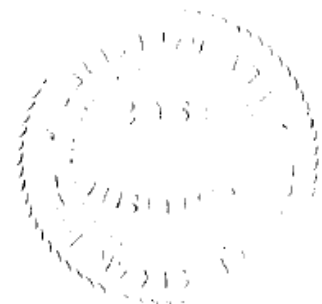
Alan R. Clark  
Print Name

IN WITNESS WHEREOF, the undersigned has affixed his/her signature and the corporate seal of the Town of Sugar Hill on this day, July 31, 2017

Lisa M. Boissonneault  
Notary

7/13/2021  
Expiration

7/31/17  
Date



Signatures are scanned facsimile; original signatures are on file.

**D. Final Approval Letter from FEMA**

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



**FEMA**

AUG 21 2017

Whitney Welch  
State Hazard Mitigation Officer  
NH Dept. of Safety HS & EM  
33 Hazen Drive  
Concord, NH 03303

Dear Ms. Welch:

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

As outlined in the FEMA-State Agreement for FEMA-DR-4316 your office has been delegated the authority to review and approve local mitigation plans under the Program Administration by States Pilot Program. On **August 1, 2017**, our Agency was notified that your office completed its review of the Sugar Hill Hazard Mitigation Plan Update 2017 and determined it meets the requirements of 44 C.F.R. Pt. 201.

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

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

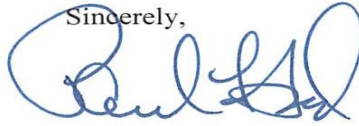
The Sugar Hill Hazard Mitigation Plan Update 2017 must be reviewed, revised as appropriate, and resubmitted to New Hampshire Homeland Security and Emergency Management for approval within **five years of the plan approval date of August 1, 2017** in order to maintain eligibility for mitigation grant funding. We encourage the Town to continually update the plan's assessment of vulnerability, adhere to its maintenance schedule, and implement, when possible, the mitigation actions proposed in the plan.

Whitney Welch  
Page 2

AUG 21 2017

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

Sincerely,



Paul F. Ford  
Acting Regional Administrator

PFF: ms

cc: Fallon Reed, Chief of Planning, New Hampshire  
Jennifer Gilbert, New Hampshire State NFIP Coordinator

*Signatures are scanned facsimile; original signatures are on file.*

**E. CWPP Approval Letter from DNCR**

**Sugar Hill, NH  
A Resolution Approving the  
Sugar Hill Hazard Mitigation Plan Update 2017  
As a Community Wildfire Protection Plan**

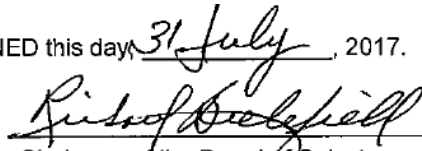
Several public meetings and committee meetings were held between April 25, 2017 and July 13, 2017 regarding the development and review of the Sugar Hill Hazard Mitigation Plan Update 2017. The Sugar Hill Hazard Mitigation Plan Update 2017 contains potential future projects to mitigate hazard and wildfire damage in the Town of Sugar Hill.

The Fire Chief along with the Board of Selectmen and EMD desire that this Plan and be accepted by the Department of Natural & Cultural Resources (DNCR) as a Community Wildfire Protection Plan, having adhered to the requirements of said Plan.

The Board of Selectmen, EMD and the Fire Chief approve the Sugar Hill Hazard Mitigation Plan Update 2017 and understand that with approval by DNCR, this Plan will also serve as a Community Wildfire Protection Plan.

For the Town of Sugar Hill

APPROVED and SIGNED this day, 31 July, 2017.

  
Chairman of the Board of Selectmen

RICHARD BIELEFIELD  
Printed Name

  
Fire Chief

ALLAN R. CLARK  
Printed Name

  
Emergency Management Director

ALLAN R. CLARK  
Printed Name

**For the Department of Natural & Cultural Resources**

APPROVED and SIGNED this day, August 16, 2017.

  
Forest Ranger – NH Division of Forest and Lands, DNCR

APPROVED and SIGNED this day, 8/16, 2017.

  
Director – NH Division of Forest and Lands, DNCR

*\*Signature is a scanned facsimile; original signatures are on file.*



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## F. Annual Review or Post Hazard Concurrence Forms

### YEAR ONE

Check all that apply

- ☐ Annual Review & Concurrence - **Year One**: \_\_\_\_\_ (Date)
- ☐ Annual Review & Concurrence – Post Hazardous Event: \_\_\_\_\_ (Event/Date)
- ☐ Annual Review & Concurrence – Post Hazardous Event: \_\_\_\_\_ (Event/Date)

The Town of Sugar Hill, NH shall execute this page annually by the members of the Town's governing body and the Town's designated Emergency Management Director after inviting the public to attend any and all hearings that pertain to this annual and/or post hazard review and/or update by means such as press releases in local papers, posting meeting information on the Town website and at the Town Offices, sending letters to federal, state local organizations impacted by the Plan posting notices in public places in the Town.

Sugar Hill, NH  
Hazard Mitigation Plan Update

REVIEWED AND APPROVED

DATE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

PRINTED NAME: \_\_\_\_\_

Emergency Management Director

CONCURRENCE OF APPROVAL

SIGNATURE: \_\_\_\_\_

PRINTED NAME: \_\_\_\_\_

Chairman of the Select Board

Changes and notes regarding the 2017 Hazard Mitigation Plan Update

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**Please use reverse side for additional notes** 

### Additional Notes – Year One:

[illegible]

**YEAR TWO**

Check all that apply

- ☐ Annual Review & Concurrence - **Year Two**: \_\_\_\_\_ (Date)
- ☐ Annual Review & Concurrence – Post Hazardous Event: \_\_\_\_\_ (Event/Date)
- ☐ Annual Review & Concurrence – Post Hazardous Event: \_\_\_\_\_ (Event/Date)

The Town of Sugar Hill, NH shall execute this page annually by the members of the Town's governing body and the Town's designated Emergency Management Director after inviting the public to attend any and all hearings that pertain to this annual and/or post hazard review and/or update by means such as press releases in local papers, posting meeting information on the Town website and at the Town Offices, sending letters to federal, state local organizations impacted by the Plan posting notices in public places in the Town.

Sugar Hill, NH  
Hazard Mitigation Plan Update

REVIEWED AND APPROVED

DATE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

PRINTED NAME: \_\_\_\_\_

Emergency Management Director

CONCURRENCE OF APPROVAL

SIGNATURE: \_\_\_\_\_

PRINTED NAME: \_\_\_\_\_

Chairman of the Select Board

Changes and notes regarding the 2017 Hazard Mitigation Plan Update

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***Please use reverse side for additional notes*** 

### Additional Notes – Year Two:

[illegible]

**YEAR THREE**

Check all that apply

- ☐ Annual Review & Concurrence - **Year Three:** \_\_\_\_\_ (Date)
- ☐ Annual Review & Concurrence – Post Hazardous Event: \_\_\_\_\_ (Event/Date)
- ☐ Annual Review & Concurrence – Post Hazardous Event: \_\_\_\_\_ (Event/Date)

The Town of Sugar Hill, NH shall execute this page annually by the members of the Town's governing body and the Town's designated Emergency Management Director after inviting the public to attend any and all hearings that pertain to this annual and/or post hazard review and/or update by means such as press releases in local papers, posting meeting information on the Town website and at the Town Offices, sending letters to federal, state local organizations impacted by the Plan posting notices in public places in the Town.

Sugar Hill, NH  
Hazard Mitigation Plan Update

REVIEWED AND APPROVED

DATE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

PRINTED NAME: \_\_\_\_\_

Emergency Management Director

CONCURRENCE OF APPROVAL

SIGNATURE: \_\_\_\_\_

PRINTED NAME: \_\_\_\_\_

Chairman of the Select Board

Changes and notes regarding the 2017 Hazard Mitigation Plan Update

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***Please use reverse side for additional notes*** 

### Additional Notes – Year Three:

[illegible]



**YEAR FOUR**

Check all that apply

- ☐ Annual Review & Concurrence - **Year Four**: \_\_\_\_\_ (Date)
- ☐ Annual Review & Concurrence – Post Hazardous Event: \_\_\_\_\_ (Event/Date)
- ☐ Annual Review & Concurrence – Post Hazardous Event: \_\_\_\_\_ (Event/Date)

The Town of Sugar Hill, NH shall execute this page annually by the members of the Town's governing body and the Town's designated Emergency Management Director after inviting the public to attend any and all hearings that pertain to this annual and/or post hazard review and/or update by means such as press releases in local papers, posting meeting information on the Town website and at the Town Offices, sending letters to federal, state local organizations impacted by the Plan posting notices in public places in the Town.

Sugar Hill, NH  
Hazard Mitigation Plan Update

REVIEWED AND APPROVED

DATE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

PRINTED NAME: \_\_\_\_\_

Emergency Management Director

CONCURRENCE OF APPROVAL

SIGNATURE: \_\_\_\_\_

PRINTED NAME: \_\_\_\_\_

Chairman of the Select Board

Changes and notes regarding the 2017 Hazard Mitigation Plan Update

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***Please use reverse side for additional notes*** 

### Additional Notes – Year Four:

[illegible]

## Chapter 12: Appendices

- APPENDIX A: BIBLIOGRAPHY
- APPENDIX B: TECHNICAL AND FINANCIAL ASSISTANCE FOR HAZARD MITIGATION
  - *Hazard Mitigation Grant Program (HMGP)*
  - *Pre-Disaster Mitigation (PDM)*
  - *Flood Mitigation Assistance (FMA)*
  - *Repetitive Flood Claims (RFC)*
  - *Severe Repetitive Loss (SRL)*
- APPENDIX C: THE EXTENT OF HAZARDS
- APPENDIX D: PRESIDENTIAL DISASTER & EMERGENCY DECLARATIONS
- APPENDIX E: POTENTIAL MITIGATION IDEAS
- APPENDIX F: ACRONYMS
- APPENDIX G: MAP DOCUMENTS
  - *Map 1 – Base Risk Analysis*
  - *Map 2 – Historic Fires & the Wildland Urban Interface (WUI)*
  - *Map 3 – Past & Potential Areas of Concern*
  - *Map 4 – Critical Infrastructure & Key Resources*

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## Appendix A: Bibliography

### Documents

- **Local Hazard Mitigation Planning Review Guide**, FEMA, October 2011
- **Local Hazard Mitigation Planning Handbook**, FEMA, March 2013
- **Mitigation Ideas, A Resource for Reducing Risk to Natural Hazards**, FEMA, January 2013
- **Hazard Mitigation Unified Guidance**, FEMA, July 12, 2013
- **Hazard Mitigation Assistance Guidance**, FEMA, February 27, 2015
- **Hazards Mitigation Plans**
  - Sugar Hill Hazard Mitigation Plan, 2012
  - Whitefield Hazard Mitigation Plan, 2017
  - Easton Hazard Mitigation Plan, 2016
  - Lyme Hazard Mitigation Plan, 2017
- **NH State Multi-Hazard Mitigation Plan**, 2013
  - <http://www.nh.gov/safety/divisions/hsem/HazardMitigation/documents/hazard-mitigation-plan.pdf>
- **NH Division of Forests and Lands Quarterly Update**
  - <http://www.nhdfi.org/fire-control-and-law-enforcement/fire-statistics.aspx>
- **Disaster Mitigation Act (DMA) of 2000**, Section 101, b1 & b2 and Section 322a
  - <http://www.fema.gov/library/viewRecord.do?id=1935>
- **Economic & Labor Market Information Bureau**, NH Employment Security, April 2017; Community Response for Sugar Hill, Received, 5/23/16, Census 2000 and Revenue Information derived from this site; <https://www.nhes.nh.gov/elmi/products/cp/profiles-pdf/sugarhill.pdf>

