Canaan

Hazard Mitigation Plan Update 2017

C A N A A N

This Plan integrates the following:

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

July 26, 2017
Final Adopted Plan for Final Approval

Prepared for the Town of Canaan and NH Homeland Security & Emergency Management
By
The Canaan Planning Team

With assistance from Mapping and Planning Solutions

"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: Canaan Meeting House
Photo Credit: http://hs-re.com/canaan-nh-homes-sale/

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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 Resources and Economic Development. 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 Energy & Planning (NHOEP)
- Mapping and Planning Solutions (MAPS)
- NH Forests & Lands (DRED)

This Plan is an update to the prior Canaan Hazard Mitigation Plan, approved in 2011.

Approval Notification Dates for 2017 Update

Approved Pending Adoption (APA): ..... July 18, 2017
Jurisdiction Adoption: ..... July 25, 2017
CWPP Approval: ..... _____, 2017
Plan Approval Date (FEMA): ..... _____, 2017
Plan Distribution (MAPS): ..... _____, 2017

Town of Canaan Hazard Mitigation Planning Team

The Town of Canaan 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:

Bill Bellion ..... Canaan EMD
Sam Frank ..... Canaan Police Chief
George Lazarus ..... Canaan DEMD
Mike Samson ..... Canaan Town Administrator
Robert Scott ..... Canaan Highway Superintendent
Sharon Duffy ..... Canaan Administrative Assistant
Aaron Treadwell ..... Canaan Information Technology
Mike Mezzacapo ..... Canaan Citizen
John Coffey ..... Canaan Water & Sewer Department
David McAlister ..... Canaan Board of Selectmen
John Bergeron ..... Canaan Planning Board
Jessica Vivian ..... Canaan Citizen
Jennifer Gilbert ..... NH OEP
Paul Hatch ..... NH 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 Canaan 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 Planning Team list above:

EMD ..... Emergency Management Director
DEMD ..... Deputy Emergency Management Director
NH HSEM ..... New Hampshire Homeland Security & Emergency Management
NH OEP ..... New Hampshire Office of Energy & Planning
MAPS ..... Mapping and Planning Solutions

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Executive Summary

The Canaan Hazard Mitigation Plan Update 2017 was compiled to assist the Town of Canaan in reducing and mitigating future losses from natural or human-caused hazardous events. The Plan was developed by participants of the Town of Canaan 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.

This Plan is an **update** to the 2011 Canaan Hazard Mitigation Plan. In an effort to produce an accurate and current planning document, the Planning Team used the 2011 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 (local roads, riverine, dam failure, ice jams)
2) Tornado & Downburst
3) Severe Winter Weather & Ice Storm
4) Hurricane & Tropical Storm
5) Thunderstorm & Lightning
6) Hailstorm
7) Extreme Temperatures (hot & cold)
8) Landslide
9) Erosion (riverbank & clear cutting)
10) Wildfire (5+ acres)
11) Radon
12) Drought
13) Earthquake

Human-Caused Hazards

1) Urban Fire
2) Extended Power Failure (3+ days)
3) Epidemic & Pandemic
4) Hazardous Materials - Fixed Location
5) Hazardous Materials – Transport
6) Terrorism

Some hazards that are listed in the 2013 NH State Hazard Mitigation Plan were not included in this Plan as the Team felt they were extremely unlikely to occur in Canaan or not applicable. These include: *Coastal Flooding, Radiological, Fire & Hazardous Materials and Snow Avalanche.* For more information on these hazards please see Chapter 3 Section E.

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; however, it is at times difficult to arrive at true mitigation projects. Some communities, though 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-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 effects 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 create some mitigation action items, such as burying power lines. In preparing this Plan, the Canaan 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:

Canaan Hazard Mitigation Plan Update 2017	the Plan or this Plan
Canaan	the Town or the Community
Hazard Mitigation Planning Team	the Team or HMPT
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 Canaan 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 Canaan 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 Canaan 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 Canaan 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".*[1]

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."*[2]

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 Canaan 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.

[1] Disaster Mitigation Act (DMA) of 2000, Section 101, b1 & b2
[2] Disaster Mitigation Act (DMA) of 2000, Section 322a

C. Jurisdiction

This Plan addresses one jurisdiction – the Town of Canaan, 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 wildfires 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, the Department of Resources and Economic Development (DRED), NH Office of Energy & Planning (OEP) 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.*[3]

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.

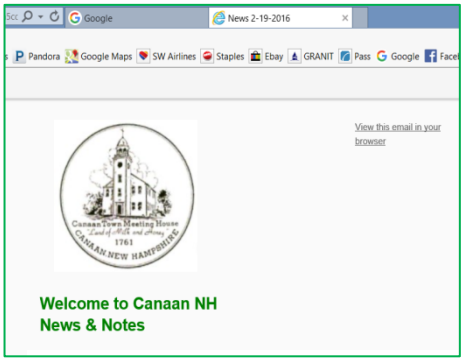
[3] Healthy Forest Restoration Act; HR 1904, 2003; Section 101-3-a.b.c; http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=108_cong_bills&docid=f:h1904enr.txt.pdf

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 Canaan understands that natural hazards do not recognize corporate boundaries.

It was noted that there are several public schools in Canaan; students (PK-4) attend school at Canaan Elementary. Middle school students (5-8) attend school at Indian River School and high school students (9-12) attend school at Mascoma Valley Regional High School. In addition, one private school, the Cardigan Mountain School, enrolls students from all over the country and world in grades 6-9. Although public notification was made and school representatives were invited to attend the hazard mitigation planning meetings, no representatives from Canaan's schools attended.

The Hazard Mitigation Planning Team (HMPT) provided excellent public and stakeholder notification beginning on February 19, 2016 with the paragraph below posted on the Town's website in "News & Notes". The hazard mitigation planning process was also discussed in both the 2015 and 2016 Annual Reports; a clip from the 2015 Annual Report is shown to the right.



Hazard Mitigation Planning

The Town of Canaan is going through a planning cycle for hazards that may impact the Town. This is a process that is repeated every five years. Usually the Fire, Police, Highway, Canaan Ambulance, Water & Sewer, and Town Administration review and update the plan over several months. This year we will be combining this effort with preliminary plans to start engineering to prevent flooding in the Village on a temporary and long term basis. This work will be done internally through the Emergency Preparedness Program and will use a professional engineering firm. There will also be coordination with FEMA in setting up the planning.

EMERGENCY MANAGEMENT

In 2015 we saw the progressive completion of the first ever Canaan Emergency Operations Center and training facility at the Canaan Emergency Services Complex. The interior of the training room was completed with carpeting, paint, lighting and necessary wiring to create a functional room to be used in managing emergencies in Canaan. A riser platform, podium, chairs, tables and a new 48 KW generator are all currently set up and being used. The electronics for running the emergency operations center are on order and will be fully functional in the near future. We will be receiving a large screen smart TV, a "Smart Board," Tablets or laptops to enable the emergency responders working in the operations center to manage many of the informational, logistical and communications requirements for events similar to the ones experienced during Hurricane Irene. The technical equipment and design is the result of a grant obtained for the town by Deputy Emergency Management Director Sam Frank and our New Hampshire Emergency Management Field representative Paul Hatch. They worked together to complete all the details necessary for us to receive the equipment. This room will also be used for training for the towns emergency services.

The emergency management department will be working with the Selectmen and NH Homeland Security and Emergency Management to complete a revised Hazard Mitigation Plan for the town. This plan will analyze the possible natural and human hazards to Canaan and means of trying to mitigate the effects of these hazards. Completion and submission of the plan will keep us in compliance for receiving grants for equipment and reimbursement for some of the expenses for the many types of storms which hit our region.

Respectfully submitted,

William Bellion Emergency Management Director

Samuel Frank and George Lazarus

Deputy Emergency Management Directors

The Town also posted upcoming meetings on the town website and calendar and promoted attendance at the meetings through the Community's "flash email" system. A link was provided on the Town website to the Press Release *(see right)*.

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 stakeholders for the Town *(see below)*.

Mapping and Planning Solutions
P.O. Box 283
Twin Mountain, NH 03595

Press Release

FOR IMMEDIATE RELEASE

February 8, 2015
Contact: June Garneau
603.846.5720

TOWN OF CANAAN COMMENCES HAZARD MITIGATION PLANNING

The Emergency Management Director met on February 8, 2016 with June Garneau, Mapping and Planning Solutions, Paul, NH Homeland Security and Emergency Management and other Team members from Canaan, to begin work on the required five-year update to the 2011 Canaan Hazard Mitigation Plan. As a result of this meeting the Emergency Management Director and Mapping and Planning Solutions are conducting a series of Hazard Mitigation Plan planning meetings over the next few months.

Through this series of public meetings, the Hazard Mitigation Planning Team will address issues such as flooding, hurricanes, drought, landslides and wildfires and determine efforts the Town can take 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 Planning Team will establish priorities for future mitigation projects and efforts that can be taken to increase public awareness of hazards in general.

As mandated by the Disaster Mitigation Act of 2000, all communities are required to complete a local hazard mitigation plan in order to qualify for FEMA funding should a natural disaster occur. The planning processes are made possible through grants from the Federal Emergency Management Administration (FEMA).

The Hazard Mitigation Planning Team is currently being formed; the public and any interested stakeholders are invited to participate. All interested parties should contact Bill Bellion, the Fire Chief and EMD at 603-523-4580, if they wish to be included in the process.

The next meeting has been scheduled for Monday, February 23 from 1:00 PM to 3:00 PM at the new Emergency Operations Center in the rear of the Canaan Public Safety Complex. The general public is encouraged to attend all meetings whether or not they are a part of the Planning Team.

For more information on the hazard mitigation planning process, please contact June Garneau at Mapping and Planning Solutions, 603.846.5720.

MAPS

MAPS
Mapping and Planning Solutions

New or changed Emergency Operations, Hazard Mitigation or Master Plan meetings; highlighted by "Counties".

Status update: 4/8/16

Day	Date	Time	Town/Location	Plan Type	HSEM Field Rep	County
Tuesday	Apr 12	9:00 AM	Ashland Fire Station	EOP	Paul Hatch	Grafton
Tuesday	Apr 12	1:30 PM	Brentwood Town Offices	EOP	Heidi Lawton	Rockingham
Wednesday	Apr 13	5:00 PM	Dummer Town Hall	HMP	Heidi Lawton	Coos
Thursday	Apr 14	9:30 AM	Whitefield Town Offices	HMP	Heidi Lawton	Coos
Monday	Apr 18	8:00 AM	Lancaster Ambulance Bay	HMP	Heidi Lawton	Coos
Tuesday	Apr 19	12:00 PM	Lyme Fire Station	HMP	Paul Hatch	Grafton
Wednesday	Apr 20	12:00 PM	Lyman Town Hall	EOP	Paul Hatch	Grafton
Thursday	Apr 21	6:00 PM	Albany Town Hall	HMP	Heidi Lawton	Carroll
Monday	Apr 25	6:00 PM	Stark Fire Station	HMP	Heidi Lawton	Coos
Tuesday	Apr 26	1:30 PM	Brentwood Town Offices	EOP	Heidi Lawton	Rockingham
Wednesday	Apr 27	1:00 PM	Canaan Public Safety Building	HMP	Paul Hatch	Grafton
Wednesday	Apr 27	6:00 PM	Bethlehem Library	MP	N/A	Grafton
Tuesday	May 3	6:30 PM	Shelburne Town Offices	MP	N/A	Coos
Wednesday	May 4	9:00 AM	Lincoln Town Offices	EOP	Paul Hatch	Grafton
Wednesday	May 11	10:00 AM	Wakefield Public Safety Building	HMP	Heidi Lawton	Carroll
Monday	May 16	5:30 PM	Ellsworth Town House	HMP	Paul Hatch	Grafton
Wednesday	May 18	9:00 AM	Lincoln Town Offices	EOP	Paul Hatch	Grafton
Wednesday	May 25	6:00 PM	Bethlehem Library	MP	N/A	Grafton
Thursday	May 26	1:30 PM	Jackson Town Offices	EOP	Heidi Lawton	Carroll
Wednesday	Jun 1	9:00 AM	Lincoln Town Offices	EOP	Paul Hatch	Grafton
Wednesday	Jun 1	1:00 PM	Canaan Public Safety Building	HMP	Paul Hatch	Grafton
Wednesday	Jun 8	9:00 AM	Lincoln Town Offices	EOP	Paul Hatch	Grafton
Wednesday	Jun 22	6:00 PM	Bethlehem Library	MP	N/A	Grafton

Many interested citizens and stakeholders had the opportunity to become aware of the hazard mitigation planning taking place in Canaan.

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 small populations, the percent of interested citizens in the rural towns' planning processes is extremely small.

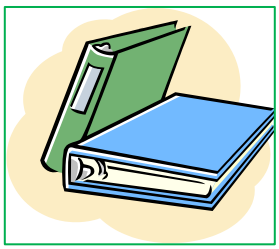
While much effort was made to promote public participation at the Canaan hazard mitigation meetings, only two general community members took the opportunity to participate. Comments made by the citizens were integrated into the narrative discussion and were incorporated into the essence of the document.

§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 Canaan Hazard Mitigation Plan of 2011 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 Canaan Hazard Mitigation Plan of 2011	Compare & Contrast
Master Plan for Canaan, NH (2006)	Community Information
Canaan Annual Report (2015)	Public Notification
Canaan Annual Report (2016)	Fire Report, MS1 Values
Area Hazard Mitigation Plans (Lyme, Orford, Wentworth)	Formats & Mitigation Ideas
The Canaan Land Use Regulations (2011)	New Development Regulations
Canaan Floodplain Regulations	Floodplain Regulations
Census 2010 Data	Population Data
The NH DRA Summary of Inventory of Valuation MS-1 2016 for Canaan	Structure Evaluation
The Economic & Labor Market Information Bureau Community Response	Population Trends
The American Community Survey (ACS 2010-2014)	Population Trends
NH Forest Forests & Lands (DRED)	DRED 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 4.2 – Critical Infrastructure & Key Resources

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

Chapter 3, Section C

Step 06: Gather Town History, Past Development Trends, Future Development Trends, 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 Prior Plan(s) 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.

HAZARD MITIGATION PROCESS
"THE BUILDING BLOCKS"

HAZARD IDENTIFICATION & RISK ANALYSIS
WHAT ARE THE HAZARDS AND WHICH ARE MOST LIKELY TO IMPACT THE COMMUNITY?
TABLE 3.1

CRITICAL INFRASTRUCTURE & KEY RESOURCES
ARE ANY IN HARM'S WAY?
TABLES 4.1-4.4 & MAP

CURRENT PLANS, POLICIES & MUTUAL AID
DO ANY NEED IMPROVEMENT?
TABLE 6.1

HISTORIC WILDFIRES & THE WILDLAND URBAN INTERFACE
WHAT ARE THE WILDFIRE RISKS THROUGHOUT THE COMMUNITY?
TABLE 3.2 & MAP

PAST & POTENTIALLY HAZARDOUS LOCATIONS
IN WHAT AREAS OF THE COMMUNITY IS THE TOWN HARDEST HIT?
TABLE 3.2 & MAP

ACCOMPLISHMENTS SINCE THE PRIOR PLAN APPROVAL
WHERE STRATEGIES COMPLETED OR SHOULD THEY BE DELETED OR DEFERRED TO THIS PLAN?
TABLE 7.1

MITIGATION ACTION ITEMS
WHAT CAN WE DO TO LESSEN, DIMINISH OR ELIMINATE THE RISK OF HAZARD?
WHAT PROBLEMS ARE WE TRYING TO SOLVE?
TABLE 9.1 – THE MITIGATION ACTION PLAN
THE END GOAL

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 2011 Canaan Hazard Mitigation Plan. After discussing these goals, the Team agreed to the following goals for this Plan.

Community & Resource Protection

- To improve upon the protection of the general population, the citizens of Canaan and visitors, from all natural and human-caused hazards.
- To reduce Canaan'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 Canaan'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 Canaan 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 Canaan'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* Canaan.
- 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 Canaan.

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 potential hazardous conditions in the Town.

The planning process included a complete review of the 2011 Canaan Hazard Mitigation Plan. Using the 2011 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 2011 Plan, strategies from the past were reassessed and improved upon for the future.

The following narrative explains how the 2011 Canaan Hazard Mitigation Plan was used during each step of the planning process to make revisions that resulted in the Plan.

Meeting 1, February 8, 2016

The first full meeting of the Canaan Hazard Mitigation Team was held. Meeting attendance included Bill Bellion (Fire Chief & Emergency Management Director), Sam Frank (Police Chief & Deputy EMD), George Lazarus (Deputy EMD), Mike Samson (Town Administrator), Robert Scott (Highway Superintendent), Paul Hatch (NH HSEM), Olin Garneau (Mapping & Planning Solutions) and June Garneau (Mapping & Planning Solutions).

To introduce the Team to 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 Goals (handout). June also explained the need to sign-in, track time (handout) and to provide public notice to encourage community involvement. In addition, June provided the Team with a sample email that would be sent to "stakeholders" to invite them to take part in the planning process; the Team reviewed the email and suggested additional stakeholders to be added to the invitation list.

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

EXPERTS
GIS Specialists
Watershed Oversight
Environmentalists

Work then began on *Table 2.1, Town Statistics*. Most of the work on this table was completed at this meeting with the exception of a few items that June would either determine through GIS or get at a later date. There was some discussion about the seasonal population change in Canaan.

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.

Next on the Agenda were hazard identification and the completion of Table 3.1. After the hazards had been identified, the Team then assessed the risk severity and probability by ranking each hazard on a scale of 1-5 (5 being very high or catastrophic) 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 ..... Likelihood of this occurring within 25 years

The rankings were then calculated to reveal the hazards which pose the greatest risks to the Community; 13 natural hazards and six human-caused hazards were identified. After analyzing these hazards using Table 3.1, Flooding (dam failure, local roads, riverine & ice jams), Tornado & Downburst and Severe Winter Weather & Ice Storms were designated as the primary concerns.

With time running out, June thanked the Team for their hard work and set the next meeting date for February 23, 2016.

Meeting 1 – February 8, 2016

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 3.2, Historic Hazard Identification
- e) Table 4.1-4.4, CIKR (time allowing)

5) Future Meetings
- a) _____

Meeting 2, February 23, 2016

Meeting attendance included Bill Bellion, Sam Frank, George Lazarus, Robert Scott, Aaron Treadwell (IT Department), Sharon Duffy (Administrative Assistant), Paul Hatch and June Garneau.

The meeting began with a review of Table 2.1 and Table 3.1. The Team was satisfied with the information in Table 2.1; however Table 3.1 did receive a few changes. The order of the hazards was adjusted and it was decided that Radon would remain in the Plan.

The Team then began work on *Table 3.2, Historic Hazard Identification*, a list of past and potentially hazardous locations and/or events. First, they looked at the hazards that were listed in the 2011 Plan and determined which they would like to see kept in this Plan.

Next, the Team examined the record of Presidential Disaster Declarations that have taken place in recent years, a record that shows substantial increase over past decades. At this point, the Team assisted June in mapping the hazards that were identified in Table 3.2 for inclusion in *Map 3, Past & Potential Areas of Concern*.

While discussing past and potentially hazardous areas, June took the opportunity to discuss 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. It was obvious in *Map 1, Fire Base Risk Analysis,* that there are areas that are more susceptible to wildfires than are other areas, particularly along southwest-facing steep terrain.

Next, June discussed the Wildland Urban Interface (WUI) and projected a map of the Wildland Urban Interface over the Canaan 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 structures 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 Canaan, are 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 look into acquiring Firewise materials to have available at the Town Offices.

Next on the agenda were *Tables 4.1–4.4, Critical Infrastructure and Key Resources (CIKR)*. The Emergency Response Facilities, the Non-Emergency Response Facilities, the Facilities & Populations to Protect and the Potential Resources from the 2011 Plan were examined and a few minor adjustments were made for this Plan. In addition, the evacuation routes, helicopter landing zones and bridges on the evacuation routes were defined. Lastly, each of the Critical Infrastructure and Key Resources were analyzed for their "Hazard Risk."

With time running out June asked the Team to think about the hazardous events that have taken place since the last Plan and to begin thinking about mitigation strategies. June thanked the Team and set the next meeting for March 9, 2016.

Meeting 2 – February 23, 2016

1) Last Meeting
   a) Discussed the process, community and stakeholder involvement, our overall goal to establish mitigation action items and the collaboration of other agencies.
   b) Completed Table 2.1, Town Statistics
   c) Completed Table 3.1, Hazard Threat Analysis

2) Today's Topics
   a) Review Table 2.1
      i) Evac Routes from EOP – see Map
      ii) MS 1 numbers
   b) Review Table 3.1 to see if order of hazards should remain as it is
   c) Press Release – where did it go? Copies?
   d) Work on….
      i) Hazard Descriptions & Mitigation Ideas
      ii) Table 3.2, Historic Hazard Identification & the WUI
      iii) Table 4.1-4.4, Critical Infrastructure & Key Resources & Hazard Risk (time allowing)

3) Next Meeting
   a) Table 7.1, Accomplishments since the last Plan
   b) Table 6.1, Current Plans, Policies & Mutual Aid

4) Future Meetings
   a) _____

Meeting 3, March 9, 2016

Meeting attendance included Bill Bellion, Sam Frank, Mike Samson, Robert Scott, Sharon Duffy, Michael Mezzacapo (Citizen), John Coffey (Water & Sewer Department), Paul Hatch, Olin Garneau and June Garneau.

The meeting started with a review of Table 4.1-4.4 and some mapping of CIKR and hazards. Some changes and additions were done to both Table 4.1-4.4 and to the mapping.

The Team then returned to the hazard descriptions, an exercise that was started at the last meeting. In order to gain more knowledge of the impact of these hazards, June asked the Team to describe each hazard as it relates to Canaan and to describe how they could or do impact the Community.

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?*
- *What mitigation strategies can we take to eliminate the hazard or diminish its impact?*

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.

Time ran out before any other work could be started. The next meeting was set for April 6, 2016. June thanked the Team and the meeting was adjourned.

Meeting 3 – March 9, 2016

1) Last Meeting
- a) Reviewed Table 2.1
  - i) Evac Routes from EOP
  - ii) MS 1 numbers
- b) Reviewed Table 3.1 to see if order of hazards should remain as it is and discussed radon
- c) Discussed "development"
- d) Discussed mitigation for Village flooding
- e) Press Release
  - i) Flash Email
  - ii) Website
  - iii) Calendar
- f) Did partial work on…
  - i) Table 3.2 (Flooding & Wildfire only)
  - ii) Discussed the WUI
  - iii) 4.1 (complete with exception of bridges and Heli LZ)
  - iv) Hazard Descriptions (flooding only)

2) Today's Topics
- a) Table 4.1
  - i) Check Evac Bridges (mapped by June)
  - ii) Check Potato Hill Access (mapped by June)
  - iii) Check Northern Rail Trail –Map (mapped by June)
  - iv) Check Past Hazards (mapped by June)
  - v) Hazard Risk for new CIKR
- b) Continue Work on….
  - i) Hazard Descriptions & Mitigation Ideas
  - ii) Table 3.2, Historic Hazard Identification & the WUI
- c) Table 6.1, Current Plans, Policies & Mutual Aid (time allowing)
- d) Table 7.1, Accomplishments since the last Plan
- e) Start discussing mitigation ideas (see link above; time allowing)

3) Next Meeting
- a) Complete and/or review Tables 7.1 & 6.1
- b) Begin detailing Mitigation Ideas

4) Future Meetings
- a) _____

Meeting 4, April 6, 2016

Meeting attendance included Bill Bellion, Sam Frank, George Lazarus, Mike Samson, Robert Scott, Sharon Duffy, John Coffey, David Macalister (Board of Selectmen), John Bergeron (Planning Board), Paul Hatch, Olin Garneau and June Garneau. A few newcomers attended this meeting so June went through a quick review of what had taken place at previous meetings.