**Photos:** Photos taken by MAPS unless otherwise noted.

### Additional Websites

- **Wildfire Links**
  - US Forest Service; <http://www.fs.fed.us>
  - US Fire Administration; <http://www.usfa.dhs.gov/>
  - US Department of Agriculture Wildfire Programs: <http://www.wildfireprograms.usda.gov/>
  - Firewise; <http://www.firewise.org/>
  - Fire Adapted Communities; [www.fireadapted.org](http://www.fireadapted.org)
  - Wildfire Preparedness Guide to Forest Wardens; [www.quickseries.com](http://www.quickseries.com)
  - Ready Set Go; [www.wildlandfires.org](http://www.wildlandfires.org)
  - Fire education for children; [www.smokeybear.com](http://www.smokeybear.com)
- NH Homeland Security & Emergency Management; <http://www.nh.gov/safety/divisions/hsem/>
- US Geological Society; <http://water.usgs.gov/ogw/subsidence.html>
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- Floodsmart, about the NFIP; [http://www.floodsmart.gov/floodsmart/pages/about/nfip\\_overview.jsp](http://www.floodsmart.gov/floodsmart/pages/about/nfip_overview.jsp)
- NOAA, National Weather Service; <http://www.nws.noaa.gov/glossary/index.php?letter=w>
- NOAA, Storm Prediction Center; <http://www.spc.noaa.gov/faq/tornado/beaufort.html>
- National Weather Service; [http://www.nws.noaa.gov/om/cold/wind\\_chill.shtml](http://www.nws.noaa.gov/om/cold/wind_chill.shtml)
- Center for Disease Control; <https://www.cdc.gov/disasters/winter/index.html>
- Slate; <http://www.slate.com/id/2092969/>
- NH Office of Energy and Planning; <http://www.nh.gov/oep/planning/programs/fmp/join-nfip.htm>
- Code of Federal Regulations; Title 14, Aeronautics and Space; Part 1, Definitions and Abbreviations; [https://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title14/14tab\\_02.tpl](https://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title14/14tab_02.tpl)
- Federal Aviation Administration; <http://faa.custhelp.com>
- US Legal, Inc.; <http://definitions.uslegal.com/v/violent-crimes/>

## Appendix B: Technical & Financial Assistance for Hazard Mitigation

FEMA's Hazard Mitigation Assistance (HMA) grant programs provide funding FEMA's Hazard Mitigation Assistance (HMA) grant programs provide funding for eligible mitigation activities that reduce disaster losses and protect life and property from future disaster damages. Currently, FEMA administers the following HMA grant programs<sup>21</sup>:

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

### Did You Know?



Money spent on reducing the risk of natural hazards is a wise investment. FEMA administers three grant programs that provide funding for eligible mitigation planning and projects: the Hazard Mitigation Grant Program (HMGP), the Flood Mitigation Assistance (FMA) Program, and the Pre-Disaster Mitigation (PDM) Program.

FEMA's HMA grants are provided to eligible Applicants (States/Tribes/Territories) that, in turn, provide sub-grants to local governments and communities. The Applicant selects and prioritizes subapplications developed and submitted to them by subapplicants. These subapplications are submitted to FEMA for consideration of funding.

Prospective subapplicants should consult the office designated as their Applicant for further information regarding specific program and application requirements. Contact information for the FEMA Regional Offices and State Hazard Mitigation Officers is available on the FEMA website, [www.fema.gov](http://www.fema.gov).

### HMA Grant Programs

The HMA grant programs provide funding opportunities for pre- and post-disaster mitigation. While the statutory origins of the programs differ, all share the common goal of reducing the risk of loss of life and property due to Natural Hazards. Brief descriptions of the HMA grant programs can be found below.

#### A. Hazard Mitigation Grant Program (HMGP)

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

Table 3: Eligible Activities by Program

Eligible Activities	HMGP	PDM	FMA
<b>1. Mitigation Projects</b>	✓	✓	✓
Property Acquisition and Structure Demolition	✓	✓	✓
Property Acquisition and Structure Relocation	✓	✓	✓
Structure Elevation	✓	✓	✓
Mitigation Reconstruction	✓	✓	✓
Dry Floodproofing of Historic Residential Structures	✓	✓	✓
Dry Floodproofing of Non-residential Structures	✓	✓	✓
Generators	✓	✓	
Localized Flood Risk Reduction Projects	✓	✓	✓
Non-localized Flood Risk Reduction Projects	✓	✓	
Structural Retrofitting of Existing Buildings	✓	✓	✓
Non-structural Retrofitting of Existing Buildings and Facilities	✓	✓	✓
Safe Room Construction	✓	✓	
Wind Retrofit for One- and Two-Family Residences	✓	✓	
Infrastructure Retrofit	✓	✓	✓
Soil Stabilization	✓	✓	✓
Wildfire Mitigation	✓	✓	
Post-Disaster Code Enforcement	✓		
Advance Assistance	✓		
5 Percent Initiative Projects	✓		
Miscellaneous/Other <sup>(1)</sup>	✓	✓	✓
<b>2. Hazard Mitigation Planning</b>	✓	✓	✓
Planning Related Activities	✓		
<b>3. Technical Assistance</b>			✓
<b>4. Management Cost</b>	✓	✓	✓

<sup>(1)</sup> Miscellaneous/Other indicates that any proposed action will be evaluated on its own merit against program requirements. Eligible projects will be approved provided funding is available.

Eligibility Chart taken from Hazard Mitigation Assistance Guidance, February 27, 2015

<sup>21</sup> Information in Appendix B is taken from the following website and links to specific programs unless otherwise noted [http://www.fema.gov/media-library-data/1424983165449-38f5dfc69c0bd4ea8a161e8bb7b79553/HMA\\_Guidance\\_022715\\_508.pdf](http://www.fema.gov/media-library-data/1424983165449-38f5dfc69c0bd4ea8a161e8bb7b79553/HMA_Guidance_022715_508.pdf)



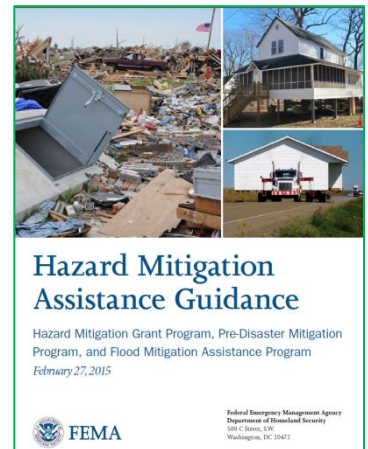
### What is the Hazard Mitigation Grant Program?

The Hazard Mitigation Grant Program (HMGP) provides grants to States and local governments to implement long-term hazard mitigation measures after a major disaster declaration. Authorized under Section 404 of the Stafford Act and administered by FEMA, HMGP was created to reduce the loss of life and property due to natural disasters. The program enables mitigation measures to be implemented during the immediate recovery from a disaster.

### Who is eligible to apply?

Hazard Mitigation Grant Program funding is only available to applicants that reside within a presidentially declared disaster area. Eligible applicants are

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



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

### How are potential projects selected and identified?

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

The State prioritizes and selects project applications developed and submitted by local jurisdictions. The State forwards applications consistent with State mitigation planning objectives to FEMA for eligibility review. Funding for this grant program is limited and States and local communities must make difficult decisions as to the most effective use of grant funds.

## **B. Pre-Disaster Mitigation (PDM)**

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

### Program Overview

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

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

### **C. Flood Mitigation Assistance (FMA)**

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

#### Program Overview

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

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

#### Types of FMA Grants

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

**Planning Grants** to prepare Flood Mitigation Plans. Only NFIP-participating communities with approved Flood Mitigation Plans can apply for FMA Project grants.

**Project Grants** to implement measures to reduce flood losses, such as elevation, acquisition, or relocation of NFIP-insured structures. States are encouraged to prioritize FMA funds for applications that include repetitive loss properties; these include structures with 2 or more losses each with a claim of at least \$1,000 within any ten-year period since 1978.

**Technical Assistance Grants** for the State to help administer the FMA program and activities. Up to ten percent (10%) of Project grants may be awarded to States for Technical Assistance Grants

### **D. Repetitive Flood Claims (RFC)**

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

#### Program Overview

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

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

#### Federal / Non-Federal Cost Share

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

### **E. Severe Repetitive Loss (SRL)**

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

#### Program Overview

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

#### Definition

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

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

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

#### Purpose

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

#### Federal / Non-Federal cost share

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

**For further information all of these programs, please refer to  
the new FEMA Hazard Mitigation Assistance Guidance:**

**[http://www.fema.gov/media-library-data/1424983165449-38f5dfc69c0bd4ea8a161e8bb7b79553/HMA\\_Guidance\\_022715\\_508.pdf](http://www.fema.gov/media-library-data/1424983165449-38f5dfc69c0bd4ea8a161e8bb7b79553/HMA_Guidance_022715_508.pdf)**

## Appendix C: The Extent of Hazards

Hazards indicated with an asterisk \* are included in this Plan.

### DAM FAILURE

A “Dam” means any artificial barrier, including appurtenant works, which impounds or diverts water, and which has a height of 4 feet or more, or a storage capacity of 2 acre-feet or more, or is located at the outlet of a great pond<sup>[1]</sup>. A dam failure occurs when water overtops the dam, or there is structural failure of the dam which causes there to be a breach and an unintentional release of water. Dams are classified in the following manner<sup>22</sup>:

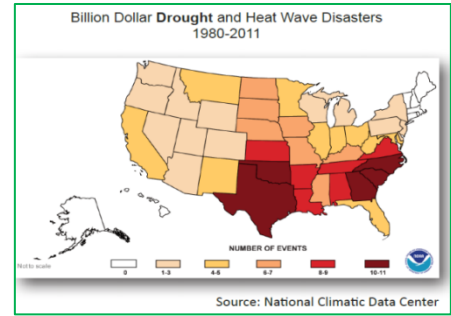
Classification	Description	Inspection Intervals
<b>Non-Menace</b>	A dam that is not a menace because it is in a location and of a size that failure or misoperation of the dam would not result in probable loss of life or loss to property. The dam must be less than six feet in height if the storage capacity is greater than 50 acre-feet or less than 25 feet in height if it has a storage capacity of 15-50 acre-feet.	Every 6 years
<b>Low Hazard</b>	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 no possible loss of life, low economic loss to structures or property, structural damage to a town or city road or private road accessing property other than the dam owner's that could render the road impassable or otherwise interrupt public safety services, the release of liquid industrial, agricultural, or commercial wastes, septage, or contained sediment if the storage capacity is less two-acre-feet and is located more than 250 feet from a water body or water course, and/or reversible environmental losses to environmentally-sensitive sites.	Every 6 years
<b>Significant Hazard</b>	A dam that has a significant hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in no probable loss of lives; however, there would be major economic loss to structures or property, Structural damage to a Class I or Class II road that could render the road impassable or otherwise interrupt public safety services, major environmental or public health losses including one or more of the following: Damages to a public water system (RSA 485:1-a, XV) which will take longer than 48 hours to repair, the release of liquid industrial, agricultural, or commercial wastes, septage, sewage, or contaminated sediments if the storage capacity is 2 acre-feet or more; or damage to an environmentally-sensitive site that does not meet the definition of reversible environmental losses.	Every 4 years
<b>High Hazard</b>	A dam that has a high hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in probable loss of human life as well as a result of; water levels and velocities causing the structural failure of a foundation of a habitable residential structure or commercial or industrial structure which is occupied under normal conditions; water levels rising above the first floor elevation of a habitable residential structure or a commercial or industrial structure, which is occupied under normal conditions when the rise due to a dam failure is greater than one foot; structural damage to an interstate highway, which could render the roadway impassable or otherwise interrupt public safety services; the release of a quantity and concentration of material, which qualify as “hazardous waste” as defined by RSA 147-A:2 VII; or any other circumstance that would more likely than not cause one or more deaths.	Every 2 years

<sup>[1]</sup> NH DES [http://des.nh.gov/organization/divisions/water/dwgb/wrpp/documents/primer\\_chapter11.pdf](http://des.nh.gov/organization/divisions/water/dwgb/wrpp/documents/primer_chapter11.pdf)

<sup>22</sup> <http://des.nh.gov/organization/commissioner/pip/factsheets/db/documents/db-15.pdf>

## \*DROUGHT

A drought is defined as a long period of abnormally low precipitation, especially one that adversely affects the growing season or living conditions of plants and animals. Droughts are rare in New Hampshire. They generally are not as damaging and disruptive as floods and are more difficult to define. The effect of drought is indicated through measurements of soil moisture, groundwater levels and stream flow.



However, not all of these indicators will be minimal during a drought. For example, frequent minor rainstorms can replenish the soil moisture without raising groundwater levels or increasing stream flow. Low stream flow also correlates with low groundwater levels because groundwater discharge to streams and rivers maintains stream flow during extended dry periods. Low stream flow and low groundwater levels commonly cause diminished water supply.

### NEW HAMPSHIRE DROUGHT HISTORY

Dates	Area Affected	Recurrence Interval Yrs	Remarks
1929-1936	Statewide	10 to > 25	Regional
1939-1944	Statewide	10 to > 25	Severe in southeast and moderate elsewhere
1947-1950	Statewide	10 to 25	Moderate
1960-1969	Statewide	> 25	Regional longest recorded continuous spell of less than normal precipitation
2001-2002	Statewide	Not yet determined	Third worst drought on record, exceeded only by the drought of 1956-1966 and 1941-1942

NH DES; <http://des.nh.gov/organization/divisions/water/dam/drought/documents/historical.pdf>

## EARTHQUAKE

An earthquake is a rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric and phone lines and often cause landslides, flash floods, fires and avalanches. Larger earthquakes usually begin with slight tremors but rapidly take the form of one or more violent shocks and end in vibrations of gradually diminishing force called aftershocks. The underground point of origin of an earthquake is called its focus; the point on the surface directly above the focus is the epicenter. The magnitude and intensity of an earthquake is widely determined by the use of two scales, the more commonly used Richter scale (measures strength or magnitude) and the Mercalli Scale (measures intensity or severity). The chart to the right shows the two scales relative to one another. The Richter Scale measures earthquakes starting at 1 as the lowest with each successive unit being about 10 times stronger and more severe than the previous one.<sup>23</sup>

Four earthquakes occurred in New Hampshire between 1924-1989 having a magnitude of 4.2 or more. Two of these occurred in Ossipee, one west of Laconia and one near the Quebec border. It is well documented that there are fault lines running throughout New Hampshire, but high magnitude earthquakes have not been frequent in New Hampshire history.

Modified Mercalli Scale		Richter Magnitude Scale
I	Detected only by sensitive instruments	1.5
II	Felt by few persons at rest, especially on upper floors; delicately suspended objects may swing	2
III	Felt noticeably indoors, but not always recognized as earthquake; standing autos rock slightly, vibration like passing truck	2.5
IV	Felt indoors by many, outdoors by few, at night some may awaken; dishes, windows, doors disturbed; autos rock noticeably	3
V	Felt by most people; some breakage of dishes, windows, and plaster; disturbance of tall objects	3.5
VI	Felt by all, many frightened and run outdoors; falling plaster and chimneys, damage small	4
VII	Everybody runs outdoors; damage to buildings varies depending on quality of construction; noticed by drivers of autos	4.5
VIII	Panel walls thrown out of frames; fall of walls, monuments, chimneys; sand and mud ejected; drivers of autos disturbed	5
IX	Buildings shifted off foundations, cracked, thrown out of plumb; ground cracked; underground pipes broken	5.5
X	Most masonry and frame structures destroyed; ground cracked, rails bent, landslides	6
XI	Few structures remain standing; bridges destroyed, fissures in ground, pipes broken, landslides, rails bent	6.5
XII	Damage total; waves seen on ground surface, lines of sight and level distorted, objects thrown up in air	7

<sup>23</sup> Modified Mercalli Scale/Richter Scale Chart; MO DNR, [http://www.dnr.mo.gov/geology/geosrv/geores/richt\\_mercalli\\_relation.htm](http://www.dnr.mo.gov/geology/geosrv/geores/richt_mercalli_relation.htm)



## \*EROSION, MUDSLIDE & LANDSLIDE

Erosion is the wearing away of land, such as loss of riverbank, beach, shoreline or dune material. It is measured as the rate of change in the position or displacement of a riverbank or shoreline over a period of time. Short-term erosion typically results from periodic natural events, such as flooding, hurricanes, storm surge and windstorms but may be intensified by human activities. Long-term erosion is a result of multi-year impacts such as repetitive flooding, wave action, sea level rise, sediment loss, subsidence and climate change. Death and injury are not typically associated with erosion; however, it can destroy buildings and infrastructure.<sup>24</sup>

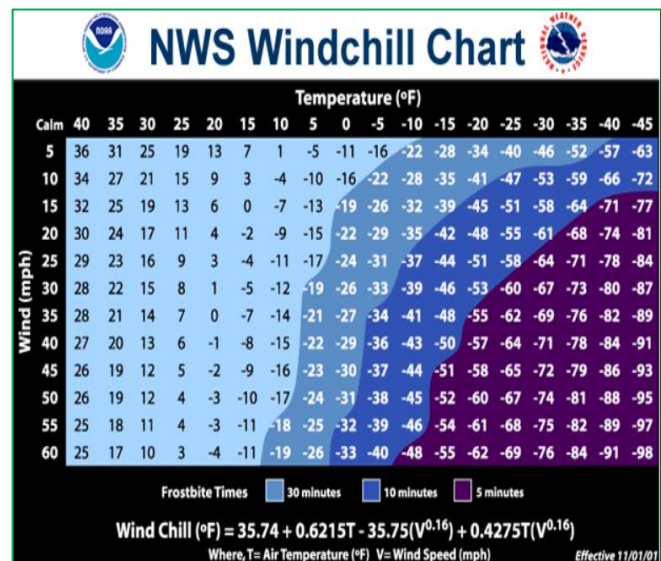
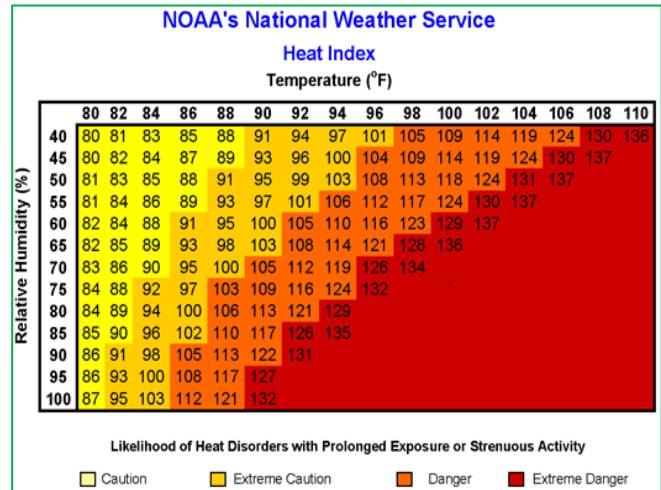
## \*EXTREME TEMPERATURES

### EXTREME HEAT

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.

Most heat disorders occur because the victim has been overexposed to heat or has over-exercised for his or her age and physical condition. Older adults, young children and those who are sick or overweight are more likely to succumb to extreme heat.

Conditions that can induce heat-related illnesses include stagnant atmospheric conditions and poor air quality. Consequently, people living in urban areas may be at greater risk from the effects of a prolonged heat wave than those living in rural areas. Also, asphalt and concrete store heat longer and gradually release heat at night, which can produce higher nighttime temperatures known as the "urban heat island effect."<sup>25</sup> The chart above explains the likelihood of heat disorders that may result from high heat.<sup>26</sup>



<sup>24</sup>Mitigation Ideas, A Resource for Reducing Risk to Natural Hazards, FEMA, January 2013

<sup>25</sup> NOAA, Index/Heat Disorders; <http://www.srh.noaa.gov/ssd/html/heatwv.htm>

<sup>26</sup> NOAA; <http://www.nws.noaa.gov/os/heat/index.shtml>

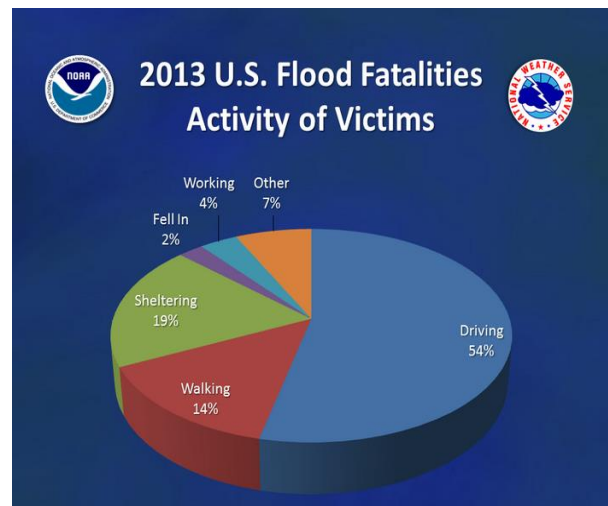
EXTREME COLD

What constitutes extreme cold and its effects can vary across different areas of the country. In regions relatively unaccustomed to winter weather, near freezing temperatures are considered “extreme cold.” Whenever temperatures drop decidedly below normal and as wind speed increases, heat can leave your body more rapidly; these weather related conditions may lead to serious health problems. Extreme cold is a dangerous situation that can bring on health emergencies in susceptible people without shelter or who are stranded, or who live in a home that is poorly insulated or without heat.<sup>27</sup> The National Weather Service Chart (previous page) shows windchill as a result of wind and temperature.<sup>28</sup>

**\*FLOODING**GENERAL FLOODING CONDITIONS

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

Inland floods are most likely to occur in the spring due to the increase in rainfall and melting of snow; however, floods can occur at any time of the year. A sudden thaw in the winter or a major downpour in the summer can cause flooding because there is suddenly a lot of water in one place with nowhere to go; warm temperatures and heavy rains cause rapid snowmelt producing prime conditions for flooding. In addition, rising waters in early spring often breaks ice into chunks that float downstream and pile up, causing flooding behind them. Small rivers and streams pose special flooding risks because they are easily blocked by jams. Ice in riverbeds and against structures presents a significant flooding threat to bridges, roads and the surrounding lands.

FLOODING (LOCAL, ROAD EROSION)

Heavy rain, rapid snowmelt and stream flooding often cause culverts to be overwhelmed and roads to wash out. Today, with changes in land use, aging roads, designs that are no longer effective and undersized culverts, the risk of flooding is a serious concern. Inadequate and aging storm water drainage systems create local flooding on both asphalt and gravel roads.

FLOODING (RIVERINE)

Floodplains are usually located in lowlands near rivers and flood on a regular basis. The term 100-year flood does not mean that flood will occur once every 100 years. It is a statement of probability that scientists and engineers use to describe how one flood compares to others that are likely to occur. It is more accurate to use the phrase “1% annual chance flood”. What this means is that there is a 1% chance of a flood of that size happening in any year. Flooding is often associated with hurricanes, heavy rains, ice jams and rapid snowmelt in the spring.

<sup>27</sup> CDC; <http://www.bt.cdc.gov/disasters/winter/guide.asp>

<sup>28</sup> National Weather Service; <http://www.nws.noaa.gov/om/windchill/>



## FLOODING (DAM FAILURE)

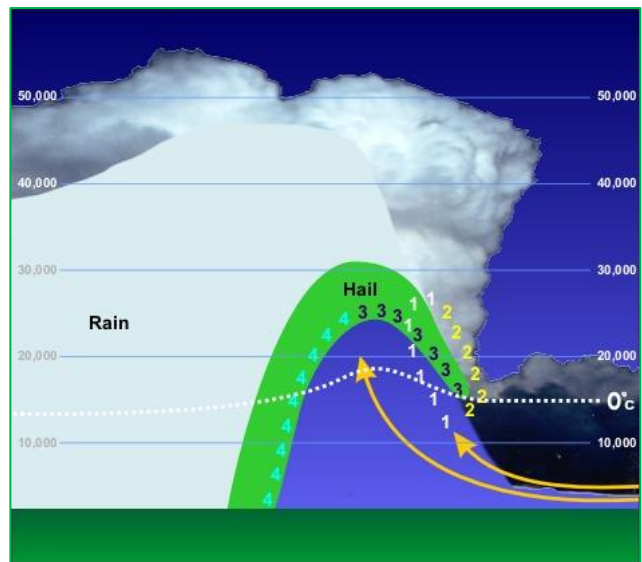
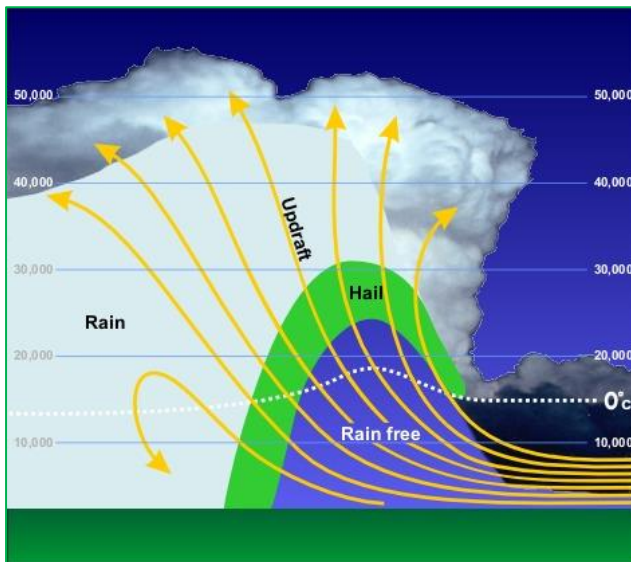
Flooding as a result of dam failure can be small enough to only affect the immediate area of the dam, or large enough to cause catastrophic results to cities, towns and human life that is below the dam. The extent of flooding depends largely on the size of the dam, the amount of water that is being held by the dam, the size of the breach, the amount of water flow from the dam and the amount of human habitation that is downstream.