Table 6.1, Current Plans, Policies & Mutual Aid, was first on agenda. 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 to the Team that those items that needed improvement would become "new strategies" for this Plan and be discussed again when we got to our final table*, Table 9.1, The Mitigation Action Plan.* There was much discussion on town regulations and the NFIP. Although the conversation was excellent, only Table 6.1 was completed at this meeting. The next meeting was set for April 27, 2016, June thanked the Team and the meeting was adjourned.

Meeting 4 – April 6, 2016

1) Last Meeting
- a) Finished, reviewed and adjusted….
  - i) Table 3.2, Historic Hazard Identification
  - ii) Table 4.1-4.4, Critical Infrastructure & Key Resources
- b) Worked on….
  - i) Mapping of hazards and CIKR
  - ii) Hazard Descriptions

2) Today's Topics
- a) Table 6.1, Current Plans, Policies & Mutual Aid
- b) Table 7.1, Accomplishment since the last Plan
- c) Start thinking about Mitigation Ideas
- d) Post meeting: mapping

3) Next Meeting
- a) Review Table 6.1 & 7.1
- b) Begin detailing Mitigation Ideas

4) Future Meetings
- a) _____

Meeting 5, April 27, 2016

Meeting attendance included Bill Bellion, Sam Frank, George Lazarus, Mike Samson, Robert Scott, Sharon Duffy, John Coffey, David Macalister, John Bergeron, Jessica Vivian (Citizen), Paul Hatch, Olin Garneau and June Garneau.

After finishing up and reviewing Table 6.1, the Team next worked on *Table 7.1, Accomplishments since the Last Plan*. Having pre-populated the table with the implementation strategies from the 2011 Plan, June lead the Team through each strategy to determine which of these were "Completed", should be "Deleted" or should be "Deferred" to this Plan as a new mitigation strategy. Many of the strategies from the 2011 Plan had been completed by the Town; several were deleted as they were felt to be no longer useful and/or were considered to be emergency preparedness.

Meeting 5 – April 26, 2016

1) Last Meeting
- a) Quick review for newcomers
- b) Worked on….
  - i) Table 6.1, Current Plans, Policies & Mutual Aid

2) Today's Topics
- a) Complete & Review
  - i) Table 6.1
- b) Work on
  - i) Table 7.1, Accomplishments since the last Plan
- c) Start thinking about Mitigation Ideas
- d) Post meeting: mapping

3) Future Meetings
- a) _____

With time running out, the meeting was adjourned and the next meeting was set for June 1, 2016.

Meeting 6, June 1, 2016

Meeting attendance included Bill Bellion, Sam Frank, George Lazarus, Mike Samson, Robert Scott, Sharon Duffy, John Bergeron, Paul Hatch, and June Garneau.

The meeting began with an overall recap of the work that had already been done. The recap included a brief look at each of the following completed tables:

- *Table 2.1 – Town Statistics*
- *Table 3.1 – Hazard Threat Analysis*
- *Table 3.2 – Historic Hazard Identification*
- *Tables 4.1-4.4 – Critical Infrastructure & Key Resources*
- *Table 6.1 – Current Plans, Policies & Mutual Aid*
- *Table 7.1 – Accomplishments since the Last Plan*

Meeting 6 – June 1, 2016

1) Last Meeting
- a) Worked on…
  - i) Table 6.1, Current Plans, Policies & Mutual Aid
  - ii) Table 7.1, Accomplishments since the Last Plan

2) Today's Topics
- a) Work on…
  - i) Table 9.1, Mitigation Action Plan
  - ii) STAPLEE
  - iii) Priority & Ranking (time allowing)

3) Next Meeting
- a) Priority & Ranking (if not finished)

4) Future Meetings
- a) _____
- b) _____

Before beginning new work, June brought the Team through a complete review of Tables 6.1 and 7.1 to ensure that none of the Team's objectives were lost in the translation from June's notes to the table. Some minor changes were made to these tables during this review. Next, the Team looked back at the Critical Infrastructure & Key Resources, Tables, 4.1-4.1 and helped June with the mapping of these CIKR.

The rest of the meeting was spent discussing mitigation strategies and taking a closer look at a comprehensive list of potential strategies that June had handed out. The Team was able to look through FEMA's Mitigation Ideas booklet[4] and to begin to relate those ideas to mitigation possibilities for the Community. Every team member was

[4] Mitigation Ideas, A Resource for Reducing Risk to Natural Hazards, FEMA, January 2013

provided with a handout of potential strategies that are also included in this Plan (see Chapter 8, Sections A & B and Appendix E).

June projected the final pre-populated table for the Team's review. This table, a combination of Table 8.1 and Table 9.1, enabled the Team to examine each strategy from Tables 6.1 and 7.1 that they had previously determined to be either in "need of improvement" or "deferred" for further action. June had also added a few additional mitigation strategies that had come up during discussions with the Team, and with the Team's help, several more action items were added. Before completing the list of action items, the Team also reviewed the hazard descriptions that were provided at the first and second meetings to be certain that any potential strategies that had been discussed in the past were included in this new table.

The Team was now able to see and understand the "Action Items" for this hazard mitigation plan. Looking carefully at each "Action Item", the Team was able to assign responsibility, the time frame for completion, the type of funding that would be required and the estimated cost of the action. After much discussion and a careful review, ultimately, the Team settled on 35 "Mitigation Action Items" they felt were achievable and that would help to diminish the impact of natural hazards in the future.

Next on the Agenda was the STAPLEE process, a systematic method used to gauge the quality of each of the Action Items; each Team member was given a handout describing the process (Chapter 8, Section C). The Social (S), Technical (T), Administrative (A), Political (P), Legal (L), Economic (E) and Environmental (E) impact for each action item was discussed; this analysis then became Table 8.1. After reviewing each action item using the STAPLEE process, the final scores ranged from 14-21, with 21 being the highest score. The average of all scores was 19.11. The action item with the lowest score was determining the best way to flood-proof the Village Center.

With time running out, June quickly reviewed the last handout, a description of the Priority & Ranking Methodology (see Chapter 9, Section A). The next meeting was set for June 22, 2016.

Meeting 7, June 22, 2016

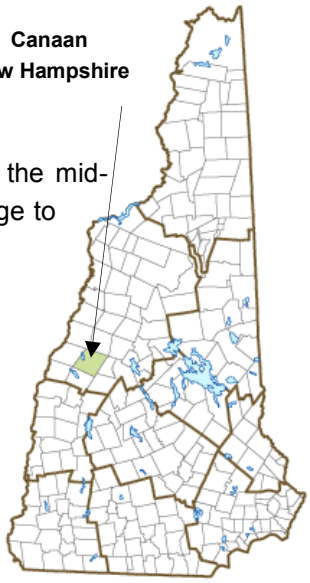
Meeting attendance included Bill Bellion, Sam Frank, Robert Scott, Sharon Duffy, John Coffey, John Bergeron, Paul Hatch, and June Garneau. First, June asked the Team if there were any additional mitigation strategies to add since our last meeting.

Next, June reviewed the explanation of the ranking and priority. June had organized the "Action Items" by ranking them from 0-3, roughly in order of time frame, the Town's authority to get the strategy accomplished and the STAPLEE score. The Team reviewed the ranking and made a changes based on the expected time frame.

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 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 meetings were scheduled.

Chapter 2: Community Profile



A. Introduction

Canaan is located in Grafton County in the Dartmouth-Lake Sunapee Tourist Region in the mid-western part of New Hampshire. The Town is bordered by Dorchester to the north, Orange to the east, Enfield to the south and Hanover to the west.

TOWN GOVERNMENT

A three-member Board of Selectmen governs the Town of Canaan. The Town's departments include, but are not limited to Fire, Police, Highway, Planning, Budget, Library, Trust Funds, Checklist, Recreation and Conservation.

Incorporated: 1761

Origin: First chartered in 1761, the town probably took its name from the hometown of early settlers from Canaan, Connecticut. Not all the grantees became permanent settlers, and a new charter was issued in 1769. According to the Canaan Historical Society, the first train passed through in November 1847 with Daniel Webster on board, and the railroad operations sparked rapid business growth in Canaan Village. In September 1907, Canaan was the site of a tragic train accident, the collision of a passenger train and a freight, resulting in 25 dead and an equal number injured.

Villages and Place Names: Canaan Village, Canaan Center, Canaan Street, West Canaan

Population, Year of the First Census Taken: 504 residents in 1790

Population Trends: Population change for Canaan totaled 2,403 over 54 years, from 1,507 in 1960 to 3,910 in 2013. The largest decennial percent change was a 28 percent increase, which occurred between 1960 and 1970, and between 1970 and 1980. The 2014 Census estimate for Canaan was 3,910 residents, ranking 97th among New Hampshire's incorporated cities and towns.

Population Density and Land Area, 2014 (US Census Bureau): 73.0 persons per square mile of land area. Canaan contains 53.3 square miles of land area and 1.8 square miles of inland water area.

Source: NH Community Profiles; 2016
http://www.nhes.nh.gov/elmi/products/cp/profi

DEMOGRAPHICS & HOUSING

Over the last 30 years, the population of Canaan has increased steadily; the population change from 1980 to 2010 showed an increase of 1453 according to US Census 2010. Canaan's population in 2014 was estimated to be 3,910. The American Community Survey (ACS) 2010-2014 estimates a total of 1,854 housing units, most of which are single family (1,349). Multiple-family structures total 113 and mobile homes and other housing units number 392. The median household income is estimated to be $58,333 (ACS 2010-2014) and the median age is 46 years.

EDUCATION & CHILD CARE

Canaan students in grades PK-4 attend Canaan Elementary School. Students in grades 5-8 attend Indian River School. Students in grades 9-12 attend Mascoma Valley Regional High School. Cardigan Mountain School, an internationally known private school for grades 6-9, is also located in Canaan. There are four licensed child care facilities in Canaan with a capacity of 35 according to the Economic & Labor Market Information Bureau, Community Response, 2016.

NATURAL FEATURES

The Town of Canaan covers approximately 53.3 square miles of land area located in the scenic Dartmouth-Lake Sunapee Region. Vegetation is typical of northern New England including both deciduous and conifer forests, open fields, swamp and riverine areas. Canaan's terrain lends itself to an abundance of lakes, ponds, streams and rivers, most notably, Canaan Street Lake, Goose Pond and Clark Pond.

TRANSPORTATION

There are two major roadways running through Canaan. US Route 4 runs east-west through the lower south-east corner of Canaan from Orange to Enfield. NH Route 118 runs north-south from US Route 4 north into Dorchester. Other smaller less traveled roads lend access to other parts of Canaan.

B. Emergency Services

EMERGENCY OPERATIONS CENTER

The Town of Canaan maintains an Emergency Operations Center (EOC) as part of the Town's emergency preparedness program. The EOC is where department heads, government officials and volunteer agencies gather to coordinate their response to a major emergency or disaster event. The EOC is where the officials responsible for responding to major emergencies and disasters assemble to direct and control the jurisdiction's response. The EOC goes into operation when town officials decide that the situation is serious enough to require a coordinated and other-than-routine response.

In Canaan the designated EOC is the Public Safety Complex. Security and maintenance of the EOC facilities will be carried out in accordance with EOC Standard Operating Procedures (SOPs) to be developed by the Emergency Management Director (EMD). If need be, the Fire Station will be used as a secondary EOC. It is noted however that the Fire Station is also located at the Public Safety Complex; therefore, if the entire building is compromised, the EOC would be moved to an alternative location, such as the Town Offices.

EMERGENCY MANAGEMENT DIRECTOR (EMD)

The Emergency Management Director (EMD) works closely with all emergency response managers as the Town collectively prepares for and responds to emergencies. During and emergency, the EMD is located at the EOC and coordinates the community-wide response to emergency events.

CANAAN POLICE DEPARTMENT

The Police Department staffs a full-time Chief and 7 sworn officers. Canaan Police Officers are well-trained in the delivery of police services in an atmosphere of regional cooperation and have found value in working with other town and regional agencies, sharing resources, training and experience to provide a superior quality of life for the residents and visitors of Canaan. The Canaan Police Department has mutual aid agreements with Enfield, Lebanon, Lyme, Hanover, Grafton and The NH State Police.

CANAAN FIRE DEPARTMENT & EMS

The Canaan Fire Department is a call fire department providing quality fire services to the residents and visitors of Canaan 24 hours a day, 365 days a year. The Department staffs a part-time Chief, 35 paid on-call firefighters and operates one station within the Community. The Canaan Fire Department participates in Upper Valley Regional Emergency Services Association along with area departments.

Emergency medical services and transport is provided by Canaan Ambulance. Canaan Ambulance staffs a volunteer President and 20 EMTs; the department is well equipped to provide medical services to all residents and visitors of Canaan.

CANAAN HIGHWAY DEPARTMENT

The Canaan Highway Department is a year-round, 24-hour as needed operation. The department staffs a full-time Superintendent and nine full-time employees. The department's mission is to support the citizens of Canaan 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 Highway Department is a member of the NH Public Works Mutual Aid Program.

CODERED

The entire town is serviced by the CodeRED emergency alert system. Emergency response is dispatched through Hanover Dispatch.

MEDICAL FACILITIES

Dartmouth-Hitchcock Medical Center, Lebanon (17 miles, 417 beds) is the primary medical facility for Canaan. An alternative medical facility that may be used is Alice Peck Day Memorial Hospital, Lebanon (15 miles, 25 beds).

EMERGENCY SHELTER(S)

The primary shelter is the location to which evacuees are directed at the time of an emergency. In Canaan, the primary shelter will be determined by contract and will be designated based on the emergency situation. Potential shelters include the Mascoma Valley Regional High School, the Methodist Church, Indian River Middle School, Canaan Hall, the Catholic Church, Canaan Elementary or Cardigan Mountain School. Each of these facilities may be utilized depending on accessibility and the situation.

C. Canaan's Current & Future Development Trends

Over the last five to ten years, development in Canaan has been relatively flat although there appears to be some improvement since 2012.

Subdivisions, new home starts and commercial projects were discussed in the 2016 Annual Report and overall comments indicate that development is showing a slow but steady increase over the past several years. Below and to the right are excerpts from the 2016 Annual Report as stated by the Planning Board and the Building Inspector. No development since 2010 has occurred in hazard prone areas and no development since 2010 has impacted the Town's hazard vulnerability.

Canaan Planning Board 2016

Subdivisions

In 2016, the Canaan Planning Board dealt with six formal subdivision applications, three voluntary lot mergers, one lot line adjustment and one excavation permit. Other less formal discussions were held for conceptual discussions of proposed projects. This is a minor increase in applications compared to the last three years.

Building Inspection Department 2016 Report

Building Activity Summation

New home starts in Canaan for 2016 totaled 8 with 4 more additional permits that replaced a single family with a duplex, replaced mobile home (M/H) with a new built home, relocated the prior M/H to a new location that had a demolished M/H removed, through a fire disaster aid effort a M/H was located to replace a fire destroyed M/H and the relocation of one M/H from a questionable site to a State and Town approved location. Commercial projects for the year totaled six and were quite diverse in scope. Starting with a Solar Panel Farm for Cardigan Mountain School located on Prospect Hill Road, a Dollar General Store on Rt. 4, also on Rt. 4 Mascoma Community Health Care is nearing completion, a large shop on Talbert Hill Road, a warehouse for Chey Insulation on Switch Road, and as a welcome surprise, an application to construct a Cellular Tower on leased land off of Grist Mill Hill Road. Most of the above have or will require Certificates of Occupancy by either lending or insuring institutions which seems to be the norm lately. Many permits were also issued for other than new homes i.e. decks, garages, sheds, additions and major renovations and are still increasing compared to past years.

City-Data.com supports the evidence presented in the 2016 Annual Report; however City-Data.com only lists building permits through 2014. *(See City-Data report to the right)*

As the economic recovery continues and as the overall economy of the region grows, the Town anticipates more construction of single family homes, request for subdivisions and new commercial ventures. The Planning Board will closely monitor future building requests, especially those requested in flood and wildland urban interface zones. 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.

The Planning Board, the Board of Selectmen and the Town Administrator will monitor growth in Canaan using existing regulatory documents such as the Master Plan, Floodplain Regulations, FEMA Flood Insurance Rate Maps (FIRMS, 2/20/08) and Land Use Regulations. There is no zoning in Canaan however a building notification process is in place that was revised in 2017.

Single-family new house Construction building permits

- 1997: 12 buildings, average cost: $70,200
- 1998: 5 buildings, average cost: $40,000
- 1999: 12 buildings, average cost: $70,000
- 2000: 6 buildings, average cost: $158,300
- 2001: 7 buildings, average cost: $158,300
- 2002: 19 buildings, average cost: $130,700
- 2003: 31 buildings, average cost: $132,800
- 2004: 36 buildings, average cost: $138,800
- 2005: 44 buildings, average cost: $150,200
- 2006: 33 buildings, average cost: $171,000
- 2007: 19 buildings, average cost: $181,200
- 2008: 17 buildings, average cost: $182,400
- 2009: 12 buildings, average cost: $178,900
- 2010: 7 buildings, average cost: $165,900
- 2011: 5 buildings, average cost: $165,900
- 2012: 8 buildings, average cost: $184,000
- 2013: 6 buildings, average cost: $193,300
- 2014: 9 buildings, average cost: $211,200

Source: City-Data.com; http://www.city-data.com/city/Canaan-New-Hampshire.html

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. The likelihood of substantial development in Canaan is improving; Town officials will continue to monitor any new growth and development, including new critical facilities, with regards to potentially hazardous events.

TABLE 2.1: TOWN STATISTICS

Table 2.1 - Town Statistics				
Census Population Data	**2010**	**2000**	**1990**	**1980**
Canaan, NH - Census Population Data	**3,909**	**3,320**	**3,048**	**2,456**
Grafton County	**89,118**	**81,826**	**74,998**	**65,806**
Elderly Population-% over 65 (ACS 2010-2014)	15.0%			
Median Age (ACS 2010-2014)	46			
Median Household Income (ACS 2010-2014)	$58,333			
Individuals below the poverty level (ACS 2010-2014)	12.5%			
Change in Population - Winter %	0% (may be less due to "snowbirds")			
Change in Population - Summer %	40%			
Housing Statistics (2010 Census)				
Total Housing Units	1,930			
Occupied Housing Units	1,588			
Owner Occupied Units	1,232			
Renter Occupied	356			

Table 2.1 - Town Statistics			
Vacant Housing Units	342		
Units for Seasonal, Recreational, Occasional Use	263		
Assessed Structure Value (2016-MS1)	**Value**	**1% Damage**	**5% Damage**
Residential Buildings	$149,235,446	$1,492,354	$7,461,772
Manufactured Housing	$14,998,800	$149,988	$749,940
Commercial Buildings	$39,765,300	$397,653	$1,988,265
Other Utilities	$0	$0	$0
Tax Exempt Buildings	$46,979,854	$469,799	$2,348,993
Utilities	$7,993,100	$79,931	$399,655
Total	$258,972,500	$2,589,725	$12,948,625
Regional Coordination			
County	Grafton		
Tourism Region	Dartmouth-Lake Sunapee		
Municipal Services & Government			
Town Administrator	Yes		
Board of Selectmen	Yes; elected		
Planning Board	Yes; elected		
School Board	Yes; elected		
Zoning Board of Adjustment	Yes (but no Zoning)		
Conservation Committee	Yes; appointed		
Master Plan	2006		
Emergency Operations Plan (EOP)	30-Sep-14		
Hazard Mitigation Plan (HMP)	2011		
Zoning Ordinances	No		
Land Use Regulations	Yes		
Land Use/Subdivisions Regulations	Yes; June 8, 2006; Amended April 14, 2011		
Capital Improvement Plan	Yes		
Capital Reserve Funds	Yes		
Building Permits Required	Building Permit Process (2017)		
City Web Site	Yes; www.canaannh.org		
Floodplain Ordinance	Yes (stand-alone ordinance)		
Member of NFIP	May 17, 1988		
Flood Insurance Rate Maps (DFIRMS)	February 20, 2008		
Flood Insurance Rate Study (FIS)	February 20, 2008		
Percent of Local Assessed Valuation by Property Type-2015 *(NH Department of Revenue)*			
Residential Buildings	83.5%		
Commercial Land & Buildings	13.8%		
Other	2.7%		

Table 2.1 - Town Statistics	
Emergency Services	
Town Emergency Warning System(s)	CodeRED
School Emergency Warning System(s)	Blackboard Connect
Emergency Page	Yes
Facebook Page	Police and Fire
Flash Email	800 households
Local Newspapers	Valley News; Union Leader
Local TV Stations	WMUR channel 9; WCAX, Channel 3, Burlington; WNNE, Channels 5 & 31, Burlington
Local Radio	WFRD 99.3 FM (Hanover-Lebanon), KIXX 100.5 FM (Lebanon), NPR 94.9 FM (Hanover)
Police Department	Yes full-time; full-time Chief, 7 sworn officers
Police Dispatch	Hanover Dispatch
Police Mutual Aid	Enfield, Lebanon, Lyme, Hanover, Grafton; State Police
Animal Control Officer	No
Fire Department	Yes on-call; part-time Chief, 35 paid on-call firefighters
Fire Dispatch	Hanover Dispatch
Fire Mutual Aid	Upper Valley Regional Emergency Services Association
Fire Stations	One
Fire Warden	Yes; and 8 deputies
Emergency Medical Services	Yes paid and volunteer; volunteer President; 20 EMTs
EMS Dispatch	Hanover Dispatch
Emergency Medical Transportation	Canaan Ambulance
HazMat Team	Southwest NH HazMat Team (resource)
Established EMD	Yes
Established Deputy EMD	Yes (2)
Public Health Network	Public Health Network of the Upper Valley
Health Officer	Yes
Building Inspector	Yes
Established Public Information Officer (PIO)	Yes
Nearest Hospital(s)	Dartmouth-Hitchcock Medical Center, Lebanon (17 miles, 417)
	Alice Peck Day Memorial, Lebanon (15 miles, 25 beds)
Local Humane Society or Veterinarians	Upper Valley Humane Society; Cardigan Mountain Veterinarian Services
Primary EOC	Public Safety Complex - EOC section
Secondary EOC	Fire Station
Primary Shelter	To Be Determined
Secondary Shelter	Canaan Elementary School; Methodist Church & other churches
Utilities	
Town Sewer	Canaan Sewer Department
Highway Superintendent	Yes; full-time superintendent, 8 full-time employees
NH Public Works Association	Yes
Water Supply	Canaan Water Department

Table 2.1 - Town Statistics		
Wastewater Treatment Plant	Yes	
Electric Supplier	NH Electric Coop; Liberty Utilities	
Natural Gas Supplier	None	
Cellular Telephone Access	Limited	
High Speed Internet	Limited	
Telephone Company	Fairpoint	
Transportation		
Primary Evacuation Routes	US Route 4 & NH Route 118	
Secondary Evacuation Routes	Canaan Street, Grafton Turnpike Road, Goose Pond Road & Potato Road (access from Ball Park, Grist Mill Hill & South Roads); Northern Rail Trail (possible evacuation)	
Nearest Interstate	I-89, Exit 17, 10 miles	
Nearest Commercial Airport(s)	Lebanon Municipal (18 miles)	
	Manchester-Boston Regional (80 miles)	
	Burlington International (95 miles)	
Public Transportation	Advance Transit; Grafton County Senior Citizens Council	
Railroad	No	
Education & Childcare		
Elementary School	Grades PK-4 - Canaan Elementary School	
Middle School	Grades 5-8 - Indian River School	
High School	Grades 9-12 - Mascoma Valley Regional High School	
Private/Parochial	Grades 6-9 - Cardigan Mountain School	
School Administrative Unit	SAU 62	
Licensed Childcare Facilities	4 facilities, 35 capacity	
Conserved Land as a Percent of Land in the Community *(GIS Analysis)*		
	Square Miles	**Percent of Town Land**
Approximate Square Miles (including water 1.8 sq/ml)	55.12	100.00%
Approximate Total Un-Conserved Land	50.99	92.51%
Approximate Total Conserved Land (%)	4.13	7.49%
Approximate Federal Owned land (%)	0.00	0.00%
Approximate State Owned Land (%)	0.68	1.24%
Approximate Municipal/County Land (%)	0.68	1.23%
Approximate Private Land (%)	2.77	5.03%
Fire Statistics *(NH Forests & Lands (DRED) Fire Statistics Report 2015 & the Town of Canaan)*		
Wildfire Fire Calls (2015)	None of significance in Canaan; responded to a 55 acres (Hartford, VT); 137 acres (Norwich, VT); 274 acres (Ossipee, NH)	
Grafton County Fire Statistics (2015)	17 fires; 22.6 acres	
State Forest Fires FY (2015)	134 fires; 661 acres	

Information found in Table 2.1, unless otherwise noted, was derived from the Economic & Labor Market Information Bureau, NH Employment Security, August 2016. Community Response Received 7/25/2016; http://www.nhes.nh.gov/elmi/products/cp/profiles-pdf/canaan.pdf and from the Town of Canaan. .

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Chapter 3: Hazard Identification

A. Description of the Hazards

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 (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.*"[5]

By using this grouping process, the Plan demonstrates each hazard's likelihood of occurrence in combination with its potential effect on the Town of Canaan. This process illustrates a comprehensive hazard statement and assists the Town with understanding which hazards should receive the most attention. Strict 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.

THE NATURAL HAZARDS THAT…

ARE MOST LIKELY TO AFFECT Canaan:

- *Flooding (dam failure, local roads, riverine & ice jams)*
- *Tornado & Downburst*
- *Severe Winter Weather & Ice Storm*

MAY AFFECT Canaan:

- *Hurricane & Tropical Storm*
- *Thunderstorm & Lightning*
- *Hailstorm*

ARE LESS LIKELY TO AFFECT Canaan:

- *Extreme Temperatures (hot & cold)*
- *Landslide*
- *Erosion (riverbank & clear cutting)*
- *Wildfire (5+ acres)*
- *Radon*
- *Drought*
- *Earthquake*

Based on this analysis, the most likely natural disaster threat to Canaan is Flooding (dam failure, local roads, riverine, ice jams). The second most likely threat is Tornado & Downburst and the third is Severe Winter Weather & Ice Storms. Six human-caused hazards were also discussed by the Team including Urban Fire, Extended Power Failure (3+ days), Epidemic & Pandemic, Hazardous Material-Fixed, Hazardous Material-Transport and Terrorism.

In light of recent events (Hurricanes Irene & Sandy), it should be noted that hurricanes can cause significant damage in Canaan as a result of both wind strength and flash flooding creating road closures and damage. Although Tropical Storm Sandy did not significantly impact Canaan, there was damage from Tropical Storm Irene to roads as a result of heavy rain (see Chapter 5). There is a good probability that tropical storms will affect Canaan in the future. The Team noted that Category 1 or greater hurricanes would not likely affect Canaan; however the tropical rains that may result could be significant.

[5] 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 or 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 (dam failure, local roads, riverine & ice jams)	3.0	5.0	4.0	4.0	4.0	16.0
2) Tornado & Downburst	3.0	4.0	4.0	4.0	3.7	14.7
3) Severe Winter Weather & Ice Storm	3.0	4.0	2.0	4.0	3.0	12.0
4) Hurricane & Tropical Storm	3.0	4.0	4.0	3.0	3.7	11.0
5) Thunderstorm & Lightning	1.0	3.0	2.0	5.0	2.0	10.0
6) Hailstorm	1.0	3.0	2.0	5.0	2.0	10.0
7) Extreme Temperatures (hot & cold)	2.0	1.0	1.0	5.0	1.3	6.7
8) Landslide	2.0	2.0	1.0	3.0	1.7	5.0
9) Erosion (riverbank & clear cutting)	1.0	3.0	1.0	3.0	1.7	5.0
10) Wildfire (5+ acres)	1.0	2.0	2.0	3.0	1.7	5.0
11) Radon	2.0	1.0	1.0	3.0	1.3	4.0
12) Drought	1.0	1.0	1.0	4.0	1.0	4.0
13) Earthquake	1.0	2.0	1.0	2.0	1.3	2.7
Human-Caused Hazards						
1) Urban Fire	3.0	3.0	3.0	3.0	3.0	9.0
2) Extended Power Failure (3+ days)	2.0	3.0	3.0	3.0	2.7	8.0
3) Epidemic & Pandemic	4.0	1.0	3.0	2.0	2.7	5.3
4) Hazardous Materials - Fixed Location	5.0	5.0	5.0	1.0	5.0	5.0
5) Hazardous Materials - Transport	3.0	3.0	3.0	1.0	3.0	3.0
6) Terrorism	3.0	3.0	2.0	1.0	2.7	2.7

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 some of the more damaging 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 Canaan, 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: Fire Base Risk Analysis*

C. Canaan National Flood Insurance Program (NFIP) Status

Canaan has been a member of the National Flood Insurance Program since May 17, 1988. According to GIS analysis, Canaan has approximately 6.91 square miles of land in the 100 and 200-year floodplain, 1.8 square miles of which is inland water. The floodplain areas of Canaan are primarily along the Mascoma and Indian Rivers and Orange Brook; there are other small streams and brooks and lakes and ponds throughout the Town that may also experience flooding.

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*

According to the NH Office of Energy and Planning, 26 NFIP policies are in effect in Canaan for a total of $3,945,800 of insurance in force. Nineteen of these policies are for residential (single-family) homes, one is non-residential, two are for 2-4 family homes and one is determined to be "other residential". Twelve losses have been paid for a total of $99,489; and there have been two reported repetitive losses for a total of $64,978.38. Repetitive loss claims include on single family home ($7,629.79) and one non-resident unit ($57,348.59)[6]. The location of structures 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 Canaan Flood Plain Regulations state *"The following shall apply to all lands designated as a special flood hazard areas by the Federal Emergency Management Agency in its "Flood Insurance Study for the Town of Canaan, N.H." together with the associated Flood Insurance Rate Maps and Flood Boundary and Flood way maps*

[6] NH Office of Energy & Planning; Jennifer Gilbert, December 1, 2015

of the Town of Canaan date March'-12, 1988 which are declared to be part of this Ordinance."[7] It should be noted that the latest Flood Insurance Rate Maps are dated February 20, 2008.

Elements of the Canaan Floodplain Development Ordinance include[8]:

Item I Definition of Terms

Item II Requirement for permits: *"All proposed development in any special flood hazard shall require a permit"*

Item III Requirement for Building Inspector 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 Specifications for water & sewer systems

Item V Requirements for certification of floodproofing

Item VI The requirement for the applicant to obtain all necessary permits (i.e., from governmental agencies)

Item VII Specification for riverine situations and watercourses and coordination with the Wetlands Board of New Hampshire (DES)

Item VIII Further specifications for Zone A, AE (and others) and the determination of the 100-year flood elevation, new construction and substantial improvements, manufactured homes and lowest floor regulations

As a relatively small and close-knit community, the Canaan Board of Selectmen and the Hazard Mitigation Planning Team are most always aware of new construction and/or substantial improvements that take place in town. Canaan has a comparatively large designated Special Flood Hazard Area (approximately 13% of the total land) compared to other New Hampshire towns. The Team felt that it is worthwhile to have NFIP brochures and information available at the Town Office for current homeowners and potential developers and to further assess the NFIP, the floodplain regulations and enforcement (see Tables 8.1 & 9.1).

The Town of Canaan, through its Flood Plain Regulations 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 floodplain. The Town will continue to work with the NH Office of Energy and Planning (NH OEP) and will carefully monitor its continued compliance with the NFIP.

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*

[7] Canaan Flood Plain Regulations; http://www.canaannh.org/boards/planning_board/flood-regulations.pdf

[8] Items in italic are taken directly from the Canaan Flood Plain Regulations

D. Profile of Past, Present & Potential Wildfire Events in Canaan

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 Planning Team noted that very few significant wildfires have occurred in Canaan in the recent past, but they have been involved with mutual aid calls in other locations in both New Hampshire and Vermont (see Table 2.1). The Team also noted that many of the Community's residences are located in the Wildland Urban Interface (WUI) and that if the right conditions were in place, a large wildfire could occur. Canaan'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 a limited municipal water supply in Canaan so the fire department must rely on static water sources to fight fires in some areas of the Community.

E. Probability of Future Potential Disasters

Due to Canaan's geographic location, forested lands, steep hills, heavy snow pack and topography, there is always a possibility of future disaster. The Town of Canaan has been impacted in the past by natural disasters, including flooding, lightning, severe winter storms, tornadoes, earthquakes and severe wind. Fortunately, many residents have generators and/or heat with wood stoves.

The hazards that are have the highest probability to occur in Canaan, based on analysis done in *Table 3.1, Hazard Threat Analysis*, are described below.

Cider Mill Road; Tropical Storm Irene
Photo Credit: Town of Canaan; Emergency Webpage

FLOODING (DAM FAILURE, LOCAL ROADS, RIVERINE, ICE JAMS)

Flooding from heavy rain and swollen rivers is a common occurrence in Canaan, particularly along the Mascoma and Indian Rivers, at the confluence of the Indian River and Orange Brook and throughout Canaan Village. Flooding events have occurred frequently in the past and are expected to continue. GIS analysis determined that many structures fall within the FEMA flood zone, particularly in Canaan Village.

Tropical Storm Irene caused damage to several roads including Transfer Station Road, Lashua Road, Cider Mill Road, Jerusalem Road, Potato Road and other locations throughout the Community. Heavy rains, saturated ground and rapid snowmelt create overburdened culverts, road washouts and road closures.

Other major flooding events have taken place in the past, notably in March 2011, May 2006 and in March 1896, an event known as "The Great Flood". It is likely that the future will bring more flooding along the Mascoma and Indian

Rivers and road flooding due to the large number of gravel roads (30.79 miles) and the number of culverts that are either undersized or aging.[9] See Chapter 5 for more information on flooding in Canaan.

TORNADO & DOWNBURST

Although tornadoes and downbursts are not as common in New Hampshire as they are in the Midwest United States, an increase in the occurrence of tornadoes is expected as a result of climate change. Small tornadoes have been reported in recent years throughout the State.

In June of 2005, a downburst occurred on Goose Pond Road. Also, on August 21, 2011, a tornado was on the ground in Canaan for approximately 2.7 miles, damaging trees and property and leaving behind a 350 yard wide swath of destruction.

"Hundreds of trees were snapped or uprooted along its path. Several buildings were damaged by falling trees and wind. A sailboat and rowboat were damaged and moved in the storm. It was rated an EF1 tornado on the Enhanced Fujita Scale."[10]

National Weather Service photo of tornado damage in Canaan, Photo Credit: The Union Leader

The probability of tornadoes occurring in Canaan in the future is good, particularly with climate change. See Chapter 5 for more information on tornadoes and downbursts in Canaan.

SEVERE WINTER WEATHER & ICE STORMS

Severe winter weather events, particularly ice storms, are felt to pose a high risk to the people of Canaan. It is not uncommon for snow storms to unload 2-3 feet of snow in a single storm; fortunately with this common occurrence also comes a vast knowledge of how to deal with the situation. In fact, large snowstorms with heavy accumulation are generally handled quite well by the Canaan Highway Department and are often welcomed by outdoor winter recreationists.

Ice storms, on the other hand, pose a serious threat as they are unpredictable, can create a mass amount of damage and result in long-lasting power outages. Much of the Town is above 1,000 feet above sea level and therefore very susceptible to ice storms and the subsequent damage they

Ice Storm of 1998 – HSEM Photo Library Photo Credit: https://www.nh.gov/safety/divisions/hsem/PhotoLibrary/naturaldisasters.html

[9] Miles of roads in Canaan: GIS Analysis of data found in the NH DOT GIS data layer
[10] Union Leader; http://www.unionleader.com/article/20110823/news11/110829950

can cause; elevations in Canaan range from approximately 945' at the lowest point to 2,270' at the top of an unnamed ridge overlooking Derby Pond.[11] Neither the 1998 or 2008 Ice Storms had a significant impact in Canaan; however the probability of future ice storms is good. Canaan assisted area communities during the 1998 Ice Storm.

The road system which passes through Canaan, with the exception of US Route 4 and NH Route 118, primarily consists of slow country roads and/or dirt roads. These dark, narrow, winding and bumpy 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. See Chapter 5 for more information on severe winter weather and ice storms in Canaan.

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[12]. 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 Canaan, should become increasingly aware of the effects of climate change on the natural hazards that are already being experienced.

STATE HAZARD MITIGATION PLAN

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

State Hazard	Reason for exclusion from Canaan's Plan
Coastal Flooding	Distance away from the sea
Radiological	Distance away from a nuclear power plant
Fire & Hazardous Materials	Addressed with "Wildfire" and "Hazard 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 Canaan 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, particularly as there are no major grocery stores located in the Community. 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 who comprise approximately 15% of the population. In addition, winter in New England commonly brings very low temperatures, while high temperatures can be experienced in the summer.

[11] Canaan, NH; Wikipedia; https://en.wikipedia.org/wiki/Canaan,_New_Hampshire
[12] State Mitigation Pan Review Guide, FEMA, Released March 2015, Effective March 2016, Section 3.2, page 13

HAZARD PROBABILITY COMBINED TRANSPORTATION

NH Route 4 serves as major east-west highway for those travelling to or from eastern NH to the Hanover region of the State, travelling parallel to the Mascoma and Indian Rivers and running across Canaan in the southern part of the Town; NH Route 118 also carries a considerable amount of traffic. Both of these roadways are often travelled by large trucks and are often impacted by weather events that create poor driving conditions.

A number of other roads serve the Community, many of which are narrow and winding and subject to severe winter weather. The Town maintains approximately 42.36 miles of paved Class V roadways and 30.79 miles of unpaved Class V roadways.[13]

Canaan's 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.

Tropical Storm Irene Photo Credit: Town of Canaan; Emergency Webpage

[13] GIS Analysis of NH DOT Road Layer; local roads Class V

TABLE 3.2: HISTORIC HAZARD IDENTIFICATION

2011 HMPT = 2011 Hazard Mitigation Planning Team
2017 HMPT = 2017 Hazard Mitigation Planning Team

Type of Event	Date	Location	Impact	Source
Past Flooding Hazards including Riverine, Heavy Rainfall, Rapid Snowmelt, Ice Jam Flooding & Local Road Flooding: 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. Flood events have the potential to impact Canaan on a town wide basis, particularly in five specific areas: parts of West Canaan (not mapped), Potato Road (mapped); Canaan Village (mapped), sections of Route 118 (not mapped) and sections of Route 4 (not mapped). Other areas that are known to flood are also mapped in ***Map 3, Past & Potential Areas of Concern.***				
Flooding/Ice Jams	1957; 1959; 1961; 1963; 1964; 1968; 1970	Mascoma River, West Canaan, Indian River	Flooding ice jam and seasonal flooding	2011 HMPT
Severe Storms & Flooding	Summer 1973 (June & July)	Local Flooding	**Presidential Disaster Declaration DR-399:** Flooding in several locations including downtown intersection.	2011 HMPT
Severe Storms & Flooding	December 1973	Local Flooding	Flooding in several locations including downtown intersection and Route 4.	2017 HMPT
Severe Storms & Flooding	March 15, 1979	Areas prone to flooding Town Wide	**Presidential Emergency Declaration EM-3073:** Five areas of Canaan are prone to flooding: Canaan Village, West Canaan, Potato Road, Route 118 and Route 4; Canaan received flooding from spring snowmelt and heavy rains. ***(Potato Road, Map ID #4 & Canaan Village, Map ID #2)***	FEMA & 2017 HMPT
Severe Storms & Flooding	March 30-April 11, 1987	Areas prone to flooding Town Wide	**Presidential Disaster Declaration DR-789:** Five areas of Canaan are prone to flooding: West Canaan, Potato Road, Route 118 and Route 4; Canaan received flooding from spring snowmelt and heavy rains.	FEMA & 2017 HMPT
Severe Storms & Flooding	August 7-11, 1990	Areas prone to flooding Town Wide	**Presidential Disaster Declaration DR-876:** Five areas of Canaan are prone to flooding: Canaan Village, West Canaan, Potato Road, Route 118 and Route 4; Canaan received flooding from spring snowmelt and heavy rains.	FEMA & 2017 HMPT
Severe Storms & Flooding	Spring 1992	Areas prone to flooding Town Wide	Heavy rain and snow melt caused flooding in Canaan Village (downtown), West Canaan, Potato Road, Route 118 and Route 4, the major places where flooding occurs on a regular basis.	2017 HMPT
Severe Storms & Flooding	October 20-November 15, 1995	Areas prone to flooding Town Wide	**Presidential Disaster Declaration DR-1077:** Five areas of Canaan are prone to flooding: Canaan Village, West Canaan, Potato Road, Route 118 and Route 4; Canaan received flooding from heavy fall rains.	FEMA & 2017 HMPT
Severe Storms & Flooding	October 20-23, 1996	Areas prone to flooding Town Wide	**Presidential Disaster Declaration DR-1144:** Five areas of Canaan are prone to flooding: Canaan Village, West Canaan, Potato Road, Route 118 and Route 4; Canaan received flooding from heavy fall rains.	FEMA & 2017 HMPT

Type of Event	Date	Location	Impact	Source
Severe Storms & Flooding	June 12-July 2, 1998	Areas prone to flooding Town Wide	**Presidential Disaster Declaration DR-1231:** Five areas of Canaan are prone to flooding: Canaan Village, West Canaan, Potato Road, Route 118 and Route 4; Canaan received flooding from heavy summer rains.	FEMA & 2017 HMPT
Severe Storms & Flooding	June 2005	Areas prone to flooding Town Wide	Heavy June rains took out Route 118 in multiple locations; in some place half of the road was washed out; repaired and mitigated by NH DOT (state road); also took Cider Mill Road.	2017 HMPT
Severe Storms & Flooding	October 7-18, 2005	Belknap, Cheshire, Grafton, Hillsborough, Merrimack & Sullivan	**Presidential Disaster Declaration DR-1610:** 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; Canaan experienced flooding in the usual five areas, Canaan Village, West Canaan, Potato Road, Route 118 and Route 4.	FEMA & 2017 HMPT
Severe Storms & Flooding	May 12-23, 2006	Belknap, Carroll, Grafton, Hillsborough, Merrimack, Rockingham & Strafford	**Presidential Disaster Declaration DR-1643:** Flooding in most of southern NH, May 12-23, 2006; Canaan experienced flooding in the usual five areas, Canaan Village, West Canaan, Potato Road, Route 118 and Route 4. (aka: Mother's Day Storm)	FEMA & 2017 HMPT
Nor'easter, Severe Storms & Flooding	April 15-23, 2007	All Ten NH Counties	**Presidential Disaster Declaration DR-1695:** Flood damages; FEMA & SBA obligated more than $27.9 million in disaster aid following the April nor'easter; Canaan experienced flooding in the usual five areas, Canaan Village, West Canaan, Potato Road, Route 118 and Route 4; heavy wind damage in Canaan. (aka: Tax Day Storm)	FEMA & 2017 HMPT
Severe Storms & Flooding	July 24-August 14, 2008	Belknap, Carroll & Grafton & Coos	**Presidential Declaration DR-1787:** Severe storms, tornado and flooding on July 24, 2008 in Carroll County (tornado did not reach Canaan); Canaan experienced flooding in the usual five areas, Canaan Village, West Canaan, Potato Road, Route 118 and Route 4 and also on Prospect Hill, Clark Hill and Fernwood Farms Roads.	FEMA & 2017 HMPT
Severe Storms & Flooding	March 17, 2011	Near Transfer Station	Heavy rain combined with ice in Orange Brook caused flooding of the Fairground and Transfer Station Road (limiting access). ***(Map ID #6)***	2017 HMPT
Severe Storms & Flooding	May 26-30, 2011	Coos & Grafton County	**Presidential Disaster Declaration DR-4006:** May Flooding Event, May 26th-30th 2011 Coos & Grafton County. (aka: Memorial Day Weekend Storm); heavy rain in Canaan.	FEMA & 2017 HMPT
Flooding & Erosion	Past (during periods of heavy rain)	Codfish Hill Road	Road and driveway erosion during high water; Codfish Hill Road needed better drainage; this has been mitigated.	2011 HMPT & 2017 HMPT
Flooding & Erosion (road)	Past & Potential (during periods of heavy rain)	Potato Road	Road floods and erodes as it is below flood elevation; mitigation is to raise the road and add culverts to increase the flow of stormwater. ***(Map ID #4)***	2011 HMPT & 2017 HMPT

Type of Event	Date	Location	Impact	Source
Flooding & Erosion (road)	Past & Potential (during periods of heavy rain)	Roberts Road	Road washes during rainy season; no longer floods but road can wash out from excess stormwater flow.	2011 HMPT
Flooding & Erosion (road)	Past (during periods of heavy rain)	Fernwood Farms Road	Eroded two years ago and another precedent occurrence; inadequate ditching; this has been mitigated.	2011 HMPT & 2017 HMPT
Flooding & Erosion (road)	Tropical Storm Irene (August 2011)	River Road	River Road flooded during Tropical Storm Irene; no structures were affected ***(see also High Wind Events below)***	2017 HMPT
Flooding & Erosion (road)	Tropical Storm Irene (August 2011)	Lashua Road	High water started to lift decking off bridge during the heavy rains of Tropical Storm Irene; FEMA funding was obtained to repair the bridge; this has been repaired but flooding can still take place. ***(see also High Wind Events below)***	2017 HMPT
Flooding & Erosion (bank)	Past & Potential (during periods of heavy rain)	Ball Park Road	Bank slides down onto Ball Park Road during heavy rain creating the potential to close the road; mitigation is to cut bank back and put erosion stone on it (riprap). ***(Map ID #10)***	2017 HMPT
Severe Storms, Flooding	July 9-10, 2013	Cheshire, Sullivan & Grafton	**Emergency Declaration DR-4139:** Severe storms, flooding and landslides during the period of June 26 to July 3, 2013 in Cheshire, Sullivan and southern Grafton Counties; no significant impact in Canaan.	FEMA & 2017 HMPT
Severe Storms, Flooding	July 1-2, 2017	Grafton County	Severe storms and flooding struck several Grafton County Communities including Canaan; Grafton Turnpike, Bradbury, Beach Cobble, Hinkson Brook, Brainard and West Farms Roads were all impacted; damaged shoulders but no road closures; no structure damage.	FEMA & 2017 HMPT
Past Wildfire Hazards: 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; wildfires have the potential to impact the Community on a town wide basis.				
Wildfire	2-Jul-53	NA	**Presidential Disaster Declaration DR-11:** This fire did not occur in Canaan.	FEMA
The Team reported that there have been no significant wildfires (5+ acres) since the last Hazard Mitigation Plan in 2011.				