## \*HAILSTORM

Hailstones are balls of ice that grow as they're held up by winds, known as updrafts that blow upwards in thunderstorms. The updrafts carry droplets of supercooled water, water at a below-freezing temperature that is not yet ice. The supercooled water droplets freeze into balls of ice and grow to become hailstones. The faster the updraft, the bigger the stones can grow. Most hailstones are smaller in diameter than a dime, but stones weighing more than a pound have been recorded. "The largest hailstone recovered in the US fell in Vivian, SD on June 23, 2010 with a diameter of 8 inches and a circumference of 18.62 inches. It weighed 1 lb. 15 oz."<sup>29</sup>

<b>Dime/Penny</b>	<b>0.75</b>	
<b>Nickel</b>	<b>0.88</b>	
<b>Quarter</b>	<b>1.00</b>	
<b>Half Dollar</b>	<b>1.25</b>	
<b>Ping Pong</b>	<b>1.50</b>	
<b>Golf Ball</b>	<b>1.75</b>	
<b>Hen Egg</b>	<b>2.00</b>	
<b>Tennis Ball</b>	<b>2.50</b>	
<b>Baseball</b>	<b>2.75</b>	
<b>Tea Cup</b>	<b>3.00</b>	
<b>Grapefruit</b>	<b>4.00</b>	
<b>Softball</b>	<b>4.50</b>	

Details of how hailstones grow are complicated, but the results are irregular balls of ice that can be as large as baseballs. The chart above shows the relative size differences and a common way to "measure" the size of hail based on diameter.<sup>30</sup> The charts below show how hail is formed.<sup>31</sup>



<sup>29</sup> NOAA National Severe Storms Laboratory; <https://www.nssl.noaa.gov/education/svrwx101/hail/>

<sup>30</sup> <http://www.pinterest.com/pin/126171227030590678/>

<sup>31</sup> <http://oceanservice.noaa.gov/education/yos/resource/JetStream/tstorms/hail.htm#hail>

### \*HIGH WIND (WINDSTORM)

As stated by NOAA (National Oceanic & Atmospheric Administration), wind is defined as “The horizontal motion of the air past a given point. Winds begin with differences in air pressures. Those pressures which are higher at one place than another place set up a force pushing from the high pressure toward the low pressure; the greater the difference in pressures, the stronger the force. The distance between the area of high pressure and the area of low pressure also determines how fast the moving air is accelerated. Meteorologists refer to the force that starts the wind flowing as the "pressure gradient force." High and low pressures are relative. There's no set number that divides high and low pressure. Wind is used to describe the prevailing direction from which the wind is blowing with the speed given usually in miles per hour or knots.” In addition, NOAA’s issuance of a Wind Advisory takes place when sustained winds reach 25 to 39 mph and/or gusts to 57 mph.<sup>32</sup>

Below is the Beaufort Wind Scale, showing expected damage based on wind (knots), developed in 1805 by Sir Francis Beaufort of England and posted on NOAA’s Storm Prediction Center website.<sup>33</sup>

Force	Wind (Knots)	WMO Classification	Appearance of Wind Effects	
			On the Water	On Land
0	Less than 1	Calm	Sea surface smooth and mirror-like	Calm, smoke rises vertically
1	1-3	Light Air	Scaly ripples, no foam crests	Smoke drift indicates wind direction, still wind vanes
2	4-6	Light Breeze	Small wavelets, crests glassy, no breaking	Wind felt on face, leaves rustle, vanes bring to move
3	7-10	Gentle Breeze	Large wavelets, crests begin to break, scattered whitecaps	Leaves and small twigs constantly moving, light flags extended
4	11-16	Moderate Breeze	Small waves 1-4 ft. becoming longer, numerous whitecaps	Dust, leaves, and loose paper lifted, small tree branches move
5	17-21	Fresh Breeze	Moderate waves 4-8 ft. taking longer form, many whitecaps, some spray	Small trees in leaf begin to sway
6	22-27	Strong Breeze	Larger waves 8-13 ft., whitecaps common, more spray	Larger tree branches moving, whistling in wires
7	28-33	Near Gale	Sea heaps up, waves 13-20 ft., white foam streaks off breakers	Whole trees moving, resistance felt walking against wind
8	34-40	Gale	Moderately high (13-20 ft.) waves of greater length, edges of crests begin to break into spindrift, foam blown in streaks	Whole trees in motion, resistance felt walking against wind
9	41-47	Strong Gale	High waves (20 ft.), sea begins to roll, dense streaks of foam, spray may reduce visibility	Slight structural damage occurs, slate blows off roofs
10	48-55	Storm	Very high waves (20-30 ft.) with overhanging crests, sea white with densely blown foam, heavy rolling, lowered visibility	Seldom experienced on land, trees broken or uprooted, "considerable structural damage"
11	56-63	Violent Storm	Exceptionally high(30-45 ft.) waves, foam patches cover sea, visibility more reduced	
12	64+	Hurricane	Air filled with foam, waves over 45 ft., sea completely white with driving spray, visibility greatly reduced	

<sup>32</sup> NOAA; <http://www.nws.noaa.gov/glossary/index.php?letter=w>

<sup>33</sup> NOAA, Storm Prediction Center, <http://www.spc.noaa.gov/faq/tornado/beaufort.html>

## \*HURRICANE & TROPICAL STORM

### HURRICANES

A hurricane is a tropical cyclone in which winds reach speeds of 74 miles per hour or more and blow in a large spiral around a relatively calm center. The eye of the storm is usually 20-30 miles wide and 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" (to the right<sup>34</sup>) 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. In the western North Pacific, the term "super typhoon" is used for tropical cyclones with sustained winds exceeding 150 mph.<sup>35</sup>

Flooding is often caused from the coastal storm surge of the ocean and torrential rains, both of which may accompany a hurricane; these floods can result in loss of lives and property.

Category	Sustained Winds	Types of Damage Due to Hurricane Winds
1	74-95 mph 64-82 kt 119-153 km/h	<b>Very dangerous winds will produce some damage:</b> Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96-110 mph 83-95 kt 154-177 km/h	<b>Extremely dangerous winds will cause extensive damage:</b> Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3 (major)	111-129 mph 96-112 kt 178-208 km/h	<b>Devastating damage will occur:</b> Well-built frame homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4 (major)	130-156 mph 113-136 kt 209-251 km/h	<b>Catastrophic damage will occur:</b> Well-built frame homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5 (major)	157-182 mph 136-158 kt 271-332 km/h	<b>Catastrophic damage will occur:</b> A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

### TROPICAL STORMS

A tropical depression becomes a tropical storm when its maximum sustained winds are between 39-73 mph. Although tropical storms have winds of less than 74 miles per hour, like hurricanes, they can do significant damage. The damage most felt by tropical storms is from the torrential rains they produce which cause rivers and streams to flood and overflow their banks.

Rainfall from tropical storms has been reported at rates of up to 6 inches per hour; 43 inches of rain in a 24 hour period was reported in Alvin, TX as a result of Tropical Storm Claudette.<sup>36</sup>

<sup>34</sup> National Hurricane Center; <http://www.nhc.noaa.gov/aboutsshws.php>

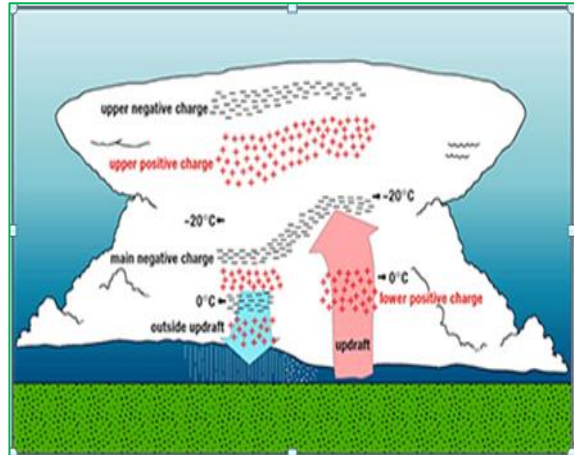
<sup>35</sup> National Hurricane Center, NOAA; <http://www.nhc.noaa.gov/aboutsshws.php>

<sup>36</sup> [http://www.wpc.ncep.noaa.gov/research/mcs\\_web\\_test\\_test\\_files/Page1637.htm](http://www.wpc.ncep.noaa.gov/research/mcs_web_test_test_files/Page1637.htm)

### \*SEVERE THUNDER & LIGHTNING STORM

As stated by the NOAA National Severe Storms Laboratory (NSSL) "Lightning is a giant spark of electricity in the atmosphere between clouds, the air, or the ground. In the early stages of development, air acts as an insulator between the positive and negative charges in the cloud and between the cloud and the ground. When the opposite charges build up enough, this insulating capacity of the air breaks down and there is a rapid discharge of electricity that we know as lightning. The flash of lightning temporarily equalizes the charged regions in the atmosphere until the opposite charges build up again."<sup>37</sup>

Thunder, a result of lightning, is created when the "lightning channel heats the air to around 18,000 degrees Fahrenheit..."<sup>38</sup> thus causing the rapid expansion of the air and the sounds we hear as thunder. Although thunder that is heard during a storm cannot hurt you, the lightning that is associated with the thunder can not only strike people but also strike homes, out-buildings, grass and trees sparking disaster. Wildfires and structure loss are at a high risk during severe lightning events.



*"A conceptual model shows the electrical charge distribution inside deep convection (thunderstorms), developed by NSSL and university scientists. In the main updraft (in and above the red arrow), there are four main charge regions. In the convective region but outside the out draft (in and above the blue arrow), there are more than four charge regions."- NOAA*

Although thunderstorms and their associated lightning can occur any time of year, in New England they are most likely to occur in the summer months and during the late afternoon or early evening hours and may even occur during a winter snowstorm. Trees, tall buildings and mountains are often the targets of lightning because their tops are closer to the cloud; however, lightning is unpredictable and does not always strike the tallest thing in the area.

"Lightning strikes the ground somewhere in the U.S. nearly every day of the year. Thunderstorms and lightning occur most commonly in moist warm climates. Data from the National Lightning Detection Network shows that over the continental U.S. an average of 20,000,000 cloud-to-ground flashes occur every year. Around the world, lightning strikes the ground about 100 times each second, or 8 million times a day.

In general, lightning decreases across the U.S. mainland toward the northwest. Over the entire year, the highest frequency of cloud-to-ground lightning is in Florida between Tampa and Orlando. This is due to the presence, on many days during the year, of a large moisture content in the atmosphere at low levels (below 5,000 feet), as well as high surface temperatures that produce strong sea breezes along the Florida coasts. The western mountains of the U.S. also produce strong upward motions and contribute to frequent cloud-to-ground lightning. There are also high frequencies along the Gulf of Mexico coast, the Atlantic coast and in the southeast United States. US Regions along the Pacific west coast have the least cloud-to-ground lightning."<sup>39</sup>

<sup>37</sup> NOAA National Severe Storms Laboratory, <https://www.nssl.noaa.gov/education/svrwx101/lightning>

<sup>38</sup> Ibid

<sup>39</sup> Ibid



### \*SEVERE WINTER SNOW & ICE STORM

Ice and snow events typically occur during the winter months and can cause loss of life, property damage and tree damage.