Type of Event	Date	Location	Impact	Source
Past High Wind Hazards including Hurricanes, Tropical Storms, Tornadoes, Downbursts & Windstorms: 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. Two hazards (Downburst, June 2005; Tornado, August 2011) were mapped and can be seen in ***Map 3, Past & Potential Areas of Concern***; tornadoes and other wind events have the potential to impact the Community on a town wide basis.				
Hurricane	September 21, 1938	Region Wide	**The Great New England Hurricane:** 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 http://nhpr.org/post/75th-anniversary-new-englands-greatest-hurricane)*	2017 HMPT
Hurricane	August 31, 1954	Region Wide	**Hurricane Carol:** 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: http://www.wmur.com/Timeline-History-Of-NH-Hurricanes/11861310)*	2017 HMPT
Hurricane Bob, Severe Storm	August 18-20, 1991	Town Wide	**Presidential Disaster Declaration DR-917:** Heavy rain and wind but no significant impact in Canaan.	FEMA & 2017 HMPT
Downburst	6-Jul-99	Town Wide	Two roofs blown off structures; power outages; downed trees, utility poles, and wires	2011 HMPT
Tropical Storm Floyd	September 16-18,1999	Belknap, Cheshire & Grafton	**Presidential Disaster Declaration DR-1305:** 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; heavy rains; Canaan received damage.	FEMA & 2017 HMPT
Downburst	June 2005	Goose Pond Road	Damage along Goose Pond Road ***(Map ID #11)***	2011 HMPT
Hurricane Katrina Evacuation	August 29-October 1, 2005	All Ten NH Counties	**Emergency Declaration EM-3258:** 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.	FEMA & 2017 HMPT
Tornado	21-Aug-11	Local Roads	An EF1 tornado ran a swath from Abbott Road to the Transfer Station, going across Gristmill Road, Ball Park Road, Sugar Hill Road and Route 4; tree and roof damage; sheds damaged and a portable garage destroyed; a boat ended up in tree; lost row boat. ***(Map ID #12)***	FEMA & 2017 HMPT

Type of Event	Date	Location	Impact	Source
Hurricane & Tropical Storm Irene	August 26-September 6, 2011	**EM 3333:** All Ten NH Counties **DR-4026:** Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, & Sullivan	**Emergency Declaration EM-3333 & Presidential Disaster Declaration DR-4026:** Tropical Storm Irene Aug 26th- Sept 6, 2011 Carroll, Coos, Grafton, Merrimack, Belknap, Strafford, & Sullivan Counties; Emergency Declaration for all ten counties; flooding in the usual areas, numerous roads damage, roads closed for up two weeks; the Town received FEMA funding to help do repairs.	FEMA & 2017 HMPT
Hurricane & Tropical Storm Sandy	October 26-November 8, 2012	**EM 3660:** All Ten NH Counties **DR-4095:** Belknap, Carroll, Coos, Grafton & Sullivan	**Emergency Declaration EM-3660 & Presidential Disaster Declaration DR-4095:** 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; no significant impact in Canaan.	FEMA & 2017 HMPT
Past Severe Winter Weather Hazards including Nor'easters, Blizzards & Ice Storms: 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 Snow Storms & ice Storm	Winter of 1968-69	Town Wide	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; in Canaan in December 26-28; an ice storm took out power around Goose Pond Road for a week.	Local & 2011 HMPT & 2017 HMPT
High Winds, Tidal Surge, Coastal Flooding & Snow	February 6, 1978	Town Wide	**Presidential Disaster Declaration DR-549:** Blizzard of '78; region-wide Blizzard severely affecting southern New England and leaving high accumulations throughout all of New England and New Hampshire; 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; heavy snow accumulations occurred but were handled by Highway Department.	FEMA & 2011 HMPT & 2017 HMPT
High Winds & Record Snowfall	March 13-17, 1994	Town Wide	**Emergency Declaration EM-3101: H**eavy snow, accumulation handled by the Canaan Highway Department.	FEMA & 2017 HMPT
Severe Snow Storm	1997	Town Wide	Power outages throughout Canaan due to heavy snowfall	2011 HMPT
Ice Storm	January 7-25, 1998	Town Wide	**Presidential Disaster Declaration DR-1199:** Canaan supplied crews to other towns but was not significantly hit by this ice storm.	FEMA & 2017 HMPT
Severe Snow Storm	Winter 2000	Town Wide	Heavy accumulations; Canaan received approximately five feet of snow; roof collapses	2017 HMPT

Type of Event	Date	Location	Impact	Source
Severe Snow Storm	March 5-7, 2001	Cheshire, Coos, Grafton, Hillsborough, Merrimack, & Strafford	**Emergency Declaration EM-3166:** Declaration covers jurisdictions with record and near-record snowfall from the late winter storm that occurred March 2001; accumulations handled by the Canaan Highway Department.	FEMA & 2017 HMPT
Severe Snow Storm	December 6-7, 2003	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack & Sullivan	**Emergency Declaration EM-3193:** The declaration covers jurisdictions with record and near-record snowfall that occurred over the period of December 6-7, 2003; accumulations handled by the Canaan Highway Department.	FEMA & 2017 HMPT
Severe Snow Storms	March 11-12, 2005 January, 22-23, 2005 February 10-11, 2005	**EM-3207 (Jan):** Belknap, Carroll, Cheshire, Grafton, Hillsborough, Rockingham, Merrimack, Strafford & Sullivan **EM-3208 (Feb):** Carroll, Cheshire, Coos, Grafton & Sullivan **EM-3201 (Mar):** Carroll, Cheshire, Hillsborough, Rockingham & Sullivan	**Emergency Declaration EM-3207:** 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 **$3,658,114.66** (Grafton: $137,118.71); **Emergency Declaration EM-3208**: February storm; total aid for the February storm was $1,121,727.20 (Grafton: $213,539.52) **EM 3208-002:** 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 received aid for the March 2005 storm; heavy snow accumulations handled by the Highway Department.	FEMA & 2017 HMPT
Severe Winter Storm & Ice Storm	December 11-23, 2008	All Ten NH Counties	**Presidential Disaster Declaration DR-1812 & Emergency Declaration EM-3297:** 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; no significant impact in Canaan.	FEMA & 2017 HMPT
Severe Winter Storm, Rain & Flooding	February 23 - March 3, 2010	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan	**Presidential Disaster Declaration: DR-1892:** 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; snow accumulation handled by the Highway Department.	FEMA & 2017 HMPT
Severe Snow Storm	October 29-30, 2011	All Ten NH Counties	**Emergency Declaration EM-3344:** Severe storm during the period of October 29-30, 2011; all ten counties in the State of New Hampshire. (aka: Snowtober); Canaan received snow but did not lose power; snow accumulation handled by Highway Department.	FEMA & 2017 HMPT
Severe Winter Storm	February 8, 2013	All Ten NH Counties	**Emergency Declaration DR-4105:** Nemo; heavy snow in February 2013; snow accumulation handled by Highway Department.	FEMA & 2017 HMPT

Type of Event	Date	Location	Impact	Source
Past Earthquake Hazards: 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	
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; felt in Canaan; no damage	
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; felt in Canaan; no damage	
Earthquake	09/18/12	Concord, NH	Magnitude 1.2	
Earthquake	10/16/12	Waterboro, ME	Magnitude 4.0; felt in Canaan; no damage	
Past Drought Hazards: 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	August-September 1995	Canaan	Drought in region and in Canaan; very low water table; high fire danger; State stationed a fire crew in Allenstown, Canaan participated.	2017 HMPT
Drought	Summer of 2016	Canaan	Drought in region and in Canaan; very low water table; high fire danger; dug wells and some drilled wells were affected; significant drought in Southern NH that extended to Canaan.	2017 HMPT

Type of Event	Date	Location	Impact	Source
Other Past or Potential Hazards: 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. One (Landslide area, Ball Park Road) hazards was mapped and can be seen on ***Map 3, Past & Potential Areas of Concern***; other natural or human-caused hazards have the potential to impact the Community on a town wide basis.				
Landslide	Past & Potential	Route 118	Slide activity along Route 118 road banks during flood events	2011 HMPT
Hazardous Materials - Fixed Location	Potential	Irving Propane Plant; US Route 4	Potential for hazardous materials incident at the Irving propane plant	2017 HMPT
Hazardous Materials - Fixed Location	Potential	Harris Rebar	Potential for hazardous materials incident at the Harris Rebar	2017 HMPT
Hazardous Materials - Fixed Location	Potential	Fairpoint	Potential for hazardous materials incident at Fairpoint; large store of batteries; some with sulfuric acid	2017 HMPT
Hazardous Materials - Fixed Location	Potential	AT&T	Potential for hazardous materials incident at AT&T; large switching transfer facility	2017 HMPT
Hazardous Materials - Fixed Location	Potential	Wastewater Treatment Plant	Potential for hazardous materials incident at the wastewater treatment plant	2017 HMPT
Hazardous Materials - Transport	Potential	Irving Propane Plant; US Route 4	Potential for hazardous materials transport incident at the propane plant due to volume of tanker traffic that is experienced.	2017 HMPT
Hazardous Materials - Transport	Potential	Town Wide	Potential for hazardous materials transport incident throughout Canaan; oil, propane and other deliveries throughout the Community.	2017 HMPT
Urban Fire			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. ***See Table 3.1, Hazard Threat Matrix and Chapter 5 for more details on these hazards.***	
Extended Power Failure (3+ days)				
Epidemic Pandemic				
Terrorism				
Radon				
Extreme Temperatures				
Thunderstorm & Lightning				
Hailstorm				

*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
- http://www.Earthquaketrack.com

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

Chapter 4: Critical Infrastructure & Key Resources (CIKR)

With Team discussion and brainstorming, Critical Infrastructure and Key Resources (CIKR) within Canaan 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	Public Safety Complex (generator)	Primary EOC	All Hazards	1
2		Canaan Police Department		
3		Canaan Fire Department (Secondary EOC)		
4		Canaan Ambulance		
5	Town Highway Garage (generator)	Heavy Equipment, Sand & Gravel	All Hazards	1
6	Town Offices/Library (no generator)	Town Government; Communications	All Hazards & Flooding	2
NM	To be determined; may be designated at the time of an emergency	Primary Shelter	Not Applicable	-
NM	Mascoma Community Health Center (2017)	Medical Services	All Hazards	1
NM	Alice Peck Day & Dartmouth-Hitchcock (DHMC) (Lebanon)	Hospitals	All Hazards	1
Dams				
7	Goose Pond Dam	High Hazard - Floods into Enfield ***(Inundation; Map 3; Map ID #6)***	All Hazards & Flooding	3
8	Canaan Street Lake Dam	High Hazard - Floods into Canaan Center ***(Inundation; Map 3; Map ID #7)***	All Hazards & Flooding	3
9	Old Reservoir Dam (May Street)	Flood into Enfield ***(Inundation; Map 3; Map ID #8)***	All Hazards & Flooding	1
10	Canaan Sewerage Lagoons	No structure flooding	All Hazards & Flooding	1
NM	Cummings Pond Dam (Dorchester)	Canaan Center to West Canaan & Enfield	All Hazards & Flooding	3
NM	Crystal Lake Dam (Enfield) (High Hazard/EAP)	High Hazard - West Canaan & Enfield	All Hazards & Flooding	3
NM	Beaver Dam (Orange)	Floods Orange Brook/Race track & transfer station	All Hazards & Flooding	2

Emergency Response Facilities (ERF)				
Bridges on the Evacuation Routes				
11	Route 4/Town Line	Bridge on Primary Evacuation Route	All Hazards & Flooding	1
12	Route 4/Mascoma Regional	Bridge on Primary Evacuation Route	All Hazards & Flooding	1
13	Route 4/Mascoma River/Pleasant Valley	Bridge on Primary Evacuation Route	All Hazards & Flooding & Ice Jams	2
14	Route 4/Mascoma River #3 Lafortune Rd	Bridge on Primary Evacuation Route	All Hazards & Flooding	1
15	Route 4/Indian River #1 - Larry Gaudette	Bridge on Primary Evacuation Route	All Hazards & Ice Jams	2
16	Route 4/Indian River #2- Dollar General	Bridge on Primary Evacuation Route	All Hazards & Ice Jams	1
17	Route 4/Indian River #3 - Williams Field	Bridge on Primary Evacuation Route	All Hazards & Flooding	1
18	Route 118/Indian River #1/State Shed	Bridge on Primary Evacuation Route	All Hazards & Flooding	3
19	Route 118/Indian River #2/Withington	Bridge on Primary Evacuation Route	All Hazards & Flooding & Ice Jams	2
20	Route 118/Indian River #3/Adams	Bridge on Primary Evacuation Route	All Hazards & Flooding	1
21	Bridge on Orange Road/Race Track	Bridge on Primary Evacuation Route	All Hazards & Flooding & Ice Jams	3
Helicopter Landing Zones				
22	Williams Field/Canaan Village	Helicopter Landing Zones	All Hazards & Flooding	3
23	Withington Field/Across from Race Track	Helicopter Landing Zones	All Hazards & Flooding	3
24	Intersection of Route 4/Switch Road Old Enfield Granite	Helicopter Landing Zones	All Hazards & Flooding	2
25	Mascoma High School Athletic Fields	Helicopter Landing Zones	All Hazards & Flooding	2
26	NH DOT Garage/Route 118	Helicopter Landing Zones	All Hazards	1
27	CMS Athletic Field Behind North Church	Helicopter Landing Zones	All Hazards	1
Evacuation Routes ***(evacuation routes are not numbered but may be seen on Map 4, Critical Facilities & Key Resources)***				
US Route 4		Primary Evacuation Route	All Hazards & Flooding	3
NH Route 118		Primary Evacuation Route	All Hazards & Flooding	3
Canaan Street		Secondary Evacuation Route	All Hazards & Flooding	1

Emergency Response Facilities (ERF)			
Grafton Turnpike	Secondary Evacuation Route	All Hazards & Flooding	1
Goose Pond Road	Secondary Evacuation Route	All Hazards & Flooding	1
Potato Road (access from Ball Park, Grist Mill Hill & South Roads)	Secondary Evacuation Route	All Hazards & Flooding	1
South Road to US Route 4	Secondary Evacuation Route	All Hazards & Flooding	1
Northern Rail Trail	Secondary Evacuation Route	All Hazards & Flooding	1

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**	
28	Mascoma Valley Regional High School (generator)	Potential Shelter; School	All Hazards	2
29	Canaan Elementary School (no generator)	Potential Shelter; School	All Hazards & Flooding	1
30	Indian River Middle School (generator)	Potential Shelter; School	All Hazards	2
31	Cardigan Mountain School (generator)	Potential Shelter; School	All Hazards & Severe Wind	2
32	St. Mary's Rectory	Potential Shelter; Gathering of People	All Hazards & Flooding	1
33	Canaan United Methodist Church	Potential Shelter; Gathering of People	All Hazards & Flooding	1
34	Assembly of God	Potential Shelter; Gathering of People	All Hazards & Flooding	2
35	Canaan Hall	Potential Shelter; Gathering of People	All Hazards & Flooding	2
36	Water Treatment Facility (generator)	Public water treatment; fire suppression	All Hazards	1
37	Wastewater Treatment Facility (generator)	Wastewater treatment	All Hazards	2
38	Transfer Station	Waste disposal	All Hazards & Flooding	3
39	NH DOT Garage	Equipment; Sand & Grave1	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**	
28	Mascoma Valley Regional High School (generator)	School; Potential Shelter; Food Preparation	All Hazards	2
29	Canaan Elementary School (no generator)	School; Potential Shelter; Food Preparation	All Hazards & Flooding	1
30	Indian River Middle School (generator)	School; Potential Shelter; Food Preparation	All Hazards	2
31	Cardigan Mountain School (generator)	School; Potential Shelter; Food Preparation	All Hazards & Severe Wind	2
32	St. Mary's Rectory	Gathering of People; Potential Shelter	All Hazards & Flooding	1
40	Indian River Nursery School	Childcare Facility	All Hazards	1
41	Kelly's Little Friends Day Care	Childcare Facility	All Hazards	1
42	Indian River Apartments	Senior & Low Income Housing	All Hazards	1
43	Indian River Grange/Senior Center	Gathering of People; Potential Shelter; Food Preparation	All Hazards & Flooding	3
44	Country Village Mobile Home Park	Mobile Home Park	All Hazards	1
45	Smith Trailer Park	Mobile Home Park	All Hazards & Flooding	3
46	Canaan Street Historic District	Historic; Structures; Gathering of People	All Hazards	1
47	Canaan Village	Historic; Structures; Gathering of People	All Hazards & Flooding	3
48	Canaan Center	Historic; Structures; Gathering of People	All Hazards	1
49	Cardigan Mountain Fish & Game Club	Gathering of People; Potential Shelter; Food Preparation	All Hazards	1

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. Several food preparation and potential shelters are listed above as Facilities & People to Protect. For additional resources, please refer to the Town's Emergency Operations Plan (EOP) completed in 2014.

Chapter 5: Hazards Effects in Canaan

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 other structures that are most likely to be damaged by these events. Using GIS analysis and aerial imagery, at-risk structures were identified throughout the Town.

All CIKR in Canaan were identified in GIS; this list was then narrowed by those CIKRs that were located in the FEMA floodplain. A total of 22 CIKRs were found in the flood zone as seen in the chart to the right. Many of Canaan's CIKR in the floodplain are bridges and dams; however, there are a significant number of other CIKR that are located in either the FEMA 100-year or 200-year floodplains, particularly in Canaan Village; it is expected that numerous non-CIKR structures are also within the FEMA floodplain. See "Flooding" in Section C of this Chapter for more information. Town officials should keep these CIKR in mind when a flood hazard is likely.

CIKR in the 100 and 200 year Flood Zone

ID	ALL_H	NAME	Hazmit_Type
1	ERF	Primary EOC	Primary EOC
2	ERF	Canaan Police Department	Police
3	ERF	Canaan Fire Department	Fire
4	ERF	Canaan Ambulance	EMS
5	ERF	Canaan Highway Garage	Highway
8	ERFD	Canaan Street Lake Dam	Dam
11	ERFB	Route 4/Town Line	Evac Bridge
13	ERFB	Route 4/Pleasant Valley	Evac Bridge
14	ERFB	Route 4/Lafortune Rd	Evac Bridge
16	ERFB	Route 4/Dollar General	Evac Bridge
17	ERFB	Route 4/Williams Field	Evac Bridge
18	ERFB	Route 18/Indian River/DOT	Evac Bridge
20	ERFB	Route 18/Indian River/Adams	Evac Bridge
21	ERFB	Orange Rd/Race Track	Evac Bridge
22	ERFH	Williams Field	Heli LZ
23	ERFH	Withington Field	Heli LZ
24	ERFH	Old Enfield Granite	Heli LZ
25	ERFH	Mascoma HS Fields	Heli LZ
34	NERF	Assembly of God	Potential Shelter
35	NERF	Canaan Hall	Secondary Shelter
38	NERF	Transfer Station	Transfer Station
40	FPP	Indian River Nursery School	School

Using the same methodology that was used for flooding, Critical Infrastructure & Key Resources falling within the Wildland Urban Interface (WUI) were reviewed. Identifying these structures 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 and to estimate their potential loss. Although seven CIKR were found in the identified WUI, it should be noted that these CIKR have substantial defensible space. Most of the Town's CIKR were found to be within the 300 foot buffer, therefore accessible by fire apparatus and hoses. However, as stated elsewhere in this Plan, the entire town of Canaan, 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.

CIKR in the Wildland Urban Interface

5	ERF	Canaan Highway Garage	Highway
9	ERFD	Old Reservoir Dam	Dam
22	ERFH	Williams Field	Heli LZ
28	NERF	Mascoma Valley Reg. HS	Potential Shelter
30	NERF	Indian River School	Potential Shelter
31	NERF	Cardigan Mt. School	Potential Shelter
42	FPP	Indian River Apts	Senior & Low Income

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 Canaan's structures, depending on the nature of the hazard and whether or not the hazard is localized.

2016-MS1	Value	1% Damage	5% Damage
Residential	$149,235,446	$1,492,354	$7,461,772
Manufactured Housing	$14,998,800	$149,988	$749,940
Commercial	$39,765,300	$397,653	$1,988,265
Other Utilities	$0	$0	$0
Tax Exempt	$46,979,854	$469,799	$2,348,993
Utilities	$7,993,100	$79,931	$399,655
Total	$258,972,500	$2,589,725	$12,948,625
2016 Annual Report			

Based on this assumption, the potential loss from any of the identified hazards would range from **$0 to $258,972,500** or **$2,589,725 to $12,948,625** based on the 2016 Canaan town valuations which lists the assessed value of all structures in Canaan to be **$258,972,500** (see chart above).

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.

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 Fujita Scale for tornadoes.

The table below represents the hazards that are mapped and can be seen in ***Map 3, Past & Potential Areas of Concern.***

Id	Town	Date_	Haz_Type	Effect	Location
1	Canaan	Ongoing	Flooding	River Flooding/Block at Pilings	Pilings/Rail Trail
2	Canaan	Ongoing	Flooding	Village Floods	Canaan Village
3	Canaan	Ongoing	Flooding	River Flooding/Block at Pilings	Pilings/Rail Trail
4	Canaan	Ongoing	Flooding	Road Flooding	Potato Rd
5	Canaan	Ongoing	Flooding	Flooding into Village	Oxbow Indian River
6	Canaan	March 2011	Flooding	Flooding/Orange Brook	Transfer St/Farigrounds
7	Canaan	Potential	Dam Failure - Potential	Flooding	Goose Pond Dam
8	Canaan	Potential	Dam Failure - Potential	Flood/Canaan Center	Canaan St. Lake Dam
9	Canaan	Potential	Dam Failure - Potential	Flooding into Enfield	Old Res. Dam
10	Canaan	Past & Potential	Landslide	Hillslide slid	Ball Park Road
11	Canaan	June 2005	Microburst	Tree/structure damage	Goose Pond Rd
12	Canaan	Past	Tornado	Tree/Roof/Shed/Garage/Boat damage	Abbott to Transfer Statio

1) Flooding (dam failure, local roads, riverine & ice jams) ..... $2,589,725 to $12,948,625

FLOODING – DAM FAILURE

The Town of Canaan is host to several dams including Goose Pond Dam, Canaan Street Lake Dam, Old Reservoir Dam and the Canaan Sewerage Lagoons. Failure of the Goose Pond Dam or Old Reservoir Dam, although in Canaan, would primarily affect the neighboring town of Enfield. Failure of the Canaan Street Lake Dam could produce significant flooding into Canaan Center, then on to West Canaan and into Enfield. Fortunately, a failure of the Sewerage Lagoons would not likely affect any structures.

Two other dams, the Cummings Pond Dam in Dorchester and Crystal Lake Dam in Enfield, have the potential to affect Canaan Center, West Canaan and Enfield and West Canaan and Enfield respectively. In addition, beaver dams have been known to cause flooding, particularly on Orange Brook which caused damage both in 1996 and during Tropical Storm Irene; these events caused flooding of the Town's racetrack and left debris and flooding at the bridge on Transfer Station Road.

Mitigation Action Items #10 & 17 recognize the need to obtain dam plans and to hold preparedness exercises for Canaan's dams.

FLOODING - LOCAL (ROADS)

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 stormwater drainage systems create local flooding on many of Canaan's roads.

It is estimated that the Town experiences some sort of stormwater problem whenever there are two or more inches of rain in a short period of time. Many of the roads in Canaan are long and winding and subject to some of the most severe weather in the State. Many of Canaan's roads are gravel; often these roads have aging or undersized culverts and poor engineering designs. The continuous erosion of roads makes for a daunting task of "up-keep" by the Town's highway department. Fortunately, two of the Town's major thoroughfares, US Route 4 and NH Route 118, are the responsibility of the State.

Road flooding occurs throughout Canaan, but particularly in five specific areas: parts of West Canaan (not mapped), Potato Road (mapped); Canaan Village (mapped), sections of Route 118 (not mapped) and sections of Route 4 (not mapped). Historic records show that flooding has occurred and has potential to occur again on Codfish Hill Road, Potato Road, Roberts Road, Fernwood Farms Road, Transfer Station Road, River Road, Lashua Road and Ball Park Road (see Table 3.2). The April 2007 storm brought heavy flood damage to the usual areas of flooding as did the rainy period during July-August 2008. Severe storms in March 2011 brought road flooding to Transfer Station Road and River Road. Tropical Storm Irene in August 2011 brought flooding to numerous roads, some of which were closed for as long as two weeks.

In early July 2017, a strong storm brought up to five inches of rain in some places in Grafton County. Many communities saw road washouts including Canaan. In Canaan, Grafton Turnpike, Bradbury, Beach Cobble, Hinkson Brook, Brainard and West Farms Roads were affected. Although no road closures resulted, the shoulders of each of these roads had significant washouts. A Presidential Declaration is anticipated.

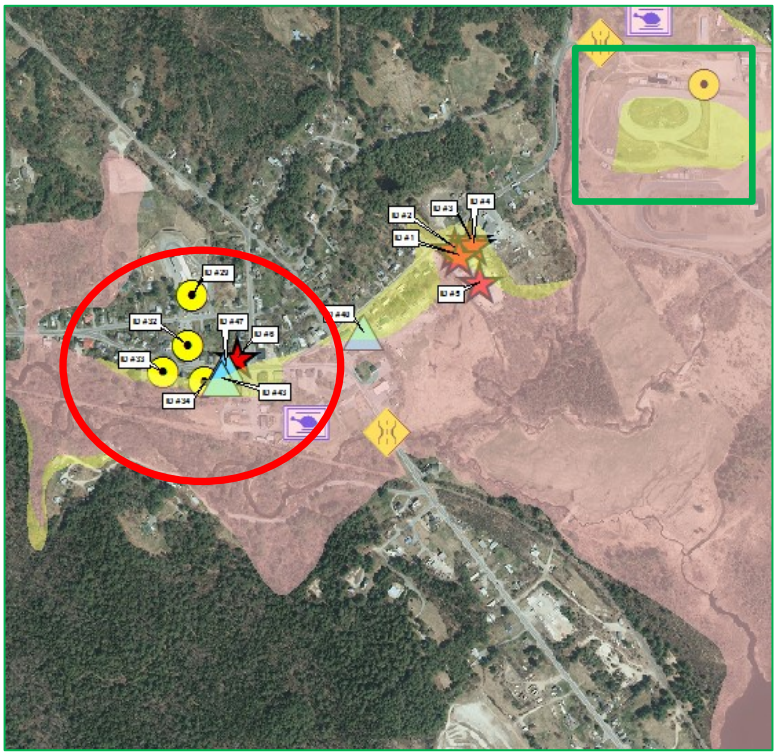
Mitigation Action Items #18 (Stormwater Maintenance Plan) calls for the development of a stormwater maintenance program that will address both ditching and the condition of culverts in Town in order to mitigate flooding issues. In addition, several other action items address culverts and roads in Canaan that need improvements. Mitigation Action Items #15 addresses Canaan Village Flooding and Action Item #27 addresses Potato Road improvements.

The cost of road erosion is difficult to calculate and it cannot be based on the assessed value of structures in Canaan. The expected loss value would be primarily on the economic impact on Community, the loss of accessibility and the time and cost of road repair which could be in the millions.

FLOODING - RIVERINE & 100-YEAR FLOODING EVENTS

Flooding is often associated with tropical storms, heavy rains and rapid snowmelt in the spring. Based on the Grafton County Floodplain Map, Canaan has a relatively large floodplain which follows along the banks of the Indian and Mascoma Rivers. Although not encompassing the entire town, the areas within the floodplain pose a serious problem for the Community.

As stated previously, there are five major areas of Canaan that experience flooding: parts of West Canaan, Potato Road; Canaan Village, sections of Route 118 and sections of Route 4. The most significant of these areas is Canaan Village (red circle) as shown in the aerial imagery below and on Map 3. Many of Canaan's key resources and much of the critical infrastructure is located within the 100-year (pink) and the 200-year (yellow) floodplains. In fact, 22 CIKR throughout the Town were found to be in the flood zone and it is expected that many other structures are also susceptible.



The Canaan Motor Club, LLC, (green square) has recently invested in a two million dollar facility, to offer track racing to enthusiasts. The 1.3 mile long track sits within the 200-year floodplain, but does not usually flood. The CMC track is expected to bring increased revenue to Canaan and to be the driving force for new development. Town officials are hoping that through mitigation, Canaan Village can be protected from future flooding events. Mitigation Action Item #16 addresses flooding in Canaan Village and proposes three possible solutions for this reoccurring flooding.

FLOODING - ICE JAM

Historically, there have been ice jams along the Indian and Mascoma Rivers in Canaan. In March 2011, an ice jam combined with heavy rain caused the Orange Brook to overflow at the Fairground and Transfer Station Road, thus limiting access (see Map 3).

Ice jams have the potential to impact all of the known areas of Canaan that experience flooding. This is particularly problematic on the Indian River and Orange Brook with the existence of oxbows and twists in these rivers (see screen print on page 59). Canaan Village is highly susceptible to flooding; an ice jam in the Indian River would like exacerbate any heavy rain situation.

2) Tornado & Downburst (microburst or macroburst) ..... $0 to $258,972,500

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. The high elevations in Canaan and the surrounding communities may deter the occurrence of tornadoes, but can contribute to the formation of downbursts.

In the past, Canaan has experienced at least two significant downbursts that resulted in downed trees and isolated property damage. In July 1999, a downburst left behind significant damage including power outages, downed trees, utility poles and wires and took two roofs off. In June of 2005, another downburst carved a large path of tree and utility destruction in the Goose Pond Road area *(see Map #3, Map ID #11)*. In August 2011, just prior to Tropical Storm Irene, an EF1 tornado ran a swath from Abbott Road to the Transfer Station, going across Gristmill, Ball Park and Sugar Hill Roads and US Route 4. Significant tree and roof damage occurred as a result of this tornado; small sheds and a portable garage were destroyed and one boat ended up in a tree *(see Map #3, Map ID #12)*.

However, due to the rareness of these events in New Hampshire, the likelihood of a tornado or downburst is low and the affects would be localized. Therefore, the potential loss value was determined to be between 0% and 1% for both downbursts and tornadoes.

3) Severe Winter Weather & Ice Storm ..... $2,589,725 to $12,948,625

SNOW STORMS

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 Canaan in the past. 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.

Winter storms often approach Canaan from the west, carrying moisture over the mountains of western Hanover. Nor'easters and blizzards can also travel into town from the east, carrying with them heavy winds and high accumulations. Fortunately, in New England, most road crews, including Canaan's, are able to handle 2-3' snow storms with a little time on their side.

Canaan's roads are often impacted by poor weather conditions and this combined with the steep terrain can make travel difficult. The topography of Canaan, with large mountains and deep river valleys makes winter weather conditions that much more threatening. Severe winter snow storms or blizzards can shut all of Canaan's roads down at least temporarily and thus prevent many of the Town's citizens from going to work and prevent visitors from arriving.

Canaan's major highways, US Route 4 and NH Route 118 are maintained by the NH Department of Transportation (DOT). Winter maintenance by DOT and the Town's Highway Department help keep traffic moving through most snow events, however, an unusual quick accumulation of snow or a series of 2-3' storms could have crippling effects for both the citizens of Canaan and the emergency response.

ICE STORMS

Of more concern in Canaan than 2-3' 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. Canaan was fortunate to have not been significantly impacted by either the 1998 or 2008 Ice Storms, although in locations where the elevation was over 1,500' some timber damage occurred.

Due to the widespread nature of significant snow storms and ice storms and the excessive damage these types of storm are able to produce, the potential loss value is estimated to be between 1% and 5% of the total assessed value of all structures in town.

4) Hurricane & Tropical Storm ..... $2,589,725 to $12,948,625

Wind damage due to hurricanes is a consideration in Canaan. Like the 1938 hurricane and hurricane Carol in 1954, which was followed by Hurricane Edna just 12 days later, major forest damage could occur. Although hurricanes could fit into several different categories (wind and flooding), the Team considered hurricanes to be separate events and chose to combine hurricanes with tropical storms. Category-named hurricanes are rare in New Hampshire, but they should not be ruled out as potential hazards. In most cases, hurricanes have been downgraded to tropical storms by the time they reach central New Hampshire.

Tropical Storm Floyd in 1999 produced heavy rains, high winds and flood damage. Tropical Storm Irene however, the remnants of Hurricane Irene, brought more significant rain and flooding to Canaan. Trees were downed as were some power lines; roads were flooded and some were closed for as long as two weeks. The five areas of Canaan that are known to flood, parts of West Canaan, Potato Road, Canaan Village and sections of NH Route 118 and US Route 4 experienced significant flooding during Tropical Storm Irene. In addition, River Road flooded and the high water of the Mascoma River caused decking to "lift" off the bridge on Lashua Road. The Town received FEMA funding to assist with repairs after Tropical Storm Irene, including the bridge on Lashua Road. Fortunately, the next major tropical storm, Tropical Storm Sandy, had little or no impact in Canaan.

Based on the impact of Tropical Storm Irene and the probability that tropical storms are more likely with climate change, the potential loss value due to hurricanes and tropical storms was determined to be between 1% and 5% of the total assessed structure value.

5) Thunderstorm & Lightning ..... $0 to $258,972,500

Severe lightning as a result of summer and mountain storms or as a residual effect from hurricanes and tornadoes has occurred in Canaan. Some of the Town's structures are older buildings and many 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.
Storms bring heavy rain and lightning often come to Canaan from the west, crossing the Connecticut River and traveling east over the higher peaks of Hanover and into Canaan. In the past, several residences have been struck by lightning as has the transfer station.

The Team noted that it appears that severe thunder and lightning storms are happening more often than in the past; several lightning strikes are documented each year. Lightning is a potential problem, but one who's affects would 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.

6) Hailstorm ..... $0 to $258,972,500

Hailstorm events, although not common in Canaan, can occur at any time. In recent years, other communities in New Hampshire including Canaan have experienced hailstones as part of severe thunder and lightning storms. Fortunately, Canaan has not experienced any significant damage from hailstorms.

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.

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. In the past, there was more concern about extremely 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.

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) Landslide ..... Structure loss value was not estimated

Landslides are a concern in Canaan, particular along NH Route 118, Ball Park Road and River Road. Heavy rain and rapid snowmelt are the major causes of these landslides. Fortunately, no buildings are susceptible to damage during these landslides; however, roads are impacted. The landslide area on Ball Park Road can be seen in Map 3, Map ID #8.
Action Item #21 calls for improvements to the banking along Ball Park Road and an assessment of the timber cutting as well as the exploration of possible underdrainage. Additional erosion concerns may also be addressed through flood mitigation techniques detailed in Table 9.1, The Mitigation Action Plan.

Landslide areas of Canaan do not pose a threat to structures. Therefore, the potential loss value estimated for landslide was not estimated.

9) Erosion (riverbank & clear cutting)..... $0 to $258,972,500

Erosion, landslides and mudslides are often associated with heavy rains, steep terrain and the overflow of river banks. Any one of these hazards, or a combination of them, could result in damage in New Hampshire communities.

Canaan has experienced erosion along the banks of the Indian River, the Mascoma River and other smaller rivers and streams. In addition, erosion of the Town's roads from heavy rain and rapid snowmelt continues (see Flooding in this chapter).

The Indian River, just north of its confluence with Orange Brook, includes a sharp oxbow which creates "pinch" points. During heavy rain, these pinch points, as well as other points along the river, create erosion in the more vulnerable areas such as the riverbank near Harris Rebar and pastureland along the shores of the river.

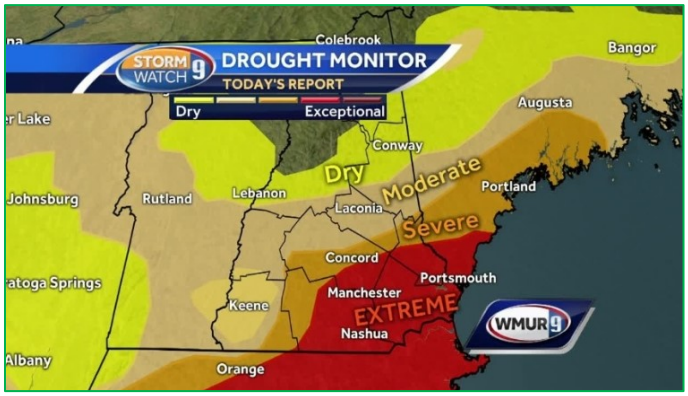
Clear cutting is also concerning with regards to the impact future clear cutting can have on the stability of hillsides in some areas of the Community. Clear cutting on the hillside behind the track has the potential to increase flooding.

Riverbank erosion and clear cutting are ongoing and although possible, no structure damage has resulted in the past. Therefore, based on the likelihood that some structure damage could occur in the future, the potential structure loss value was determined to be between 0% and 1% of the total assessed structure value in Canaan.

10) Wildfire..... $0 to $258,972,500

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. Burn permits are required in Canaan, as they are throughout the State, but often burning takes place without the proper permits. The steep terrain and heavily forested areas of Canaan are difficult to monitor, therefore the occasional unauthorized burn will take place.

No wildfires of five or more acres have taken place in Canaan since the prior hazard mitigation plan. The Canaan Fire Department has been called to assist with large wildfires elsewhere in the states of New Hampshire (274 acres in Ossipee, NH) and Vermont (55 acres in Hartford, VT and 137 acres in Norwich, VT). The incidence of wildfires in the State became more significant during the summer of 2016 when the majority of the southern part of the New Hampshire was under extreme, severe, moderate or dry conditions as shown in the graphic to the right.



WMUR Archives; September 15, 2016

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 is noted again that in communities that are heavily forested, like Canaan, many Rangers feel that the entire community is in the WUI and therefore the extent of a wildfire could potentially be the entire community. (See Map 2)

Large wildfires in New Hampshire are uncommon; however, given the right set of conditions (drought, lightning, human interface), the potential for large wildfires is good. With advance warning, human life is rarely threatened by wildfires; however, structures, particularly older wooden-frame buildings, are susceptible. Canaan is heavily forested and is host to hikers and campers; however with advanced warning and local response, the effects of wildfire could be localized. Therefore the potential loss value was determined to be between 0% and 1% of the total assessed structure value.

11) Radon.....Structure loss value was not estimated

Although as a natural hazard radon is expected to be eliminated from the NH State Hazard Mitigation Plan, the Team felt it worthwhile to include radon as a hazard in this hazard mitigation plan.

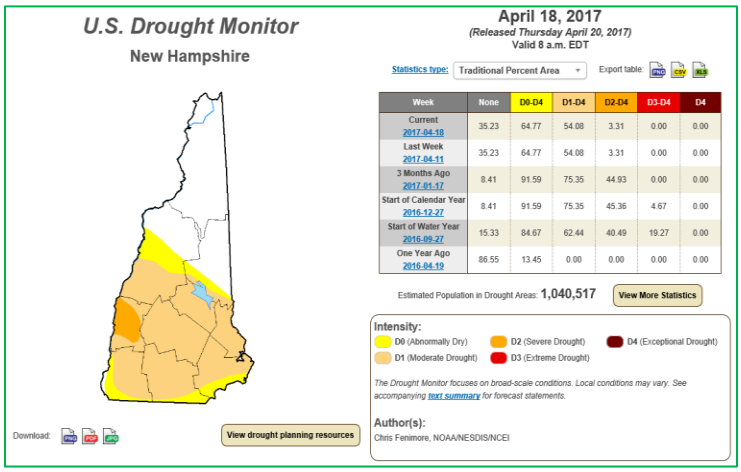
Radon is a radioactive gas that is found in the bedrock of much of the State. This gas is not only colorless but also odorless and tasteless and often finds its way into homes through the air and through water use such as

showering, dishwashing and doing laundry. Stone foundations, cracks in foundation floors and the water from drilled wells may contribute to the presence of radon in homes [14] Exposure to radon poses an increased risk of developing certain types of cancer, primarily lung cancer and stomach cancer.[15]

Mitigation Action Item #14 addresses radon in Canaan. Through public outreach and education, the goal of this mitigation action item is to bring better awareness to the citizens of Canaan and to encourage them to test the air and water in their homes. It is hoped that those citizens, whose homes tested to reveal higher than acceptable radon levels, will work with professionals to reduce the presence.
The cost of radon is difficult to calculate as it is not based on the loss of structures. The expected loss value would be primarily on the cost of testing and the cost of mitigation that will be borne by individual homeowners when the problem is discovered. Based on the assumption that damage would not occur to structures, the structure loss value due to radon was not estimated.

12) Drought ..... $0 to $258,972,500

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 Canaan; however, a significant drought occurred in most of central and southern NH during the summer of 2016. Citizens of Canaan were affected by the 2016 drought; some dug wells dried up and the Town's public water supply (Canaan Street Lake) was vulnerable. The Team also noted a period in late summer of 1995 when the water table was very low and the fire danger was high; the State positioned a fire crew, including members of the Canaan Fire Department, in Allenstown as a precaution.



Fortunately, the 2016 drought has abated, although recovery is still taking place. Current drought monitoring depicts drought conditions in Canaan to be "Abnormally Dry" (see chart above).[16]

Mitigation Action Item #26 addresses the need for an additional public water source to guard against drought. Action Item #35 addresses the need to develop a "Drought Plan" so that the Town is prepared should another significant drought threaten the Town and its citizens.

A significant drought, therefore, could not only impact the forested lands of Canaan but also the agricultural land and subsequently create economic hardship. 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.

[14] Environmental Fact Sheer, Radon in Your Home, NH DES, https://www.des.nh.gov/organization/commissioner/pip/factsheets/dwgb/documents/dwgb-3-12.pdf
[15] Ibid
[16] US Drought Monitor-New Hampshire, April 18, 2017; https://www.drought.gov/drought/new-hampshire

13) Earthquake ..... $2,589,725 to $12,948,625

Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric and phone lines and are often associated with landslides and flash floods. Four earthquakes occurred in New Hampshire between 1940-1982 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.

In October 2012, an earthquake with its epicenter in Hollis, ME and a magnitude of 4.6 on the Richter scale occurred. The tremor was felt through most of New England and in Canaan, but no damage was reported. The Team also reported "feeling" the 1982 earthquake that occurred west of Laconia and the 2011 earthquake that occurred in Virginia; no damage occurred in either occurrence.

Although historically earthquakes have been rare in New Hampshire, the potential does exist and depending on the location, the impact could be significant. The potential structure loss value due to earthquakes was determined to be between 1% and 5% of the total assessed structure value.

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 Canaan.

1) Urban Fire (Conflagration)

"Conflagration is an uncontrolled burning that threatens human life, health, property or ecology. A conflagration can be accidentally or intentionally created".[17]

In Canaan, the risk of a large uncontrolled fire is particularly threatening in the Canaan Village area where there is a high density of older properties and business facilities. These factors, when combined with high winds and drought, could potentially result in a large uncontrolled fire that could spread from building to building. A large fire of this sort could result in explosion(s), affect the transportation infrastructure, hamper communication and power systems and shut down the numerous businesses in Canaan Village.

On June 2, 1923, the entire village burned, resulting in the loss of 48 buildings in this single fire. Should a conflagration of this type occur again, communication systems, power and transportation would likely be temporarily impacted, and damage to homes and businesses could be permanent and significant.

2) Extended Power Failure

Extended power failure is a concern, particularly when combined with any of the natural hazards detailed above. Extended power outages of several days have occurred in Canaan, 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 or handicapped.

[17] Fire Definitions; HotAsBlazes.com

The Team felt that many residents were somewhat self-sufficient; many residences are equipped with generators and many others have woodstoves. The Team felt that the outlying areas of the Community are more susceptible to power outages than Canaan Village. The biggest impact from on extended power failure would be the inconvenience caused by the inability to pump water for residents who rely on wells. It is also noted that Canaan is subject to difficult weather conditions and steep terrain and that many services, including major grocers, are located out of town.

3) Epidemic/Pandemic

Canaan's unique geography provides hikers and summer and winter recreation enthusiasts opportunities to visit the Town; this Community's population shows approximately a 40% increase during the summer due to an influx of summer visitors and tourists. Canaan's middle and high school students attend school with students from several nearby towns. In addition, Cardigan Mountain School, a private school for grades 6-9, attracts students from all over the world with approximately 50% of the student body from Asia.