#### SNOW STORMS

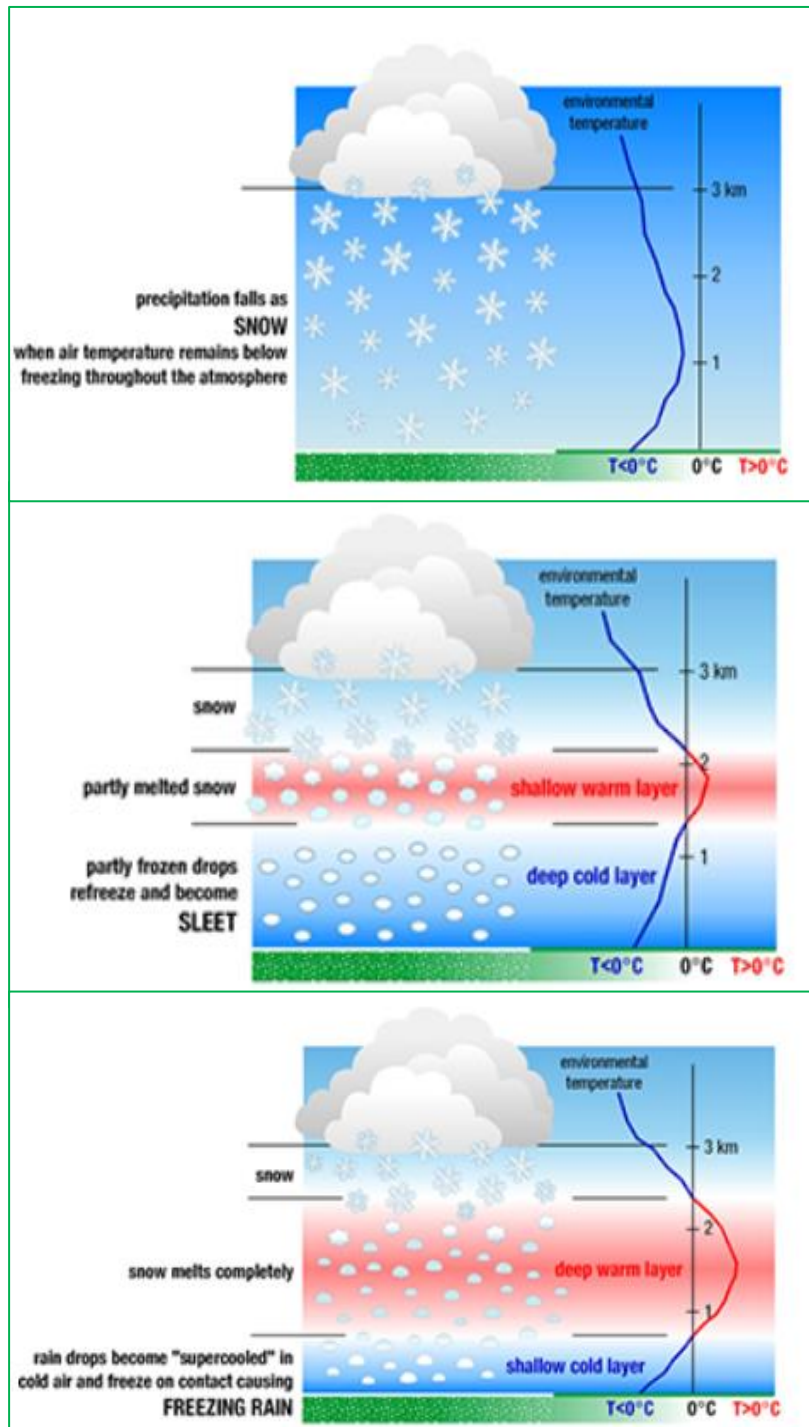
A winter storm can range from moderate snow to blizzard conditions. Blizzard conditions are considered blinding wind-driven snow over 35 mph that lasts several days. A severe winter storm deposits four or more inches of snow during a 12-hour period or six inches of snow during a 24-hour period.

#### SLEET

Snowflakes melt as they fall through a small band of warm air and later refreeze when passing through a wider band of cold air. These frozen rain drops then fall to the ground as “sleet”.

#### FREEZING RAIN & ICE STORMS

Snowflakes melt completely as they fall through a warm band of air then fall through a shallow band of cold air close to the ground to become “supercooled”. These supercooled raindrops instantly freeze upon contact with the ground and anything else that is below 32 degrees Fahrenheit. This freezing creates accumulations of ice on roads, trees, utility lines and other objects resulting in what we think of as an “Ice Storm”. “Ice coating at least one-fourth inch in thickness is heavy enough to damage trees, overhead wires and similar objects.”<sup>40</sup>



*Types of Severe Winter Weather*  
NOAA – National Severe Storms Laboratory

<sup>40</sup> NOAA, National Severe Storms Laboratory, <https://www.nssl.noaa.gov/education/svrwx101/winter/types/>

The Sperry-Piltz Ice Accumulation Index (SPIA) (below) is designed to help utility companies better prepare for predicated ice storms.<sup>41</sup>

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

ICE DAMAGE INDEX	* AVERAGE NWS ICE AMOUNT (in inches) <small>* Revised-October, 2011</small>	WIND (mph)	DAMAGE AND IMPACT DESCRIPTIONS
<b>0</b>	< 0.25	< 15	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
<b>1</b>	0.10 – 0.25	15 – 25	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
	0.25 – 0.50	> 15	
<b>2</b>	0.10 – 0.25	25 – 35	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
	0.25 – 0.50	15 – 25	
	0.50 – 0.75	< 15	
<b>3</b>	0.10 – 0.25	> = 35	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1 – 5 days.
	0.25 – 0.50	25 – 35	
	0.50 – 0.75	15 – 25	
	0.75 – 1.00	< 15	
<b>4</b>	0.25 – 0.50	> = 35	Prolonged & widespread utility interruptions with extensive damage to main distribution feeder lines & some high voltage transmission lines/structures. Outages lasting 5 – 10 days.
	0.50 – 0.75	25 – 35	
	0.75 – 1.00	15 – 25	
	1.00 – 1.50	< 15	
<b>5</b>	0.50 – 0.75	> = 35	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.
	0.75 – 1.00	> = 25	
	1.00 – 1.50	> = 15	
	> 1.50	Any	

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

## SNOW AVALANCHE

According to the National Snow & Ice Data Center “An avalanche is a rapid flow of snow down a hill or mountainside. Although avalanches can occur on any slope given the right conditions, certain times of the year and certain locations are naturally more dangerous than others. Wintertime, particularly from December to April, is when most avalanches tend to happen. However, avalanche fatalities have been recorded for every month of the year.”<sup>42</sup>



“All that is necessary for an avalanche is a mass of snow and a slope for it to slide down...A large avalanche in North America might release 230,000 cubic meters (300,000 cubic yards) of snow. That is the equivalent of 20 football fields filled 3 meters (10 feet) deep with snow. However, such large avalanches are often naturally released, when the snowpack becomes unstable and layers of snow begin to fail. Skiers and recreationalists usually trigger smaller, but often more deadly avalanches.”

There are three main parts to an avalanche (see image above). The first and most unstable is the “starting zone”, where the snow can “fracture” and slide. “Typical starting zones are higher up on slopes. However, given the right conditions, snow can fracture at any point on the slope.”<sup>43</sup>

<sup>41</sup> The Weather Channel, <http://www.weather.com/news/weather-winter/rating-ice-storms-damage-sperry-piltz-20131202>

<sup>42</sup> Copyright Richard Armstrong, NSIDC, <http://nsidc.org/cryosphere/snow/science/avalanches.html>






<sup>43</sup> NSIDC, <http://nsidc.org/cryosphere/snow/science/avalanches.html>; image credit: Betsy Armstrong

The second part is the “avalanche track”, or the downhill path that the avalanche follows. The avalanche is evident where large swaths of trees are missing or where there are large pile-ups of rock, snow, trees and debris at the bottom of an incline.

The third part of an avalanche is the “runout zone”. The runout zone is where the avalanche has come to a stop and left the largest and highest pile of snow and debris.

“Several factors may affect the likelihood of an avalanche, including weather, temperature, slope steepness, slope orientation (whether the slope is facing north or south), wind direction, terrain, vegetation and general snowpack conditions. Different combinations of these factors can create low, moderate, or extreme avalanche conditions. Some of these conditions, such as temperature and snowpack, can change on a daily or hourly basis.”<sup>44</sup>

When the possibility of an avalanche is evident, an “avalanche advisory” is issued. This preliminary notification warns hikers, skiers, snowmobilers and responders that conditions may be favorable for the development of avalanches. The chart below shows avalanche danger as determined by likelihood, size & distribution.<sup>45</sup>

<b>North American Public Avalanche Danger Scale</b> Avalanche danger is determined by the likelihood, size and distribution of avalanches.				
Danger Level		Travel Advice	Likelihood of Avalanches	Avalanche Size and Distribution
<b>5 Extreme</b>		Avoid all avalanche terrain.	Natural and human-triggered avalanches certain.	Large to very large avalanches in many areas.
<b>4 High</b>		Very dangerous avalanche conditions. Travel in avalanche terrain <u>not</u> recommended.	Natural avalanches likely; human-triggered avalanches very likely.	Large avalanches in many areas; or very large avalanches in specific areas.
<b>3 Considerable</b>		Dangerous avalanche conditions. Careful snowpack evaluation, cautious route-finding and conservative decision-making essential.	Natural avalanches possible; human-triggered avalanches likely.	Small avalanches in many areas; or large avalanches in specific areas; or very large avalanches in isolated areas.
<b>2 Moderate</b>		Heightened avalanche conditions on specific terrain features. Evaluate snow and terrain carefully; identify features of concern.	Natural avalanches unlikely; human-triggered avalanches possible.	Small avalanches in specific areas; or large avalanches in isolated areas.
<b>1 Low</b>		Generally safe avalanche conditions. Watch for unstable snow on isolated terrain features.	Natural and human-triggered avalanches unlikely.	Small avalanches in isolated areas or extreme terrain.
Safe backcountry travel requires training and experience. You control your own risk by choosing where, when and how you travel.				

<sup>44</sup> Copyright Richard Armstrong, NSIDC, <http://nsidc.org/cryosphere/snow/science/avalanches.html>

<sup>45</sup> [http://www.avalanche.org/danger\\_card.php](http://www.avalanche.org/danger_card.php)



## \*TORNADO & DOWNBURST (MICROBURST)

### TORNADO

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

Tornadoes produce the most violent winds on earth, at speeds of 280 mph or more. In addition, tornadoes can travel at a forward speed of up to 70 mph. Damage paths can be in excess of one mile wide and 50 miles long. Violent winds and debris slamming into buildings cause the most structural damage.

The Fujita Scale is the standard scale for rating the severity of a tornado as measured by the damage it causes. A tornado is usually accompanied by thunder, lightning, heavy rain and a loud "freight train" noise. In comparison to a hurricane, a tornado covers a much smaller area but can be more violent and destructive.

"Dr. T. Theodore Fujita developed the Fujita Tornado Damage Scale (F-Scale) to provide estimates of tornado strength based on damage surveys. Since it's practically impossible to make direct measurements of tornado winds, an estimate of the winds based on damage is the best way to classify a tornado. The new Enhanced Fujita Scale (EF-Scale) addresses some of the limitations identified by meteorologists and engineers since the introduction of the Fujita Scale in 1971. The new scale identifies 28 different free standing structures most affected by tornadoes taking into account construction quality and maintenance. The range of tornado intensities remains as before, zero to five, with 'EF-0' being the weakest, associated with very little damage and 'EF-5' representing complete destruction, which was the case in Greensburg, Kansas on May 4th, 2007, the first tornado classified as 'EF-5'. The EF scale was adopted on February 1, 2007."<sup>46</sup> The chart (above), adapted from wunderground.com, shows a comparison of the Fujita Scale to the Enhanced Fujita Scale.

Tornadoes are relatively uncommon natural hazards in New Hampshire; on average, about six tornadoes touch down each year. Damage largely depends on where the tornado strikes. If it were to strike an inhabited area, the impact could be severe.