Because of these factors, the Team determined that an epidemic or pandemic could present a possible threat to Canaan. With the occurrence of worldwide pandemics such as SARS, Zika, H1N1 and Avian Flu, Canaan could be susceptible to an epidemic and subsequent quarantine.

4) Hazardous Material Fixed

Hazardous material in a fixed location is of concern for Canaan's emergency responders. Although well monitored, hazardous material is located in several locations in the Community including a propane plant on Route 4, small service stations, a rebar manufacturer, utility switching stations, transfer facilities and at the Town's wastewater treatment plan.

5) Hazardous Material Transport

The possibility of vehicular accidents involving hazardous materials is identified as potentially significant in Canaan. The Town has two major roadways, US Route 4 and NH Route 118; these roads, particularly US Route 4, are well-travelled by both large and small vehicles, at times transporting hazardous materials. US Route 4 travels from central NH and the Concord area to western NH and the Hanover/Lebanon area, while the long and winding NH route 118 travels from Wentworth through Dorchester to Canaan. Trucks using both US Route 4 and NH Route 118 often carry hazardous materials, such as a variety of chemicals and petroleum products, throughout the Community. Adding to the possibility of a HazMat risk are the deliveries to and transport from the propane plant on Route 4.

6) Terrorism

Terrorism is a concern in Canaan and in our nation in general. As with many small towns, the terrorism threat is minimal however possible; if a terrorist incident were to occur, it would most likely be a home-grown terrorist event. Canaan's public water supply is of particular concern. Also of concern is the Cardigan Mountain School as many wealthy and politically connected students from around the world attend.

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 Canaan 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
Emergency Operations Plan (2014)	An Emergency Operations Plan provides a guideline for responding to all types of hazardous event based on 15 Emergency Support Functions (ESF) as recommended by the State	Town Wide	Emergency Management Director	Excellent	**Improvements Needed:** The Canaan Emergency Operations Plan was updated in 2014 in accordance with the 16-ESF (Emergency Support Function Format) and will be ready for a recommended update in 2019; deferred to this Plan for a recommended update in 2019 which will be based on the new state 15-ESF format; include a review of this Plan while preparing the EOP update. **Action Item #33** ***(Also in Table 7.1)***

Current Program or Activity	Description	Area of Town	Responsible Department	Effectiveness	Improvements Needed or Not Needed
Master Plan	The Master Plan serves as the guiding document for future development in Canaan. Second, it serves as the guiding document to assist the Planning Board as it updates local ordinances, Subdivision and Site Plan Review Regulations.	Town Wide	Planning Board	Good	**Improvements Needed:** The Canaan Master Plan was updated in 2006 and will be ready for a recommended 10-year update; deferred to this Plan to complete the update that is underway. **Action Item #31** ***(Also in Table 7.1)***
Comprehensive Emergency Management Program (CEMPS) for schools	An integrated approach to mitigation, preparedness, response, and recovery.	Schools in Town	SAU #62 and Emergency Management Director	Poor	**Improvements Needed:** The schools in Canaan do not have current Emergency Operations Plans in place; deferred to this Plan to update the current plans at the Canaan Elementary School, the Indian River School, the Mascoma Valley High School and Cardigan Mountain School. **Action Item #30** ***(Also in Table 7.1)***
Public Education	Provide materials and information to public about all hazards and NFIP	Town Wide	Town Administrator & Web Administrator	Good	**Improvements Needed:** The Town had acquired NFIP materials and information after the last hazard mitigation plan, but the supply has dwindled; deferred to this Plan to continue to provide education to current and potential homeowners; explore additional public outreach possibilities. **Action Item #12** ***(Also in Table 7.1)***
Capital Improvement Plan (CIP)	A Capital Improvement Plan is a long-range plan, usually six to twenty years, which identifies capital projects and equipment purchases; provides a planning schedule and identifies options for financing the plan; a CIP provides a link between a Town and its departments through a comprehensive and strategic plan.	Town Wide	Planning Board, CIP Committee, Board of Selectmen & Budget Committee	Good	**Improvements Needed:** The Canaan Capital Improvement Plan (CIP) is reviewed annually at budget time; the CIP works well however there is currently a shortage of planning and funding for buildings; deferred to this Plan to review this Hazard Mitigation Plan and Action Items in this Plan for incorporation into the CIP. **Action Item #34**

Current Program or Activity	Description	Area of Town	Responsible Department	Effectiveness	Improvements Needed or Not Needed
Local Emergency Notification System	50% of Canaan's households are registered with the Canaan Flash Email; this system is used to notify citizens of Canaan about important issues, emergency preparedness and hazard mitigation.	Town Wide	Emergency Management Director	Average	**Improvements Needed:** The Canaan Flash Email system is a good warning system; the Town should provide public outreach to encourage residents to contact the Town Office to add cell numbers, emails, and unlisted numbers and to verify information. **Action Item #2**
Functional Needs List	A prepared and updated list of those citizens of the Community who may require special assistance at the time of an emergency.	Town Wide	Emergency Management Director	Poor	**Improvements Needed:** Canaan has not maintained a list of the functional needs population, this list needs to be developed and maintained in order to serve as an effective tool during an emergency. **Action Item #5**
911 Signage Compliance	A system that complies with recommended signage size, location and visibility to ensure identification by emergency responders.	Town Wide	Emergency Management Director & Board of Selectmen	Poor	**Improvements Needed:** The Town is about 40% compliant now; deferred to this Plan to consider ways to get this signage more compliant so that emergency responders can better assist the public at the time of need; perhaps through purchase of signs by the Town and/or public outreach. **Action Item #7**
Stormwater Management	The Canaan Highway Superintendent and the State DOT clean the drainage basins once a year and after major flooding events. Culverts are repaired as needed	Town Wide	Public Works Department	Average	**Improvements Needed**: Although the Highway Department and NH DOT do a good job with culvert and drainage systems, there is no written stormwater maintenance record in place; deferred to this Plan to develop a stormwater maintenance plan and an inventory of culverts, drains, etc. along with a record of size, type and expected length of service. **Action Item #18** ***(Also in Table 7.1)***

Current Program or Activity	Description	Area of Town	Responsible Department	Effectiveness	Improvements Needed or Not Needed
Subdivision Regulations	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	**Improvements Needed:** Although the Town's Subdivision Regulations do include limited regulations for fire equipment access on new roads, they do not include regulations that require fire suppression capabilities in new developments or regulations that address building on steep slopes; deferred to consider amending the Subdivision Regulations to include protection from natural hazards such as requirements for new developments to install water resources (fire ponds, cisterns, dry hydrants, etc.) and other regulation amendments that will limit building on steep slopes and address driveway specifications. **Action Item #25** ***(Also in Table 7.1)***
Emergency Back-up Power	Emergency back-up power has been established at many locations in Town; other Critical Facilities are still in need of generators.	Canaan Elementary & Town Office	SAU #62 & Emergency Management Director	Good	**Improvements Needed:** In order to best maximize the use of critical facilities at the time of an emergency, additional generators should be installed; deferred to this Plan to install permanent generators at Canaan Elementary and the Town Office in order to ensure effective operation during an emergency. **Action Items #20 & 32** ***(Also in Table 7.1)***
Flood Plain Ordinance	The minimum National Flood Insurance Program (NFIP) requirements have been adopted as the Canaan Flood Plain Regulations, a stand-alone document; the floodplain ordinance regulates all new and substantially improved structures located in the 100-year floodplain, as identified on the FEMA Flood Insurance Rate Maps dated 2/20/08	Floodplain	Board of Selectmen & Building Inspector	Average	**Improvements Needed:** Canaan has been a member of the National Flood Insurance Program (NFIP) since May 17, 1988; the Town is compliant with the requirements of the National Flood Insurance Program; deferred to work on an acceptable plan that may reflect changes in the regulation if any and to improve assessment and enforcement capabilities. **Action Item #11**

Current Program or Activity	Description	Area of Town	Responsible Department	Effectiveness	Improvements Needed or Not Needed
Emergency Communication	Town radio system has a lot of dead spots due to topography	Town Wide	Emergency Management Director	Good	**Improvements Needed:** Repeaters are located in the Police cruisers; fire repeater system has also been improved; cell boosters are in some vehicles; new cell towers are anticipated; deferred to this Plan to add fire repeater systems to fire and highway vehicles to improve communications and help eliminate dead spots in Town; look into possibility of a tower repeater. **Action Item #19** ***(Also in Table 7.1)***
Comprehensive Shoreland Protection Act	Restricts development near specific water bodies	Town Wide	Building Inspector	Average	**Improvements Needed:** The Shore Land Water Quality Protection Act (formerly the Shoreland Protection Act) is part of the Town's planning mechanisms; the Town will support and facilitate the laws that are set forth in the Act; deferred to consider making changes in the building permit process to ensure State and local regulations are met. **Action Item #23**
Wetlands Protection	The state and federal ordinances contains wetland buffer regulations	Town Wide	Building Inspector	Average	**Improvements Needed:** Wetland Protection is part of the Town's planning mechanisms; the Town will support and facilitate the state and federals laws that refer to wetlands protection; deferred to consider making changes in the building permit process to ensure state and federal regulations are met. **Action Item #22** ***(Also in Table 7.1)***
Dam EAPs & Dam Breach Exercises	Require determination of dam failure impact; drills	<u>Town Dams</u> Crystal Lake Goose Pond Canaan Street Lake Cummins Pond	Emergency Management Director	Average	**Improvements Needed:** Dam plans for Crystal Lake Dam and Goose Pond Dam (both state dams) have been obtained and are located at the Fire Station; the Town does not have a copy of the dam plan for Canaan Street Lake Dam and Cummins Pond Dam (Dorchester); deferred to this Plan to obtain dam plans for Canaan Street Lake Dam and Cummins Pond Dam. **Action Item #17**

Current Program or Activity	Description	Area of Town	Responsible Department	Effectiveness	Improvements Needed or Not Needed
Road Design Standards	Canaan Subdivision Regulations include road design standards that control the amount and retention of stormwater runoff.	Town Wide	Planning Board	Good	**Improvements Needed:** The Canaan road design standards are detailed within the Town's Subdivision Regulations and adhere to State standards; these road standards also address steep slopes; deferred to this Plan to consider the impact of climate change and to consider changes to the regulations that could further protect the roads and the citizens of Canaan from the impact of natural hazards. **Action Item #28**
Building Codes	The Town complies with the State of New Hampshire Building Code which incorporates the International Building Codes (IBC), International Residential Codes (IRC), International Electrical Codes (IEC), the International Plumbing Codes (IPC) and National Fire Protection Codes (NFPA-1); currently there is a part-time building inspector to enforce the standards in Canaan.	Town Wide	Building Inspector	Poor	**Improvements Needed:** The Town complies with the State building codes as detailed in the description to the left; deferred to consider making changes in the building permit process to ensure State and local regulations are met. **Action Item #24**
Hazard Tree Maintenance	NH Electric Coop and Liberty Utilities have a tree maintenance program to remove trees and tree limbs from around the power lines. In addition, the Canaan DPW and State DOT have a tree maintenance program to clear trees and hanging limbs from roadways.	Town Wide	Public Works Department	Good	**Improvements Needed:** Although NH Electric Coop, Liberty Utilities and the Canaan Department of Public Works do a good job maintaining brush and tree removal, this is deferred to this Plan to continue these efforts into the future. **Action Item #9**

Current Program or Activity	Description	Area of Town	Responsible Department	Effectiveness	Improvements Needed or Not Needed
CodeRED	Grafton County Emergency Alert System through Hanover Dispatch.	Town Wide	Emergency Management Director	Average	**Improvements Needed:** CodeRED is an excellent warning system but it only stores resident phone numbers that are listed in the phone book; the Town should provide public outreach to encourage residents to contact CodeRED to add cell numbers, emails, and unlisted numbers and to verify information. **Action Item #1**
Conservation Commission Fund	Acquisition and protection of lands	Town Wide	Conservation Commission	Good	**No Improvements Needed:** The Town has a Conservation Commission Fund that can be used to purchase parcels of land in town that have been repeatedly subject to hazards in the past and that are deemed necessary to protect; the system of acquisition to protect lands works well.
Water Supply Protection Program	Canaan has identified a wellhead protection area. The purpose is to prevent the contamination of groundwater used for drinking water. The area is the surface and subsurface area surrounding the public water supply where contaminants are likely to reach.	Town Public Water	Water Department	Good	**No Improvements Needed:** The existing ordinances that are in place to protect the public water supply are good and are enforced; wellhead protection at the Town's wells is also good; no improvements needed.
Fire Department Mutual Aid	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 Department	Excellent	**No Improvements Needed:** The Canaan Fire Department has a mutual aid agreement with the Upper Valley Regional Emergency Services Association (UVRESA); Canaan Fire is dispatched through Hanover Dispatch; the system that is in place works well. ***(Also in Table 7.1)***

Current Program or Activity	Description	Area of Town	Responsible Department	Effectiveness	Improvements Needed or Not Needed
Public Works Mutual Aid	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	Public Works Department	Excellent	**No Improvements Needed:** The Canaan Public Works Department is a member of the NH Public Works Mutual Aid Association which enables it to access resources the Town may need during an emergency; the system that is in place works well. ***(Also in Table 7.1)***
Police Department	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	Canaan Police Department	Excellent	**No Improvements Needed:** The Canaan Police Department has mutual aid agreements with the Enfield, Lebanon, Lyme and Hanover Police Departments and with the NH State Police; Canaan Police is dispatched through Hanover Dispatch; the system that is place works well. ***(Also in Table 7.1)***
Emergency Operations Center in Police Station	The EOC is where department heads, government officials and volunteer agencies gather to coordinate their response to a major emergency or disaster event. The EOC is where the officials responsible for responding to major emergencies and disasters assemble to direct and control the Town's response. The EOC goes into operation when Town officials decide that the situation is serious enough to require a coordinated and other-than-routine response.	Police Station	Police Department	Excellent	**No Improvements Needed:** The newly created Canaan Emergency Operations Center, located in the rear of the Police Station in the Canaan Public Safety Building, is now functional and well equipped to handle emergency situations.

Current Program or Activity	Description	Area of Town	Responsible Department	Effectiveness	Improvements Needed or Not Needed
Public Works Winter Operations Plan	Winter operations Plan discusses best practices for snow removal and other winter hazards.	Town Wide	Public Works Department	Good	**No Improvements Needed:** The Canaan Public Works Winter Operations Plan is in place and works well to stay ahead of winter storms and other winter hazards.
Capital Reserve Fund (annual)	A phased projection of needs for town buildings, equipment & town roads	Town Wide	Board of Selectmen	Good	**No Improvements Needed:** Capital reserve funds are reviewed annually at budget time; there is currently a shortage of planning and funding for buildings.
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 Upper Valley Regional Public Health Network	Town Wide	Upper Valley Regional Public Health Network	Excellent	**No Improvements Needed:** The Public Health Plan does what it is meant to do; the Town participates in regional public health meetings whenever possible.
State Division of Forest and Lands/Fire Permits	State regulations for open burning and permits	Town Wide	Fire Warden	Good	**No Improvements Needed:** System that is in place with NH Forests & Lands (DRED) and the local fire warden works well; public is aware of fire permitting requirements and the ability to get permits online (fee required).
Burning Index	New Hampshire Forests & Lands (DRED) 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	Fire Department	Excellent	**No Improvements Needed:** The Fire Department receives regular notification of the burning index via fax and email from NH Forests & Lands (DRED); this notification is made daily during the fire danger season; this is also being posted on the Fire Department's Facebook page.

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Chapter 7: Prior Mitigation Plan(s)

A. Date of Prior Plan

Canaan has participated in the development of a prior Hazard Mitigation Plan, based on the Disaster Mitigation Act (DMA) of 2000, which received Final Approval by FEMA in May 2011. This Plan, the "Canaan Hazard Mitigation Plan Update 2017" is an update to the 2011 Plan.

Below are the action items that were identified in the 2011 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?

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?

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

TABLE 7.1: ACCOMPLISHMENTS SINCE PRIOR PLAN(S) APPROVAL

NOTE: Items in red were extracted word-for-word from the 2011 Hazard Mitigation Plan and do not represent a time frame for this plan.

Mitigation Action	Who	When	How (Funding Sources)	Cost Estimate	Completed, Deleted, Deferred
Dam EAPs & Dam Breach Exercises - Determine call list for 911 alerts	EMD	2011	Grants & Taxes	Staff Time	**Partially Completed & Deferred:** This strategy from the prior plan was partially completed and deferred to continue exercises for Dam Failure. **Action Item #10**
Emergency Power - Install transfer switches at Highway, & Town Officers; acquire three generators; work with schools to install generators	EMD	2011	Grants & Taxes	$30K	**Deferred:** Generators have been installed at the Fire, Police and Highway Departments (2011) and the Emergency Operations Center (2015); there are also generators at the high school/middle school, pump station, wastewater treatment and water treatment plants; deferred to this Plan to install generators at the Town Hall and the Canaan Elementary School. **Action Items #20 & 32.** ***(Also in Table 6.1)***

Mitigation Action	Who	When	How (Funding Sources)	Cost Estimate	Completed, Deleted, Deferred
Stormwater Management - Learn newly acquired software (culvert maintenance)	Road Agent	2011-12	Taxes - staff time	Staff Time	**Partially Completed & Deferred:** The Highway Department has learned the Pubworks software program but the Town's culverts still need to be inventoried. **Action Item #18**
Emergency Communications - Create inexpensive relay system to Hanover Dispatch	Department Heads; Town Administrator	2011	Grants & Taxes	$1K	**Completed & Deferred:** Repeaters are located in the Police cruisers; fire repeater system has also been improved; cell boosters are in some vehicles; new cell towers are anticipated; deferred to this Plan to add fire repeater systems to fire and highway vehicles to improve communications and help eliminate dead spots in Town; look into possibility of a tower repeater. **Action Item #19** ***(Also in Table 6.1)***
Police Department - Provide comprehensive staffing and on-going training; improve informational systems	Police Chief	2011-2015	Grants & Taxes	$35K no inc. salary	**Completed & Deleted:** Information systems are in place so that the Police Department is connected to other law enforcement and safety agencies and is aware of emergency situations elsewhere that could affect Canaan; training is done on a regular basis; deleted as this strategy from the prior plan is preparedness, not mitigation.
Emergency Operations Plan - Update plan and incorporate Cardigan Mountain School and SAU #62 Emergency Plans; require public facilities (e.g. day cares) to submit emergency plans to town	SAU Superinten-dent; EMD	2011	Grants & Taxes	$5K	**Deferred:** The Canaan Emergency Operations Plan was updated in 2014 and will be ready for a recommended update in 2019; deferred to this Plan to update the EOP according to the NH 15-ESF template in 2019. **Action Item #33** ***(Also in Table 6.1)***
Comprehensive Emergency Management Programs for schools - Provide refresher courses for faculty and staff	SAU Superinten-dent; Headmasters	2012	Grants & Taxes	Staff Time	**Completed & Deferred:** The schools in Canaan do not have current Emergency Operations Plans in place; deferred to this Plan to work with the School Boards to update the current plans at the Canaan Elementary School, the Indian River School, the Mascoma Valley High School and Cardigan Mountain School. **Action Item #30** ***(Also in Table 6.1)***
Conservation Commission Fund - Continue to seek conservation easements	Conservation Commission	2011-2016	Current Use Penalties	Unknown	**Completed & Deferred:** Some conservation easements have been established, including 10,000 acres in the Silvio Conte easement, since the prior plan; deferred to continue to evaluate and establish easements that will support the protection of property and natural resources from the impact of natural hazards. **Action Item #22**

Mitigation Action	Who	When	How (Funding Sources)	Cost Estimate	Completed, Deleted, Deferred
Fire Department - New equipment; improve rural water protection	Fire Chief	2011-2016	Grants & Taxes	$16K	**Completed & Deferred:** The Fire Department continues to seek funding for new and versatile equipment; deferred to determine areas of the Community that are lacking adequate water resources for fire suppression. **Action #8**
Highway Department Winter Operations Program - Upgrade plow equipment; new salt and sand sheds; expand garage	Road Agent	2016-2020	Grants & Taxes	$105K	**Completed & Deleted:** The Capital Improvement Plan includes the expansion of the Highway Garage and included the building of a new Salt & Sand Shed (2012); the Town has adequate equipment to handle anticipated snow levels; deleted as this strategy from the prior plan is preparedness, not mitigation.
Road Improvements - Codfish Hill Road	Road Agent	Summer 2011	Grants & Taxes	$86,000	**Completed & Deleted:** Road improvements were done on Codfish Hill Road in 2015; deleted as this strategy from the last plan is complete.
Road Improvements - Potato Road	Road Agent	Summer 2012	Grants & Taxes	$55,000	**Deferred:** Improvements are still needed on Potato Road; a new bridge and possibly abutments need to be constructed; planning to raise the road and provide additional drainage under the road to mitigate flooding. **Action Item #27**
Road Improvements - Roberts Road	Road Agent	Summer 2011	Grants & Taxes	$7,600	**Completed & Deleted:** Road improvements were done on Roberts Road; there is no longer a problem in this location; deleted as this strategy from the last plan is complete.
Public Education - Contact OEP Flood program to acquire educational materials for distribution; add information to town web site; include importance of wetland protection for flood control	Town Administrator	2012	Grants & Taxes	Staff Time	**Completed & Deferred**: 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 and add important flood mitigation techniques/ideas to the Town's website including appropriate links. **Action Item #12** ***(Also in Table 6.1)***
National Flood Insurance - Develop tracking system of new development and potential impact on floodways; continue trying to join CRS	Building Inspector; Town Administrator	2013-2016	Grants & Taxes	Staff Time	**Completed & Deleted:** Tracking system for new developments has been started and is ongoing; no intention of joining CRS in the next five years.