EF SCALE	OLD F-SCALE	TYPICAL DAMAGE
<b>EF-0</b> (65-85mph)	<b>F0</b> (65-73 mph)	<b>Light damage.</b> Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
<b>EF-1</b> (86-110 mph)	<b>F1</b> (74-112 mph)	<b>Moderate damage.</b> Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
<b>EF-2</b> (111-135 mph)	<b>F2</b> (113-157 mph)	<b>Considerable damage.</b> Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off
<b>EF-3</b> (136-165 mph)	<b>F3</b> (158-206 mph)	<b>Severe damage.</b> Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
<b>EF-4</b> (166-200 mph)	<b>F4</b> (207-260 mph)	<b>Devastating damage.</b> Well-constructed houses and whole frame houses completely leveled; cars through and small missiles generated.
<b>EF-5</b> (> 200 mph)	<b>F5</b> (261-318 mph)	<b>Incredible damage.</b> Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (109 yards); high-rise buildings have significant structural deformation; incredible phenomena will occur.
EF No rating	<b>F6-F12</b> (319 mph to speed of sound)	<b>Inconceivable damage.</b> Should a tornado with the maximum wind speed in excess of EF5 occur, the extent and types of damage may not be conceived. A number of missiles such as iceboxes, water heaters, storage tanks, automobiles, etc. will create serious secondary damage on structures.

<sup>46</sup> Enhance Fujita Scale, [http://www.wunderground.com/resources/severe/fujita\\_scale.asp](http://www.wunderground.com/resources/severe/fujita_scale.asp)

## DOWNBURST

A downburst is a strong downdraft which causes damaging winds on or near the ground according to NOAA. Not to be confused with downburst, the term "microburst" describes the size of the downburst. A comparison of a microburst and the larger macroburst shows that both can cause extreme winds.

A microburst is a downburst with winds extending 2 ½ miles or less, lasting 5 to 15 minutes and causing damaging winds as high as 168 MPH. A macroburst is a downburst with winds extending more than 2 ½ miles lasting 5 to 30 minutes. Damaging winds, causing widespread, tornado-like damage, could be as high as 134 MPH.<sup>47</sup>

## \*WILDFIRE

As stated by the National Wildfire Coordinating Group (NWCG), wildfires are designated in seven categories as seen in the top chart to the right:<sup>48</sup> For the purpose of statistical analysis, the US Forest Service recognizes the cause of fires according to the bottom chart to the right:<sup>49</sup>

The definition according to the International Wildland-Urban Interface Code of wildfire is "an uncontrolled fire spreading through vegetative fuels exposing and possibly consuming structures". In addition, the IWUIC goes on to define the wildland urban interface area as "that geographical area where structures and other human development meets or intermingles with wildland or vegetative fuels."<sup>50</sup>

There are two main potential losses with a wildfire: the forest itself and the threat to the built-up human environment (the structures within the WUI). In many cases, the only time it is feasible for a community to control a wildfire is when it threatens the built-up human environment. Therefore, the loss to the forest itself will not be a factor in our loss calculation analysis.

Class	Aces Burned
Class A	0 to .25 acres
Class B	.26 to 9 acres
Class C	10 to 99 acres
Class D	100 to 299 acres
Class E	300 to 999 acres
Class F	1,000 to 4,999 acres
Class G	5,000 acres or more
Code	Statistical Cause
1	Lightning
2	Equipment Use
3	Smoking
4	Campfire
5	Debris Burning
6	Railroad
7	Arson
8	Children
9	Miscellaneous

<sup>47</sup> NOAA - <http://www.srh.noaa.gov/jetstream/tstorms/wind.html>

<sup>48</sup> <http://www.nwcg.gov/pms/pubs/glossary/s.htm>

<sup>49</sup> [https://www.fs.fed.us/cgi-bin/Directives/get\\_dirs/fsh?5109.14](https://www.fs.fed.us/cgi-bin/Directives/get_dirs/fsh?5109.14)

<sup>50</sup> International Wildland-Urban Interface Code, 2012, International Code Council, Inc.

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## Appendix D: NH Presidential Disaster & Emergency Declarations

### Presidential Disaster Declarations

Number	Description	Date of Event	Counties	Description
DR-4316	Severe Winter Storm and Snowstorm	March 14-15, 2017	Belknap & Carroll	<b>Presidential Emergency Declaration DR-4316:</b> Severe winter storm and snowstorm in Belknap & Carroll Counties; disaster aid to supplement state and local recovery efforts.
DR-4209	Severe Winter Storm and Snowstorm	January 26-28, 2015	Hillsborough, Rockingham & Stafford	<b>Presidential Emergency Declaration DR-4206:</b> Severe winter storm and snowstorm in Hillsborough, Rockingham and Strafford Counties; disaster aid to supplement state and local recovery efforts.
DR-4139	Severe Storms, Flooding	July 9-10, 2013	Cheshire, Sullivan & Grafton	<b>Presidential Emergency Declaration DR-4139:</b> Severe storms, flooding, and landslides during the period of June 26 to July 3, 2013 in Cheshire, Sullivan and southern Grafton Counties.
DR-4105	Severe Winter Storm	8-Feb-13	All Ten NH Counties	<b>Presidential Emergency Declaration DR-4105:</b> Nemo; heavy snow in February 2013.
DR-4095	Hurricane Sandy	October 26-November 8, 2012	Belknap, Carroll, Coos, Grafton & Sullivan	<b>Presidential Disaster Declaration DR-4095:</b> The declaration covers damage to property from the storm that spawned heavy rains, high winds, high tides and flooding over the period of October 26-November 8, 2012.
DR-4065	Severe Storm & Flooding	May 29-31, 2012	Cheshire	<b>Presidential Disaster Declaration DR-4065:</b> Severe Storm and Flood Event May 29-31, 2012 Cheshire County.
DR-4049	Severe Storm & Snowstorm	October 29-30, 2011	Hillsborough & Rockingham	<b>Presidential Disaster Declaration DR-4049:</b> Severe Storm and Snowstorm Event October 29-30, 2011 Hillsborough and Rockingham Counties.
DR-4026	Tropical Storm Irene	August 26-September 6, 2011	Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, & Sullivan	<b>Presidential Disaster Declaration DR-4026:</b> Tropical Storm Irene Aug 26th- Sept 6, 2011 Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, & Sullivan Counties.
DR-4006	Severe Storms & Flooding	May 26-30, 2011	Coos & Grafton County	<b>Presidential Disaster Declaration DR-4006:</b> May Flooding Event, May 26th-30th 2011 Coos & Grafton County. (aka: Memorial Day Weekend Storm)
DR-1913	Severe Storms & Flooding	March 14-31, 2010	Hillsborough & Rockingham	<b>Presidential Disaster Declaration DR-1913:</b> Flooding to two NH counties including Hillsborough and Rockingham counties.
DR-1892	Severe Winter Storm, Rain & Flooding	February 23 - March 3, 2010	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan	<b>Presidential Disaster Declaration: DR-1892:</b> Flood and wind damage to most southern NH including six counties; 330,000 homes without power; more than \$2 million obligated by June 2010.
DR-1812	Severe Winter Storm & Ice Storm	December 11-23, 2008	All Ten NH Counties	<b>Presidential Disaster Declaration DR-1812:</b> Damaging ice storms to entire state including all ten NH counties; fallen trees and large scale power outages; five months after December's ice storm pummeled the region, nearly \$15 million in federal aid had been obligated by May 2009.

Number	Description	Date of Event	Counties	Description
DR-1799	Severe Storms & Flooding	September 6-7, 2008	Hillsborough	<b>Presidential Disaster Declaration: DR-1799:</b> Severe storms and flooding beginning on September 6-7, 2008.
DR-1787	Severe Storms & Flooding	July 24-August 14, 2008	Belknap, Carroll & Grafton & Coos	<b>Presidential Disaster Declaration DR-1787:</b> Severe storms, tornado, and flooding on July 24, 2008.
DR-1782	Severe Storms, Tornado, & Flooding	24-Jul-08	Belknap, Carroll, Merrimack, Strafford & Rockingham	<b>Presidential Disaster Declaration DR-1782:</b> Tornado damage to several NH counties.
DR-1695	Nor'easter, Severe Storms & Flooding	April 15-23, 2007	All Ten NH Counties	<b>Presidential Disaster Declaration DR-1695:</b> Flood damages; FEMA & SBA obligated more than \$27.9 million in disaster aid following the April nor'easter. (aka: Tax Day Storm)
DR-1643	Severe Storms & Flooding	May 12-23, 2006	Belknap, Carroll, Grafton, Hillsborough, Merrimack, Rockingham & Strafford	<b>Presidential Disaster Declaration DR-1643:</b> Flooding in most of southern NH; May 12-23, 2006. (aka: Mother's Day Storm)
DR-1610	Severe Storms & Flooding	October 7-18, 2005	Belknap, Cheshire, Grafton, Hillsborough, Merrimack & Sullivan	<b>Presidential Disaster Declaration DR-1610:</b> To date, state and federal disaster assistance has reached more than \$3 million to help residents and business owners in New Hampshire recover from losses resulting from the severe storms and flooding in October.
DR-1489	Severe Storms & Flooding	July 21-August 18, 2003	Cheshire & Sullivan	<b>Presidential Disaster Declaration DR-1489:</b> Floods stemming from persistent rainfall and severe storms that caused damage to public property occurring over the period of July 21 through August 18, 2003.
DR-1305	Tropical Storm Floyd	September 16-18, 1999	Belknap, Cheshire & Grafton	<b>Presidential Disaster Declaration DR-1305:</b> The declaration covers damage to public property from the storm that spawned heavy rains, high winds and flooding over the period of September 16-18.
DR-1231	Severe Storms & Flooding	June 12-July 2, 1998	NA	<b>Presidential Disaster Declaration DR-1231:</b>
DR-1199	Ice Storms	January 7-25, 1998	NA	<b>Presidential Disaster Declaration DR-1199:</b>
DR-1144	Severe Storms/Flooding	October 20-23, 1996	NA	<b>Presidential Disaster Declaration DR-1144:</b>
DR-1077	Storms/Floods	October 20-November 15, 1995	NA	<b>Presidential Disaster Declaration DR-1077:</b>
DR-923	Severe Coastal Storm	October 30-31, 1991	NA	<b>Presidential Disaster Declaration DR-923:</b>
DR-917	Hurricane Bob, Severe Storm	August 18-20, 1991	NA	<b>Presidential Disaster Declaration DR-917:</b>

Number	Description	Date of Event	Counties	Description
DR-876	Flooding, Severe Storm	August 7-11, 1990	NA	<b>Presidential Disaster Declaration DR-876:</b>
DR-789	Severe Storms & Flooding	March 30-April 11, 1987	NA	<b>Presidential Disaster Declaration DR-789</b>
DR-771	Severe Storms & Flooding	July 29-August 10, 1986	NA	<b>Presidential Disaster Declaration DR-771:</b>
DR-549	High Winds, Tidal Surge, Coastal Flooding & Snow	16-Feb-78	NA	<b>Presidential Disaster Declaration DR-549:</b> Blizzard of 1978
DR-411	Heavy Rains, Flooding	21-Jan-74	NA	<b>Presidential Disaster Declaration DR-411:</b>
DR-399	Severe Storms & Flooding	11-Jul-73	NA	<b>Presidential Disaster Declaration DR-399:</b>
DR-327	Coastal Storms	18-Mar-72	NA	<b>Presidential Disaster Declaration DR-327:</b>
DR-11	Forest Fire	2-Jul-53	NA	<b>Presidential Disaster Declaration DR-11:</b>

### Emergency Disaster Declarations

Number	Description	Date of Event	Counties	Description
EM-3360	Hurricane Sandy	October 26-31, 2012	All Ten NH Counties	<b>Presidential Emergency Declaration EM-3360:</b> Hurricane Sandy came ashore in NJ and brought high winds, power outages and heavy rain to NH- All ten counties in the State of New Hampshire.
EM-3344	Severe Snow Storm	October 29-30, 2011	All Ten NH Counties	<b>Presidential Emergency Declaration EM-3344:</b> Severe storm during the period of October 29-30, 2011; all ten counties in the State of New Hampshire. (aka: Snowtober)
EM-3333	Hurricane Irene	August 26-September 6, 2011	All Ten NH Counties	<b>Presidential Emergency Declaration EM-3333:</b> Emergency Declaration for Tropical Storm Irene for in all ten counties.
EM-3297	Severe Winter Storm	11-Dec-08	All Ten NH Counties	<b>Presidential Emergency Declaration EM-3297:</b> Severe winter storm beginning on December 11, 2008.
EM-3258	Hurricane Katrina Evacuation	August 29-October 1, 2005	All Ten NH Counties	<b>Presidential Emergency Declaration EM-3258:</b> Assistance to evacuees from the area struck by Hurricane Katrina and to provide emergency assistance to those areas beginning on August 29, 2005, and continuing; The President's action makes Federal funding available to the State and all 10 counties of the State of New Hampshire.