Mitigation Action	Who	When	How (Funding Sources)	Cost Estimate	Completed, Deleted, Deferred
Mutual Aid - Explore regional emergency services	Police Chief; Fire Chief; Road Agent; Town Administrator	2011-2016	Taxes	$3K Membership Dues	**Completed & Deferred:** The Canaan Fire Department has a mutual aid agreement with the Upper Valley Regional Emergency Services Association (UVRESA); Canaan Fire is dispatched through Hanover Dispatch; the system that is in place works well; defer to obtain funding by local and grants to participate in a regional hazmat team. **Action Item #16**
Road Improvements - Fernwood Farms Road	Road Agent	Summer 2011	Grants & Taxes	$80,000	**Completed & Deleted:** Culverts, ditching and the raising of the road by two feet has mitigated flooding in this area; underdrainage and road fabric was also added; work done with local money.
Road Improvements - River Road	Road Agent	Summer 2015	Grants & Taxes	$75,000	**Completed & Deleted**: The bridge on River Road was replaced with a larger and wider bridge; work done with state bridge funding and local money.
Road Improvements - Ballpark Road	Road Agent	Summer 2012	Grants & Taxes	$75,000	**Partially Completed & Deferred:** The road surface has been improved and Ball Park Road is closed during deep mud season; improvements still needed slope banking and tree cutting to prevent the banks from sliding onto the road; underdrainage may also be needed. **Action Item #21**
Water Supply Protection Program - Develop new ordinances for water quality protection; develop secondary public water sources	Conservation Commission; Water Supply Protection Committee; Town Administrator	2012	Taxes	Staff Time	**Partially Completed & Deferred:** The Town has identified an additional public water source and passed a new ordinance in 2012, the Water Supply Protection Ordinance; deferred to continue to explore additional public water sources. **Action Item #26**
Town Master Plan - Update plan and include hazard mitigation and emergency management programs	Planning Board	2011-2016	Taxes	Staff/ volunteer time	**Deferred:** The Canaan Master Plan was updated in 2006 and is being updated at this time according to the recommended 10-year update; deferred to this Plan for that update and to include a natural hazard section and mitigation action items from this Plan. **Action Item #31** ***(Also in Table 6.1)***
Stormwater Program - Seek better management and enforcement systems	Town Administrator	2015	Taxes	Staff Time	**Deferred**: The Public Works Department did not develop a stormwater program due to oversight; deferred to this Plan to develop an inventory of culverts, drains, etc. along with a record of size, type and expected length of service. **Action Item #18** ***(Also in Table 6.1)***

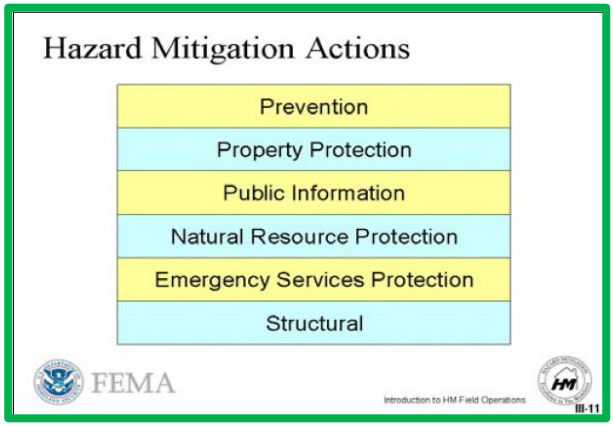
Mitigation Action	Who	When	How (Funding Sources)	Cost Estimate	Completed, Deleted, Deferred
Subdivision Regulations - Consider road and driveway specifications	Planning Board	2011-2016	NCRC&D Grant	Staff/ volunteer time	**Completed & Deferred:** Driveway and road regulations have been established; deferred to consider amending the Subdivision Regulations to include protection from natural hazards such as adding requirements for new developments to install water resources and other regulation amendments that will limit building on steep slopes. **Action Item #25** ***(Also in Table 6.1)***
Water Supply Mapping	Fire Chief	2015	Taxes	$0	**Completed & Deferred**: Mapping the public water supply was done in 2012; deferred to look for additional public water supply resources and to continue to look for water resources for fire suppression; consider tapping the Indian River and other rivers and streams in Town. **Action Item #8**
Drought Mitigation Plan	EMD/Water Operations	2015	Taxes	Staff Time	**Deferred:** A drought mitigation plan was not developed; deferred to develop a plan that will enable the Town to provide emergency water supplies at the time of drought and to respond to other drought-related issues. **Action Item #35**
Firewise Education	Fire Chief	2012	Taxes	Staff Time	**Complete & Deferred:** Some Firewise brochures were obtained and kept in the Fire Station and Town Hall, 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 continue to provide information through Flash Mail, the website and the Fire Department's Facebook page. **Action Item #13**
Emergency Shelters	EMD; DEMD; Town Administrator	2011	Taxes	Staff Time	**Completed & Deleted:** Shelter areas have been designated in the Town of Canaan; deleted as this strategy from the prior plan is preparedness, not mitigation.
Emergency Spill Plan & Equipment	EMD; DEMD; Town Administrator	2011	Taxes	Staff Time	**Completed & Deleted:** The Fire Department, the Water Department and the Wastewater Department all have emergency plans and trained personnel trained to the “Awareness & Operations Level"; deleted as this strategy from the prior plan is preparedness, not mitigation.

Mitigation Action	Who	When	How (Funding Sources)	Cost Estimate	Completed, Deleted, Deferred
Building Code Adoption	Building Inspector; Fire Chief	2012	Taxes	Staff Time	**Completed & Deferred:** The Town complies with the State building codes as detailed in the description for this policy; deferred to consider making changes in the building permit process to ensure that State and local regulations are met. **Action Item #22**
GIS Mapping of Hazard Areas	Town Administrator	2015	Grants & Taxes	Staff Time	**Completed & Deferred**: The Town has started to integrate a GIS system that incorporates some hazard areas; maps are also included within this Plan that show hazard areas in Canaan. **Action Item #29**

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 Canaan 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 Duel 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 **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic and **E**nvironmental 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):

- **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 strategy. 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 Canaan 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 comprehesive 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	Total	S	T	A	P	L	E	E
Action Item #1: Provide public outreach to encourage residents to contact CodeRED to add cell numbers, emails, and unlisted numbers and to verify information. **(MU14)** **(Table 6.1)**	Town Wide	Public Education & Awareness	20	2	3	3	3	3	3	3
				Social: *Some people may not want to give out personal information*						
Action Item #2: Provide public outreach to encourage residents to contact the Town Office to add cell numbers, emails, and unlisted numbers and to verify information for the Canaan Flash Email System. **(MU14)** **(Table 6.1)**	Town Wide	Prevention Public Education & Awareness Emergency Service Protection	20	3	2	3	3	3	3	3
				Technical: *There could be limitations on the Flash Email system during power outages*						
Action Item #3: National Incident Management System (NIMS) & Incident Command System (ICS) training for Town Officials in order to have better trained individuals handling disaster events so that the effects of the event can be mitigated. (ICS 100 & 200; NIMS 700).	Town Wide	Emergency Service Protection	21	3	3	3	3	3	3	3
				No apparent difficulties with this Action Item						
Action Item #4: Develop a formal maintenance program and appropriate recording keeping for future use and conduct regular maintenance of all fire hydrants to reduce risk. **(WF7)**	Hydrants throughout Community	Prevention Emergency Service Protection Property Protection Natural Resource Protection Structural Projects	19	3	3	2	3	3	2	3
				Administrative: *Staff time to develop plan and to implement it* ***Economic:*** *Budget restraints*						
Action Item #5: Establish and maintain a list of functional needs persons by promoting voluntary participation to coincide with HIPAA laws; create a database to track those individuals at high risk of death, such as the elderly, homeless, etc. (website, mailing, Town Report, Facebook, visits) **(ET3)** **(Table 6.1)**	Town Wide	Prevention Public Education & Awareness Emergency Service Protection	19	2	3	2	3	3	3	3
				Social: *Some functional needs residents may not want to divulge personal information* ***Administrative:*** *Creating and maintain this data base may put time constraints on Town staff*						

Potential Mitigation Action Item	Affected Location	Type of Activity	Total	S	T	A	P	L	E	E
Action Item #6: Establish an interactive webpage or use Flash Email and Facebook 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)**.	Town Wide	Prevention Public Education & Awareness Property Protection Natural Resource Protection	21	3	3	3	3	3	3	3
				No apparent difficulties with this Action Item						
Action Item #7: Consider ways to get 911 signage more compliant so that emergency responders can better assist the public at the time of need; perhaps through purchase of signs by the Town and/or public outreach. **(MU14)** **(Table 6.1)**	Town Wide	Prevention Public Education & Awareness Emergency Service Protection Property Protection	18	2	3	2	3	2	3	3
				Social: *Some residents may not want to comply with recommendations from local government on the appropriate signage for 911* ***Administrative:*** *An enforcement strategy will need to be built* ***Legal:*** *May have to pay for counsel for any legal issues that may arise.*						
Action Item #8: Identify water resources for fire suppression; consider tapping the Indian River and other rivers and streams in Town. **(WF4)** **(Table 7.1)**	Town Wide	Prevention Emergency Service Protection Property Protection Natural Resource Protection Structural Projects	16	3	2	2	3	2	2	2
				Technical: *Will need to gather technical information to be the most effective* ***Administrative:*** *Staff time* ***Legal:*** *May need easements* ***Economic:*** *Budget constraints* ***Environment:*** *May need permitting*						
Action Item #9: Continue efforts to trim trees, limbs and brush around critical facilities and key resources and drainage systems to reduce the impact from natural hazards such as wildfires, ice storms, severe wind storms, etc. **(WF9 & SW4)** **(Table 6.1)**	Town Wide	Prevention Property Protection Natural Resource Protection	21	3	3	3	3	3	3	3
				No apparent difficulties with this Action Item						

Potential Mitigation Action Item	Affected Location	Type of Activity	Total	S	T	A	P	L	E	E
Action Item #10: Continue to hold preparedness exercises for the dams in Town. **(F7) (Table 7.1)**	Dams located in Town	Prevention Emergency Service Protection Property Protection	19	3	3	2	3	3	2	3
				Administration: *Staff time* ***Economic:*** *Cost of people losing work to participate & the cost of the exercise itself*						
Action Item #11: Develop an acceptable plan that will be able to reflect changes in NFIP regulations if they occur and to improve assessment and enforcement capabilities. **(F2) (Table 6.1)**	Town Wide	Prevention Public Education & Awareness Property Protection	21	3	3	3	3	3	3	3
				No apparent difficulties with this Action Item						
Action Item #12: 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 National Flood Insurance Program (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 Emergency Management Services webpage. **(Tables 6.1 & 7.1)**	Town Wide	Public Education & Awareness Property Protection Natural Resource Protection	21	3	3	3	3	3	3	3
				No apparent difficulties with this Action Item						
Action Item #13: Obtain and have available "Firewise" brochures or other written material to educate homeowners on methods to reduce fire risk around their homes **(WF10)**; 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. **(WF12)**	Town Wide	Prevention Public Education & Awareness Property Protection Natural Resource Protection	21	3	3	3	3	3	3	3
				No apparent difficulties with this Action Item						
Action Item #14: Provide public education on the risks of radon and the methods by which citizens can get their homes and water tested and monitored. **(MU14)**	Town Wide	Prevention Public Education & Awareness	21	3	3	3	3	3	3	3
				No apparent difficulties with this Action Item						

Potential Mitigation Action Item	Affected Location	Type of Activity	Total	S	T	A	P	L	E	E
Action Item #15: Do an engineering and hydrology study to determine the best way to flood proof the Village Center; consider possible mitigation strategies such as 1) river redirection and the removal of impediments to the flow of water, 2) buying super sacks (sand) to serve as a temporary dike and 3) flood proofing buildings; explore these three solutions to address inevitable and reoccurring flooding in the Village Center. **(F1, F5 & F13)**	Canaan Village	Prevention Property Protection Structural Projects	14	3	2	2	2	3	1	1
				Technical: *Engineering requirements* ***Administrative:*** *Staff time* ***Political:*** *Local people disagree about how though handle the problem; there are varying opinions* ***Economic:*** *Budget constraints* ***Environmental:*** *DES permitting and involvement; Army Corp may also be needed*						
Action Item #16: Obtain funding through both local funds and grants to participate in a regional hazmat team. **(Table 7.1)**	Town Wide	Prevention Emergency Service Protection Property Protection Natural Resource Protection	18	3	3	3	2	2	2	3
				Political: *Board of Selectmen may not want to do this* ***Legal:*** *Will need to explore legal and insurance costs* ***Economic:*** *Will cost funds annually; may not be approved*						
Action Item #17: Obtain dam plans for Canaan Street Lake Dam and Cummins Pond Dam plan. **(F7)** **(Table 6.1)**	Canaan Street Lake Dam & Cummins Pond Dam	Prevention Emergency Service Protection Property Protection Natural Resource Protection	15	3	2	1	1	2	3	3
				Technical: *Dams are both private; town has no say* ***Administrative:*** *Staff time* ***Political:*** *Lack of control and responsibility; not owned by town* ***Legal:*** *Lack of control and responsibility; not owned by town*						
Action Item #18: Develop a 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; use the new Pubworks software. **(F5 & F13)** **(Tables 6.1 & 7.1)**	Town Wide	Prevention Emergency Service Protection Property Protection Natural Resource Protection	21	3	3	3	3	3	3	3
				No apparent difficulties with this Action Item						
Action Item #19: Obtain funding and add fire repeater systems to fire and highway vehicles to improve communications and help eliminate dead spots in Town; explore the possibility of a tower repeater. **(Tables 6.1 & 7.1)**	Town Wide & Town Vehicles	Prevention Emergency Service Protection	19	3	3	3	3	3	1	3
				Economic: *Budget constraints*						
Action Item #20: Install a permanent generator at the Canaan Elementary School so that this critical facility can be used as the Primary Shelter at the time of a natural disaster. **(MU 13)** **(Tables 6.1 & 7.1)**	Canaan Elementary School	Prevention Emergency Service Protection Property Protection	20	3	3	3	3	3	2	3
				Economic: *Budget constraints*						

Potential Mitigation Action Item	Affected Location	Type of Activity	Total	S	T	A	P	L	E	E
Action Item #21: Improve the slope banking and tree cutting on Ball Park Road to prevent the banks from sliding onto the road; underdrainage may also be needed. **(ER5)** **(Table 7.1)**	Ball Park Road	Prevention Property Protection Natural Resource Protection Structural Projects	20	3	3	3	3	3	2	3
				Economic: *Budget constraints*						
Action Item #22: Consider making changes in the building permit process to ensure that state and federal regulations that concern Wetland Protection are met; encourage the Conservation Commission to establish easements that support the protection of property and natural resources from the impact of natural hazards. **(MU4)** **(Tables 6.1 & 7.1)**	Town Wide Wetlands	Prevention Property Protection Natural Resource Protection	20	3	3	3	2	3	3	3
				Political: *The Board of Selectmen and many citizens are opposed to regulations, including their enforcement, whenever there is a risk of increased administrative costs or infringement on individual or property rights.*						
Action Item #23: Consider making changes in the building permit process to ensure that the Shore Land Water Quality Protection Act and local regulations are met. **(MU4)** **(Table 6.1)**	Town Wide Surface Water Shoreland (rivers, streams, ponds & lakes)	Prevention Property Protection Natural Resource Protection	20	3	3	3	2	3	3	3
				Political: *The Board of Selectmen and many citizens are opposed to regulations, including their enforcement, whenever there is a risk of increased administrative costs or infringement on individual or property rights.*						
Action Item #24: Consider making changes in the building permit process to ensure State and local regulations are met. **(Tables 6.1 & 7.1)**	Town Wide	Prevention Property Protection	17	3	2	2	2	3	2	3
				Technical: *A qualified person is not currently available* ***Administrative:*** *Staff availability; time constraints* ***Political:*** *People don't like restrictions* ***Economic:*** *Property owners may not want to bear the expense for code compliance*						
Action Item #25: Consider amending the Subdivision Regulations to include protection from natural hazards; for example, consider requirements for new developments to install water resources (fire ponds, cisterns, dry hydrants, etc.) and other regulation amendments that will limit building on steep slopes and address driveway specifications. **(WF2)** **(Tables 6.1 & 7.1)**	New Subdivisions	Prevention Public Education & Awareness Emergency Service Protection Property Protection Natural Resource Protection	16	2	3	2	1	3	2	3
				Social: *Some residents would prefer less regulations, not more* ***Administrative:*** *There could be time and personnel issues to implement and enforce subdivision changes* ***Political:*** *Some residents would prefer less regulations, not more* ***Economic:*** *Changes to the Subdivision Regulations may make building more expensive for contractors and ultimately for homeowners*						

Potential Mitigation Action Item	Affected Location	Type of Activity	Total	S	T	A	P	L	E	E
				3	2	2	3	2	1	3
Action Item #26: Explore additional public water sources in the Community to guard against the loss of water supply, particularly during periods of drought. **(D4)** **(Table 7.1)**	Town Wide	Prevention Emergency Service Protection Property Protection Natural Resource Protection	16	***Technical:*** *Need to figure out backup water sources; difficulty locating water sources* ***Administrative:*** *Staff time* ***Legal:*** *Easements on private property may be needed* ***Economic:*** *Budget constraints for equipment and exploration* ***Environmental:*** *DES would need to be involved*						
				3	2	3	3	3	2	2
Action Item #27: Investigate the construction of a new bridge and possibly abutments on Potato Road; raise the road and provide additional drainage under the road to mitigate flooding. **(F17)** **(Table 7.1)**	Potato Road	Prevention Property Protection Natural Resource Protection Structural Projects	18	***Technical:*** *Will require an engineering study; may need to be tied into other flood mitigation projects* ***Economic:*** *Budget constraints* ***Environmental:*** *DES permitting will be required*						
				3	3	3	3	3	3	3
Action Item #28: Review the Canaan road design standards and consider the impact of climate change as well as changes to the regulations that could further protect the roads and the citizens of Canaan from the impact of natural hazards. **(F1, F4, F5, F6 & F13)** **(Table 6.1)**	Town Roads	Prevention Property Protection Natural Resource Protection	21	*No apparent difficulties with this Action Item*						
				3	2	2	2	3	2	3
Action Item #29: Complete the initial mapping and integration of hazard areas into the Town's GIS mapping system. **(MU2)** **(Table 7.1)**	Town Wide	Prevention Emergency Service Protection Property Protection Natural Resource Protection	17	***Technical:*** *Will need the integration of software packages to make this effective* ***Administrative:*** *Staff time* ***Political:*** *Board of Selectmen is reluctant to spend money at this time* ***Economic:*** *Budget constraints*						
				3	2	2	3	3	3	3
Action Item #30: Update the Emergency Operations Plans at the Canaan Elementary School, the Indian River School, the Mascoma Valley High School and Cardigan Mountain School. **(Tables 6.1 & 7.1)**	Schools	Prevention Public Education & Awareness Emergency Service Protection Property Protection	19	***Technical:*** *Lack of sufficient understanding of the issues at play* ***Administrative:*** *Delegation of authority, awareness of the importance of the Plan as well at time constraints; staff time for in-service may be limited*						

Potential Mitigation Action Item	Affected Location	Type of Activity	Total	S	T	A	P	L	E	E
Action Item #31: Complete the update of the Canaan Master Plan and include a section on natural hazards. (MU6) **(Tables 6.1 & 7.1)**	Town Wide	Prevention	20	3	3	3	2	3	3	3
				Political: *Zoning, as part of the Master Plan, has not been welcome in the past by the Community*						
Action Item #32: In order to maintain continuity of government and, obtain funding and install a permanent generator at the Canaan Town Offices, a designated critical facility. (MU13) **(Tables 6.1 & 7.1)**	Canaan Town Offices	Prevention Emergency Service Protection Property Protection	21	3	3	3	3	3	3	3
				No apparent difficulties with this Action Item						
Action Item #33: Update the Canaan Emergency Operations Plan to coincide with the new State 15-ESF format and include "Player Packets" for Lead Agencies. **(Tables 6.1 & 7.1)**	Town Wide	Prevention Public Education & Awareness Emergency Service Protection Property Protection	21	3	3	3	3	3	3	3
				No apparent difficulties with this Action Item						
Action Item #34: Review this Hazard Mitigation Plan and Action Items in this Plan for incorporation into the Capital Improvement Plan (CIP). (MU6) **(Table 6.1)**	Town Wide	Prevention Emergency Service Protection Property Protection Structural Projects	20	3	3	3	3	3	2	3
				Economic: *Budget constraints*						
Action Item #35: Develop a drought mitigation plan that will enable the Town to provide emergency water supplies at the time of drought and to respond to other drought-related issues. (D4) **(Table 7.1)**	Town Wide	Prevention Public Education & Awareness Emergency Service Protection Property Protection Natural Resource Protection	18	3	2	2	3	3	2	3
				Technical: *Will need to gather technical information to be the most effective* ***Administrative:*** *Staff time; planning details and logistics will take some development* ***Economic:*** *Budget constraints; cost to do plan; may be costs associated with the solutions that are found*						

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 12 months.
- **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 be completed within 13-36 months.
- **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 generally be completed within 37-60 months.

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 Team 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 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** ($0 - $1,000 or staff time only)
- **Medium** ($1,000 - $10,000)
- **High** ($10,000 or more)

The time frame was determined using the following criteria:

- **Short Term**, Ongoing for the life of the Plan
- **Short Term**, 1 year or less (0-12 months)
- **Medium Term**, 2-3 years (13-36 months)
- **Long Term**, 3-5 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 Plan - Items are listed in order of priority.