Number	Description	Date of Event	Counties	Description
EM-3211	Snow	March 11-12, 2005	Carroll, Cheshire, Hillsborough, Rockingham & Sullivan	<b>Presidential Emergency Declaration EM-3211:</b> March snowstorm; more than \$2 million has been approved to help pay for costs of the snow removal; Total aid for the March storm is <b>\$2,112,182.01</b> (Carroll: \$73,964.57; Cheshire: \$118,902.51; Hillsborough: \$710,836; Rockingham: \$445,888.99; Sullivan: \$65,088.53; State of NH: \$697,501.41)
EM-3208	Snow	February 10-11, 2005	Carroll, Cheshire, Coos, Grafton & Sullivan	<b>Presidential Emergency Declaration EM-3208:</b> FEMA had obligated more than \$1 million by March 2005 to help pay for costs of the heavy snow and high winds; Total aid for the February storm is <b>\$1,121,727.20</b> (Carroll: \$91,832.72; Cheshire: \$11,002.18; Coos: \$11,650.10; Grafton: \$213,539.52; Sullivan: \$68,288.90; State of NH: \$521,536.78) <b>EM 3208-002:</b> The Federal Emergency Management Agency (FEMA) has obligated more than \$6.5 million to reimburse state and local governments in New Hampshire for costs incurred in three snow storms that hit the state earlier this year, according to disaster recovery officials. Total aid for all three storms is \$6,892,023.87 (January: \$3,658,114.66; February: \$1,121,727.20; March: \$2,113,182.01)
EM-3207	Snow	January, 22-23, 2005	Belknap, Carroll, Cheshire, Grafton, Hillsborough, Rockingham, Merrimack, Strafford & Sullivan	<b>Presidential Emergency Declaration EM-3207:</b> JANUARY STORM DAMAGE: More than \$3.5 million has been approved to help pay for costs of the heavy snow and high winds; Total aid for the January storm is <b>\$3,658,114.66</b> (Belknap: \$125,668.09; Carroll: \$52,864.23; Cheshire: \$134,830.95; Grafton: \$137,118.71; Hillsborough: \$848,606.68; Merrimack: \$315,936.55; Rockingham: \$679,628.10; Strafford: \$207,198.96; Sullivan: \$48,835.80; State of NH: \$1,107,426.59)
EM-3193	Snow	December 6-7, 2003	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack & Sullivan	<b>Presidential Emergency Declaration EM-3193:</b> The declaration covers jurisdictions with record and near-record snowfall that occurred over the period of December 6-7, 2003
EM-3177	Snowstorm	February 17-18, 2003	Cheshire, Hillsborough, Merrimack, Rockingham & Strafford	<b>Presidential Emergency Declaration EM-3177:</b> Declaration covers jurisdictions with record and near-record snowfall from the snowstorm that occurred February 17-18, 2003
EM-3166	Snowstorm	March 5-7, 2001	Cheshire, Coos, Grafton, Hillsborough, Merrimack, & Strafford	<b>Presidential Emergency Declaration EM-3166:</b> Declaration covers jurisdictions with record and near-record snowfall from the late winter storm that occurred March 2001
EM-3101	High Winds & Record Snowfall	March 13-17, 1994	NA	<b>Presidential Emergency Declaration EM-3101:</b>
EM-3073	Flooding	15-Mar-79	NA	<b>Presidential Emergency Declaration EM-3073:</b>

**Source:**

Disaster Declarations for New Hampshire

[http://www.fema.gov/disasters/grid/state-tribal-government/33?field\\_disaster\\_type\\_term\\_tid\\_1=All](http://www.fema.gov/disasters/grid/state-tribal-government/33?field_disaster_type_term_tid_1=All)



## Appendix E: Potential Mitigation Ideas<sup>51</sup>

### Drought

- D1 ..... Assess Vulnerability to Drought Risk
- D2 ..... Monitoring Drought Conditions
- D3 ..... Monitor Water Supply
- D4 ..... Plan for Drought
- D5 ..... Require Water Conservation during Drought Conditions
- D6 ..... Prevent Overgrazing
- D7 ..... Retrofit Water Supply Systems
- D8 ..... Enhance Landscaping & Design Measures
- D9 ..... Educate Residents on Water Saving Techniques
- D10 .... Educate Farmers on Soil & Water Conservation Practices
- D11 .... Purchase Crop Insurance

### Earthquake

- EQ1.... Adopt & Enforce Building Codes
- EQ2.... Incorporate Earthquake Mitigation into Local Planning
- EQ3.... Map & Assess Community Vulnerability to Seismic Hazards
- EQ4.... Conduct Inspections of Building Safety
- EQ5.... Protect Critical Facilities & Infrastructure
- EQ6.... Implement Structural Mitigation Techniques
- EQ7.... Increase Earthquake Risk Awareness
- EQ8.... Conduct Outreach to Builders, Architects, Engineers and Inspectors
- EQ9.... Provide Information on Structural & Non-Structural Retrofitting

### Erosion

- ER1.... Map & Assess Vulnerability to Erosion
- ER2.... Manage Development in Erosion Hazard Areas
- ER3.... Promote or Require Site & Building Design Standards to Minimize Erosion Risk
- ER4.... Remove Existing Buildings & Infrastructure from Erosion Hazard Areas
- ER5.... Stabilize Erosion Hazard Areas
- ER6.... Increase Awareness of Erosion Hazards

### Extreme Temperatures

- ET1 .... Reduce Urban Heat Island Effect
- ET2 .... Increase Awareness of Extreme Temperature Risk & Safety
- ET3 .... Assist Vulnerable Populations
- ET4 .... Educate Property Owners about Freezing Pipes

### Hailstorm

- HA1 .... Locate Safe Rooms to Minimize Damage
- HA2 .... Protect Buildings from Hail Damage
- HA3 .... Increase Hail Risk Awareness

### Landslide

- LS1.... Map & Assess Vulnerability to Landslides
- LS2.... Manage Development in Landslide Hazard Areas
- LS3.... Prevent Impacts to Roadways
- LS4 .... Remove Existing Buildings & Infrastructure from Landslide

### Lightning

- L1 ..... Protect Critical Facilities
- L2 ..... Conduct Lightning Awareness Programs

### Flood

- F1 ..... Incorporate Flood Mitigation in Local Planning
- F2 ..... Form Partnerships to Support Floodplain Management
- F3 ..... Limit or Restrict Development in Floodplain Areas
- F4 ..... Adopt & Enforce Building Colds and Development Standards
- F5 ..... Improve Stormwater Management Planning
- F6 ..... Adopt Policies to Reduce Stormwater Runoff
- F7 ..... Improve Flood Risk Assessment
- F8 ..... Join or Improve Compliance with NFIP
- F9 ..... Manage the Floodplain beyond Minimum Requirements
- F10 .... Participate in the CRS
- F11 .... Establish Local Funding Mechanism for Flood Mitigation
- F12 .... Remove Existing Structures from Flood Hazard Areas
- F13 .... Improve Stormwater Drainage System Capacity
- F14 .... Conduct Regular Maintenance for Drainage Systems & Flood Control Structures
- F15 .... Elevate of Retrofit Structures & Utilities
- F16 .... Floodproof Residential & Non-Residential Structures
- FT17 .. Protect Infrastructure
- FT18 .. Protect Critical Facilities
- FT19 .. Construct Flood Control Measures
- FT20 .. Protect & Restore Natural Flood Mitigation Features
- FT21 .. Preserve Floodplains as Open Space
- FT22 .. Increase Awareness of Flood Risk & Safety
- FT23 .. Educate Property Owners about Flood Mitigation Techniques

### Severe Wind

- SW1... Adopt & Enforce Building Codes
- SW2... Promote or Require Site & Building Design Standards to Minimize Wind Damage
- SW3... Assess Vulnerability to Severe Wind
- SW4... Protect Power Lines & Infrastructure
- SW5... Retrofit Residential Buildings
- SW6... Retrofit Public Buildings & Critical Facilities
- SW7... Increase Severe Wind Awareness

### Severe Winter Weather

- WW1.. Adopt & Enforce Building Codes
- WW2.. Protect Buildings & Infrastructure
- WW3.. Protect Power Lines
- WW4.. Reduce Impacts to Roadways
- WW5.. Conduct Winter Weather Risk Awareness Activities
- WW6.. Assist Vulnerable Populations

### Tornado

- T1 ..... Encourage Construction of Safe Rooms
- T2 ..... Require Wind-Resistant Building Techniques
- T2 ..... Conduct Tornado Awareness Activities

<sup>51</sup> Mitigation Ideas, A Resource for Reducing Risk to Natural Hazards, FEMA, January 2013

**Wildfire**

WF1 ... Map & Assess Vulnerability to Wildfire  
WF2 ... Incorporate Wildfire Mitigation in the Comprehensive Plan  
WF3 ... Reduce Risk through Land Use Planning  
WF4 ... Develop a Wildland Urban Interface Code  
WF5 ... Require or Encourage Fire-Resistant Construction Techniques  
WF6 ... Retrofit At-Risk Structure with Ignition-Resistant Materials  
WF7 ... Create Defensible Space around Structures & Infrastructure  
WF8 ... Conduct Maintenance to Reduce Risk  
WF9 ... Implement a Fuels Management Program  
WF10 . Participate in the Firewise Program  
WF11 . Increase Wildfire Awareness  
WF12 . Educate Property Owners about Wildfire Mitigation Techniques

**Multi-Hazards**

MU1 ... Assess Community Risk  
MU2 ... Map Community Risk  
MU3 ... Prevent Development in Hazard Areas  
MU4 ... Adopt Regulations in Hazard Areas  
MU5 ... Limit Density in Hazard Areas  
MU6 ... Integrate Mitigation into Local Planning  
MU7 ... Strengthen Land Use Regulations  
MU8 ... Adopt & Enforce Building Codes  
MU9 ... Create Local Mechanisms for Hazard Mitigation  
MU10 . Incentivize Hazard Mitigation  
MU11 . Monitor Mitigation Plan Implementation  
MU12 . Protect Structures  
MU13 . Protect Infrastructure & Critical Facilities  
MU14 . Increase Hazard Education & Risk Awareness  
MU15 . Improve Household Disaster Preparedness  
MU16 . Promote Private Mitigation Efforts

## Appendix F: Acronyms

### Hazard Mitigation Planning List of Acronyms

ACS.....	American Community Survey (Census)
BFE .....	Base Flood Elevation
BOCA .....	Building Officials and Code Administrators International
CIKR.....	Critical Infrastructure & Key Resources
CIP .....	Capital Improvements Program
CWPP .....	Community Wildfire Protection Plan
DNCR.....	Department of Natural & Cultural Resources (formerly DRED)
EMD .....	Emergency Management Director
EMS .....	Emergency Medical Services
EOC .....	Emergency Operations Center
ERF .....	Emergency Response Facility
FEMA .....	Federal Emergency Management Agency
FIRM .....	Flood Insurance Rate Map
FPP .....	Facilities & Populations to Protect
GIS .....	Geographic Information System
HFRA .....	Healthy Forest Restoration Act
HMGP .....	Hazard Mitigation Grant Program
HSEM.....	Homeland Security & Emergency Management (NH)
ICS .....	Incident Command System
LEOP.....	Local Emergency Operations Plan
MOU .....	Memorandum of Understanding
NCRC&D.....	North Country Resource Conservation & Development Council
NOAA .....	National Oceanic and Atmospheric Association
NSSL.....	National Severe Storms Laboratory (NOAA)
MAPS .....	Mapping and Planning Solutions
NERF .....	Non-Emergency Response Facility
NFIP .....	National Flood Insurance Program
NGVD .....	National Geodetic Vertical Datum of 1929
NHDOT .....	NH Department of Transportation
NHOSI.....	NH Office of Strategic Initiatives (formerly NH Office of Energy & Planning)
NIMS .....	National Incident Management System
PR .....	Potential Resources
SPNHF .....	Society for the Protection of New Hampshire Forests
USDA .....	US Department of Agriculture
USDA-FS .....	USDA-Forest Service
USGS .....	United States Geological Society
WMNF.....	White Mountain National Forest
WUI .....	Wildland Urban Interface

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## **Appendix G: Map Documents**

The following 11" x 17" maps are included in hard copy plans:

*Map 1 – Base Risk Analysis*

*Map 2 – Historic Wildfires & Wildland Urban Interface*

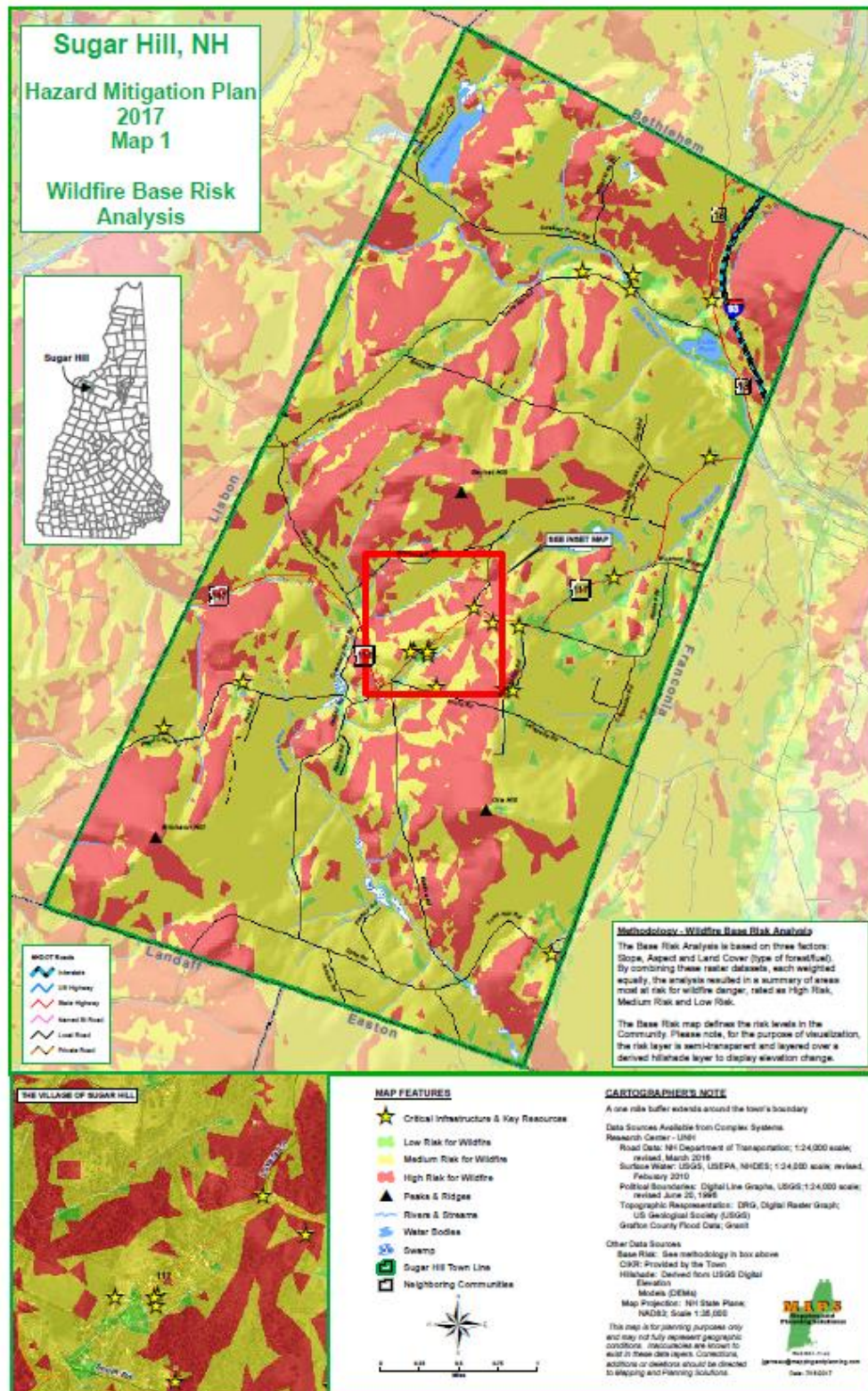
*Map 3 – Past & Potential Areas of Concern*

*Map 4 – Critical Infrastructure & Key Resources*

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## MAP 1 – BASE RISK ANALYSIS

To be replaced with 11" x 17" map in final hard copy.

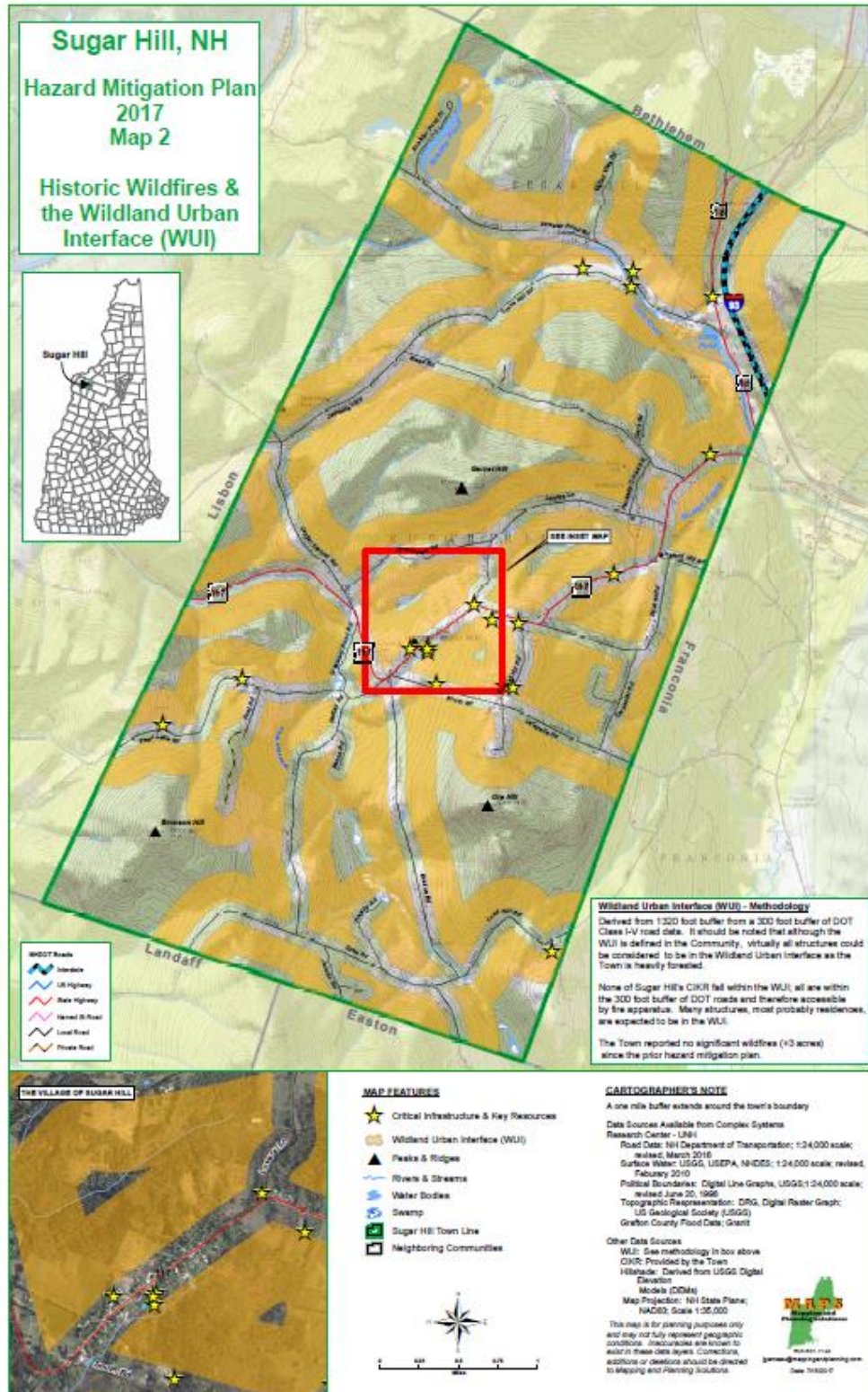




PLACE HOLDER FOR MAP 1

## MAP 2 – HISTORIC WILDFIRES & THE WILDLAND URBAN INTERFACE

To be replaced with 11" x 17" map in final hard copy.



PLACE HOLDER FOR MAP 2



**To be replaced with 11" x 17" map in final hard copy.**

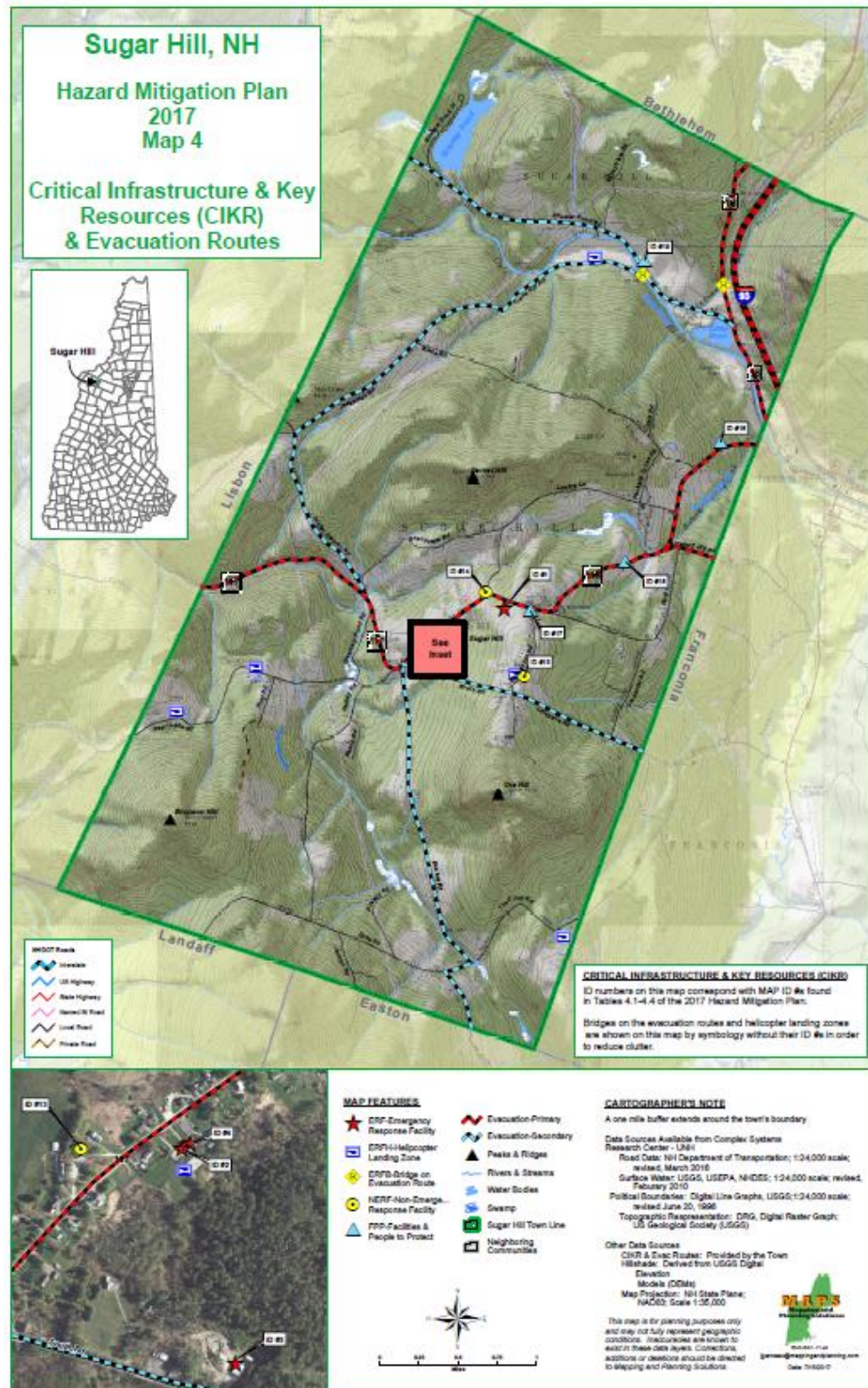


PLACE HOLDER FOR MAP 3



## MAP 4 – CRITICAL INFRASTRUCTURE & KEY RESOURCES

*To be replaced with 11" x 17" map in final hard copy.*



PLACE HOLDER FOR MAP 4



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**Sugar Hill Fire Station**

*Photo Credit: Union Leader, October 14, 2019*

*<http://www.unionleader.com/article/20161015/NEWS07/161019523&template=mobileart>*

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