Final Priority	Mitigation Action Item	Hazard Addressed	Responsible Department	Funding or Support	Time Frame	Est. Cost	STAP LEE
0-1	***Problem Statement:*** *CodeRED is an excellent warning system but it only stores resident phone numbers that are listed in the phone book.* **Action Item #1**: Provide public outreach to encourage residents to contact CodeRED to add cell numbers, emails, and unlisted numbers and to verify information. **(MU14)** **(Table 6.1)**	All Hazards	Town Administrator	Local	**Short Term or ongoing** For the life of the Plan	**Low Cost** <$1,000 or staff time only	20
0-2	***Problem Statement:*** *The Canaan Flash Email system is an excellent warning system; however, more public outreach about this service should be provided to the citizens of Canaan.* **Action Item #2**: Provide public outreach to encourage residents to contact the Town Office to add cell numbers, emails, and unlisted numbers and to verify information for the Canaan Flash Email System. **(MU14)** **(Table 6.1)**	All Hazards	Town Administrator	Local	**Short Term or ongoing** For the life of the Plan	**Low Cost** <$1,000 or staff time only	20
0-3	***Problem Statement:*** *Not all Town Officials (those who would respond at the time of an emergency) have been trained in ICS 100 & 200 and NIMS 700.* **Action Item #3:** National Incident Management System (NIMS) & Incident Command System (ICS) training for Town Officials in order to have better trained individuals handling disaster events so that the effects of the event can be mitigated. (ICS 100 & 200; NIMS 700).	All Hazards	Emergency Management Director	Local	**Short Term or ongoing** For the life of the Plan	**Low Cost** <$1,000 or staff time only	21
0-4	***Problem Statement:*** *Although hydrants are cared for on an "as needed" basis, there is no formal record keeping of these events.* **Action Item #4:** Develop a formal maintenance program and appropriate recording keeping for future use and conduct regular maintenance of all fire hydrants to reduce risk. **(WF7)**	Wildfire & Urban Fire	Water & Sewer Department & Fire Department	Local	**Short Term or ongoing** For the life of the Plan	**Medium Cost** $1,000 to $10,000	19

Final Priority	Mitigation Action Item	Hazard Addressed	Responsible Department	Funding or Support	Time Frame	Est. Cost	STAP LEE
0-5	***Problem Statement:*** *A functional needs list is not established and a system to keep it updated is not in place.* **Action Item #5:** Establish and maintain a list of functional needs persons by promoting voluntary participation to coincide with HIPAA laws; create a database to track those individuals at high risk of death, such as the elderly, homeless, etc. (website, mailing, Town Report, Facebook, visits) **(ET3)** **(Table 6.1)**	Extreme Temperatures & All Hazards	Town Administrator, Emergency Management Director & Canaan FAST Squad	Local	**Short Term or ongoing** For the life of the Plan	**Low Cost** <$1,000 or staff time only	19
0-6	***Problem Statement:*** *Residents may not be aware of emergency procedures or preventative techniques that can be done to protect their lives and property.* **Action Item #6:** Establish an interactive webpage or use Flash Email and Facebook 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)**.	All Hazards including: Severe Wind, Drought, Earthquake, Extreme Temperatures, Hail, Lightning, Severe Winter Weather, Tornado & Wildfire	Town Administrator & Other Town Departments	Local	**Short Term or ongoing** For the life of the Plan	**Low Cost** <$1,000 or staff time only	21
0-7	***Problem Statement:*** *Residents of Canaan are only about 40% compliant with appropriately placed 911 signage, making emergency response difficult.* **Action Item #7**: Consider ways to get 911 signage more compliant so that emergency responders can better assist the public at the time of need; perhaps through purchase of signs by the Town and/or public outreach. **(MU14)** **(Table 6.1)**	All hazards	Building Inspection, Town Administrator & Police Chief	Local	**Short Term or ongoing** For the life of the Plan	**Medium Cost** $1,000 to $10,000	18

Final Priority	Mitigation Action Item	Hazard Addressed	Responsible Department	Funding or Support	Time Frame	Est. Cost	STAP LEE
0-8	***Problem Statement:*** *Mapping the public water supply was done in 2012; however water resources for fire suppression should be identified.* **Action Item #8:** Identify water resources for fire suppression; consider tapping the Indian River and other rivers and streams in Town. **(WF4) (Table 7.1)**	Drought & Wildfire	Emergency Management Director, Water & Sewer Department & Fire Department	Local	**Short Term or ongoing** For the life of the Plan	**Medium Cost** $1,000 to $10,000	16
0-9	***Problem Statement:*** *Although NH Electric Coop, Liberty Utilities and the Canaan Department of Public Works do a good job maintaining brush and tree removal, it is important to continue these efforts into the future.* **Action Item #9**: Continue efforts to trim trees, limbs and brush around critical facilities and key resources and drainage systems to reduce the impact from natural hazards such as wildfires, ice storms, severe wind storms, etc. **(WF9 & SW4) (Table 6.1)**	Wildfires, Ice Storms, Severe Wind Storms	Highway Department	Local	**Short Term or ongoing** For the life of the Plan	**Low Cost** <$1,000 or staff time only	21
0-10	***Problem Statement:*** *Dam exercises need to continue into the future.* **Action Item #10:** Continue to hold preparedness exercises for the dams in Town. **(F7) (Table 7.1)**	Flooding (dam failure)	Emergency Management Director & NH-DES	Local	**Short Term or ongoing** For the life of the Plan	**Low Cost** <$1,000 or staff time only	19
0-11	***Problem Statement:*** *Canaan has been a member of the National Flood Insurance Program (NFIP) since May 17, 1988; the Town is compliant with the requirements of the National Flood Insurance Program; however systems are not in place to reflect changes in the regulation, to improve assessment and to improve enforcement capabilities.* **Action Item #11**: Develop an acceptable plan that will be able to reflect changes in NFIP regulations if they occur and to improve assessment and enforcement capabilities. **(F2) (Table 6.1)**	Flooding	Town Administrator	Local	**Short Term or ongoing** For the life of the Plan	**Low Cost** <$1,000 or staff time only	21

Final Priority	Mitigation Action Item	Hazard Addressed	Responsible Department	Funding or Support	Time Frame	Est. Cost	STAP LEE
0-12	***Problem Statement:*** *Although Canaan is compliant with the NFIP and has a Flood Ordinance, more public outreach should be done to advise residents of the risks of building in the floodplain.* **Action Item #12:** 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 National Flood Insurance Program (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 Emergency Management Services webpage. **(Tables 6.1 & 7.1)**	Flooding	Town Administrator & Emergency Management Director	Local	**Short Term or ongoing** For the life of the Plan	**Low Cost** <$1,000 or staff time only	21
0-13	***Problem Statement:*** *The Town should maintain a supply of Firewise brochures and provide website links, Flash Email and Facebook notices for residents and builders to inform residents of best practice mitigation strategies to protect their properties from wildfire.* **Action Item #13:** Obtain and have available "Firewise" brochures or other written material to educate homeowners on methods to reduce fire risk around their homes **(WF10)**; 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. **(WF12)**	Wildfire	EMD & FD	Local	**Short Term or ongoing** For the life of the Plan	**Low Cost** <$1,000 or staff time only	21
0-14	***Problem Statement:*** *The citizens of Canaan may not know the risks of radon and the ability to get testing.* **Action Item #14:** Provide public education on the risks of radon and the methods by which citizens can get their homes and water tested and monitored. **(MU14)**	Radon	Town Administrator, Emergency Management Director & Water & Sewer Department	Local	**Short Term or ongoing** For the life of the Plan	**Low Cost** <$1,000 or staff time only	21

Final Priority	Mitigation Action Item	Hazard Addressed	Responsible Department	Funding or Support	Time Frame	Est. Cost	STAP LEE
1-1	***Problem Statement:*** *Canaan's Village Center is subject to flooding during periods of heavy rain and/or rapid snowmelt due primarily three restrictions in the Indian River, Orange Brook and Mirror Lake drainage.* **Action Item #15:** Do an engineering and hydrology study to determine the best way to flood proof the Village Center; consider possible mitigation strategies such as 1) river redirection and the removal of impediments to the flow of water, 2) buying super sacks (sand) to serve as a temporary dike and 3) flood proofing buildings; explore these three solutions to address inevitable and reoccurring flooding in the Village Center. **(F1, F5 & F13)**	Flooding	Town Administrator, Emergency Management Director, Planning Board, Board of Selectmen & Building Inspector	Local & Grants	**Short Term** 1 year or less (0-12 months)	**High Cost** >$10,000	14
1-2	***Problem Statement:*** *The Canaan Fire Department has a mutual aid agreement with the Upper Valley Regional Emergency Services Association (UVRESA); however, the Department would like to participate in a regional hazmat team.* **Action Item #16:** Obtain funding through both local funds and grants to participate in a regional hazmat team. **(Table 7.1)**	HazMat	Emergency Management Director & Fire Department	Local & Grants	**Short Term** 1 year or less (0-12 months)	**Medium Cost** $1,000 to $10,000 **High Cost** >$10,000	18
1-3	***Problem Statement:*** *Dam plans for Crystal Lake Dam and Goose Pond Dam (both state dams) have been obtained and are located at the Fire Station; the Town does not have a copy of the dam plan for Canaan Street Lake Dam and Cummins Pond Dam (Dorchester).* **Action Item #17**: Obtain dam plans for Canaan Street Lake Dam and Cummins Pond Dam plan. **(F7) (Table 6.1)**	Flooding (dam failure)	Emergency Management Director	Local	**Short Term** 1 year or less (0-12 months)	**Low Cost** <$1,000 or staff time only	15
2-1	***Problem Statement:*** *Although the Canaan Highway Department does a good job with culvert and drainage systems, a formal written stormwater maintenance plan has not been developed.* **Action Item #18:** Develop a 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; use the new Pubworks software. **(F5 & F13) (Tables 6.1 & 7.1)**	Flooding	Highway Department	Local	**Medium Term** 2-3 years (13-36 months)	**Low Cost** <$1,000 or staff time only	21

Final Priority	Mitigation Action Item	Hazard Addressed	Responsible Department	Funding or Support	Time Frame	Est. Cost	STAP LEE
2-2	***Problem Statement:*** *Although repeaters have been located in the Police cruisers, the fire repeater system has been improved, cell boosters are in some vehicles and new cell towers are anticipated, there are still dead spots in parts of Canaan.* **Action Item #19**: Obtain funding and add fire repeater systems to fire and highway vehicles to improve communications and help eliminate dead spots in Town; explore the possibility of a tower repeater. **(Tables 6.1 & 7.1)**	All Hazards	Police, Fire & Highway Departments	Local & Grants	**Medium Term** 2-3 years (13-36 months)	**High Cost** >$10,000	19
2-3	***Problem Statement:*** *In order to best maximize the use of critical facilities at the time of an emergency, a permanent generator should be installed at the Canaan Elementary School, a facility that will likely be used as the Primary Shelter depending on the location and extent of the hazard.* **Action Item #20**: Install a permanent generator at the Canaan Elementary School so that this critical facility can be used as the Primary Shelter at the time of a natural disaster. **(MU 13)** **(Tables 6.1 & 7.1)**	All Hazards	Town Administrator & SAU 62	Local & Grants	**Medium Term** 2-3 years (13-36 months)	**High Cost** >$10,000	20
2-4	***Problem Statement:*** *The road surface has been improved and Ball Park Road is closed during deep mud season; however, improvements are still needed to prevent the banks along the side of the road from sliding.* **Action Item #21:** Improve the slope banking and tree cutting on Ball Park Road to prevent the banks from sliding onto the road; underdrainage may also be needed. **(ER5)** **(Table 7.1)**	Erosion	Highway Department	Local	**Medium Term** 2-3 years (13-36 months)	**Medium Cost** $1,000 to $10,000	20
2-5	***Problem Statement:*** *Wetland Protection is part of the Town's planning mechanisms; the Town will support and facilitate the state and federals laws that refer to wetlands protection; however changes in the local building permit process may be needed.* **Action Item #22**: Consider making changes in the building permit process to ensure that state and federal regulations that concern Wetland Protection are met; encourage the Conservation Commission to establish easements that support the protection of property and natural resources from the impact of natural hazards. **(MU4)** **(Tables 6.1 & 7.1)**	All Hazards	Town Administrator, Building Inspector & Planning Board	Local	**Medium Term** 2-3 years (13-36 months)	**Low Cost** <$1,000 or staff time only	20

Final Priority	Mitigation Action Item	Hazard Addressed	Responsible Department	Funding or Support	Time Frame	Est. Cost	STAP LEE
2-6	***Problem Statement:*** *The Shore Land Water Quality Protection Act (formerly the Shoreland Protection Act) is part of the Town's planning mechanisms; the Town will support and facilitate the laws that are set forth in the Act, however changes in the local building permit process may be needed.* **Action Item #23**: Consider making changes in the building permit process to ensure that the Shore Land Water Quality Protection Act and local regulations are met. **(MU4)** **(Table 6.1)**	All Hazards	Town Administrator, Building Inspector & Planning Board	Local	**Medium Term** 2-3 years (13-36 months)	**Low Cost** <$1,000 or staff time only	20
2-7	***Problem Statement:*** *The Town complies with the State building codes; however changes in the building permit process may need to be addressed to ensure that state and local regulations are met.* **Action Item #24**: Consider making changes in the building permit process to ensure State and local regulations are met. **(Tables 6.1 & 7.1)**	All Hazards	Town Administrator, Building Inspector, Fire Chief & Planning Board	Local	**Medium Term** 2-3 years (13-36 months)	**Low Cost** <$1,000 or staff time only	17
2-8	***Problem Statement:*** *Although the Town's Subdivision Regulations do include limited regulations for fire equipment access on new roads, they do not include regulations that require fire suppression capabilities in new developments or regulations that address building on steep slopes.* **Action Item #25**: Consider amending the Subdivision Regulations to include protection from natural hazards; for example, consider requirements for new developments to install water resources (fire ponds, cisterns, dry hydrants, etc.) and other regulation amendments that will limit building on steep slopes and address driveway specifications. **(WF2)** **(Tables 6.1 & 7.1)**	Wildfire	Planning Board	Local	**Medium Term** 2-3 years (13-36 months)	**Low Cost** <$1,000 or staff time only	16
2-9	***Problem Statement:*** *The Town has identified an additional public water source and passed a new ordinance in 2012, the Water Supply Protection Ordinance; additional public water sources may be needed, particular during times of drought.* **Action Item #26:** Explore additional public water sources in the Community to guard against the loss of water supply, particularly during periods of drought. **(D4)** **(Table 7.1)**	Drought	Water & Sewer Department	Local	**Medium Term** 2-3 years (13-36 months)	**Medium Cost** $1,000 to $10,000	16

Final Priority	Mitigation Action Item	Hazard Addressed	Responsible Department	Funding or Support	Time Frame	Est. Cost	STAP LEE
2-10	***Problem Statement:*** *Improvements are still needed on Potato Rad to mitigate flooding.* **Action Item #27:** Investigate the construction of a new bridge and possibly abutments on Potato Road; raise the road and provide additional drainage under the road to mitigate flooding. **(F17) (Table 7.1)**	Flooding (local roads)	Highway Department	Local & Grants	**Medium Term** 2-3 years (13-36 months)	**High Cost** >$10,000	18
2-11	***Problem Statement:*** *The Canaan road design standards are detailed within the Town's Subdivision Regulations and adhere to State standards; these road standards also address steep slopes; however, a consideration of the impact of climate change has not been integrated into the regulations.* **Action Item #28**: Review the Canaan road design standards and consider the impact of climate change as well as changes to the regulations that could further protect the roads and the citizens of Canaan from the impact of natural hazards. **(F1, F4, F5, F6 & F13) (Table 6.1)**	Flooding (local roads)	Highway Department & Planning Board	Local	**Medium Term** 2-3 years (13-36 months)	**Low Cost** <$1,000 or staff time only	21
2-12	***Problem Statement:*** *The Town has not completed the integration of hazard areas in its GIS mapping.* **Action Item #29:** Complete the initial mapping and integration of hazard areas into the Town's GIS mapping system. **(MU2) (Table 7.1)**	All Hazards	Town Administrator & Assessing Department	Local & Grants	**Medium Term** 2-3 years (13-36 months)	**Medium Cost** $1,000 to $10,000	17
2-13	***Problem Statement:*** *The schools in Canaan do not have current Emergency Operations Plans in place;* **Action Item #30**: Update the Emergency Operations Plans at the Canaan Elementary School, the Indian River School, the Mascoma Valley High School and Cardigan Mountain School. **(Tables 6.1 & 7.1)**	All Hazards	Emergency Management Director; SAU 62 & Cardigan Mountain School	Local	**Medium Term** 2-3 years (13-36 months)	**Low Cost** <$1,000 or staff time only	19

Final Priority	Mitigation Action Item	Hazard Addressed	Responsible Department	Funding or Support	Time Frame	Est. Cost	STAP LEE
2-14	***Problem Statement:*** *The Canaan Master Plan was updated in 2006 and is ready for a recommended 10-year update.* **Action Item #31**: Complete the update of the Canaan Master Plan and include a section on natural hazards. **(MU6)** **(Tables 6.1 & 7.1)**	All Hazards	Planning Board	Local	**Medium Term** 2-3 years (13-36 months)	**Low Cost** <$1,000 or staff time only	20
2-15	***Problem Statement:*** *In order to best maximize the use of critical facilities at the time of an emergency, a permanent generator should be installed at the Canaan Town Office building.* **Action Item #32**: In order to maintain continuity of government and, a permanent generator to be installed at the Canaan Town Offices, a designated critical facility. **(MU13)** **(Tables 6.1 & 7.1)**	All Hazards	Town Administrator & SAU 62	Local & Grants	**Medium Term** 2-3 years (13-36 months)	**Medium Cost** $1,000 to $10,000	21
2-16	***Problem Statement:*** *The Canaan Emergency Operations Plan will be in need of an update according to the recommended five-year cycle; the EOP was last updated in 2014 and will need to be updated again in 2019.* **Action Item #33:** Update the Canaan Emergency Operations Plan to coincide with the new State 15-ESF format and include "Player Packets" for Lead Agencies. **(Tables 6.1 & 7.1)**	All Hazards	Emergency Management Director	Local & Grants	**Medium Term** 2-3 years (13-36 months)	**Medium Cost** $1,000 to $10,000	21
3-1	***Problem Statement:*** *The Canaan Capital Improvement Plan (CIP) is reviewed annually at budget time; the CIP works well however there is currently a shortage of planning and funding for buildings.* **Action Item #34**: Review this Hazard Mitigation Plan and Action Items in this Plan for incorporation into the Capital Improvement Plan (CIP). **(MU6)** **(Table 6.1)**	All Hazards	Capital Improvement Plan Committee	Local	**Long Term** 3-5 years (37-60 months)	**High Cost** >$10,000	20
3-2	***Problem Statement:*** *A drought mitigation plan was not developed as suggested in the prior plan.* **Action Item #35:** Develop a drought mitigation plan that will enable the Town to provide emergency water supplies at the time of drought and to respond to other drought-related issues. **(D4)** **(Table 7.1)**	Drought	Water & Sewer Department & Emergency Management Director	Local	**Long Term** 3-5 years (37-60 months)	**Low Cost** <$1,000 or staff time only	18

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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 Canaan 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 items. 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. Canaan completed its last hazard mitigation plan in 2011 and has completed many of projects from that Plan. The Town was able to integrate these actions into other town activities, plans and mechanisms. Canaan will continue to take the necessary steps to incorporate the mitigation action items and other information contained in this Plan with other town activities, plans and mechanisms, when appropriate. The Town will incorporate elements from this Plan into the following documents:

Canaan 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. Canaan's Master Plan was created in 2006 and an update has not been done; following the recommended 10-year plan, Canaan is ready for a recommended update of the Master Plan. Updating the Master Plan was discussed during meetings with the Hazard Mitigation Planning Team and it was stated that work has been started on the Master Plan. Updates to the Master Plan will integrate concepts and ideas from this Hazard Mitigation Plan. **(Action Item #31)**

Canaan Emergency Operations Plan 2014 (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 Canaan EOP was finished in 2014 and is recommended to be updated in 2019. The new EOP will include elements from this hazard mitigation plan. **(Action Item #33)**

Capital Improvement Plan & Capital Reserve Funds:

The Town maintains a Capital Improvement Plan (CIP) for long-term spending and Capital Reserve Funds for planned major expenditures. The CIP is reviewed annually and serves as a guide for future spending within the Community. The Capital Reserve Funds are 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 and the Capital Improvement Plan review, 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 in conjunction with state or federal grant. (Action Item #34)**

Ordinances & Subdivision Regulations:

As time goes by and the needs of the Town change, these ordinances 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 items. **(Action Items #11, 22, 23, 24, 25 & 28)**

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

This Plan was completed in a series of open meetings beginning on February 8, 2016. 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, DRED 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).

(Note: for the purposes of clarity, the above paragraph was written in future tense, noting that these actions have not yet transpired – this box will be deleted when final hard copy is distributed)

Jerusalem Road, Tropical Storm Irene
Photo Credit: http://www.canaannh.org/departments/emergency_mgt/hurricane-irene.html

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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

PARTIES TO THE AGREEMENT
Mapping and Planning Solutions
Town of Canaan, NH **PDM14 Grant Expiration: September 30, 2016**

This Agreement between the Town of Canaan (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 Canaan 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 Canaan Hazard Mitigation Plan.

- After final approval is received from FEMA, MAPS will provide the Town with a one copy 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; additional copies of the Plan will be priced according to number of pages. 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 Canaan 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 Canaan, 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 September 30, 2016 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.

- **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 Canaan. 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 Canaan 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 50 Hazard Mitigation Plans, more than 35 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
P.O. Box 283, 91 Cherry Mountain Place
Twin Mountain, NH 03595
jgarneau@mappingandplanning.com

For the Town

Bill Bellion
EMD & Fire Chief
Town of Canaan
PO Box 38
Canaan, NH 03741
cfdchief@canaan.org

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

FOR THE TOWN OF CANAAN, NH

Signature

MICHAEL SAMSON TOWN ADMIN.
Printed Name/Title

2/8/16
Date

FOR MAPPING AND PLANNING SOLUTIONS

June E. Garneau

Signature
June Garneau, Owner
September 16, 2015

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

B. Conditional Approval Letter from FEMA

Canaan, NH - Approvable Pending Adoption

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

Sent: Tue 7/18/2017 2:14 PM
To: 'June Garneau'
Cc: 'townadmin@canaannh.org'; 'cfdchief@canaannh.org'; Hatch, Paul

Good afternoon!

The Department of Safety, Division of Homeland Security & Emergency Management (HSEM) has completed its review of the Canaan, 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. 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 or 603-223-3667.

Thank you for submitting the Canaan, 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

Canaan, NH

Board of Selectmen

A Resolution Adopting the Town of Canaan, Hazard Mitigation Plan Update 2017

WHEREAS, the Town of Canaan 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 Canaan 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 February 8, 2016 and June 22, 2016 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 Canaan; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the Town of Canaan 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 Canaan of 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 Canaan;
2. The respective officials identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;

Canaan, 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 25TH **of** July, **2017**

Chairman of the Board of Selectmen

Signature

SCOTT BOARTHWICK

Print Name

Member of the Board of Selectmen

Signature

AL POSNANSKI

Print Name

Member of the Board of Selectmen

Signature

David E. Mcalister

Print Name

Emergency Management Director (or DEMD)

Signature

William Bellion

Print Name

IN WITNESS WHEREOF, the undersigned has affixed his/her signature and the corporate seal of the Town of Canaan on this day, 7/25, 2017

Notary

3-9-2021

Expiration

7/25/2017

Date

THERESA PURCELL
MY COMMISSION EXPIRES MARCH 9, 2021
NOTARY PUBLIC
NEW HAMPSHIRE

Signatures are scanned facsimile; original signatures are on file.

D. Final Approval Letter from FEMA

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PAGE LEFT INTENTIONALLY BLANK FOR INSERTION OF FINAL APPROVAL LETTER (PAGE 2) FROM FEMA WHEN RECEIVED.

Signatures are scanned facsimile; original signatures are on file.

E. CWPP Approval Letter from DRED

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

Several public meetings and committee meetings were held between February 8, 2016 and June 22, 2016 regarding the development and review of the Canaan Hazard Mitigation Plan Update 2017. The Canaan Hazard Mitigation Plan Update 2017 contains potential future projects to mitigate hazard and wildfire damage in the Town of Canaan.

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

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

For the Town of Canaan

APPROVED and SIGNED this day, _____, 2017.

_____ _____
Chairman of the Board of Selectmen Printed Name

_____ _____
Fire Chief (or Designee) Printed Name

For the Department of Resources and Economic Development

APPROVED and SIGNED this day, _____, 2017.

_____
Forest Ranger – NH Division of Forest and Lands, DRED

APPROVED and SIGNED this day, _____, 2017.

_____
Director – NH Division of Forest and Lands, DRED

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 Canaan, 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.

Canaan, 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

_____

_____

_____

_____

_____

Please use reverse side for additional notes ➡

Additional Notes – Year One:

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 Canaan, 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.

Canaan, 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:

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 Canaan, 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.

Canaan, 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:

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 Canaan, 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.

Canaan, 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:

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**
    - Canaan Hazard Mitigation Plan, 2011
    - Wentworth Hazard Mitigation Plan, 2015
    - Orford 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.nhdfl.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, August 2016;Community Response for Canaan, Received, 7/25/16, Census 2000 and Revenue Information derived from this site; *http://www.nhes.nh.gov/elmi/products/cp/profiles-pdf/canaan.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*
    - Wildfire Preparedness Guide to Forest Wardens; *www.quickseries.com*
    - Ready Set Go; *www.wildlandfires.org*
    - Fire education for children; *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
- Department Environmental Services; *http://des.nh.gov/organization/divisions/water/dam/drought/documents/historical.pdf*
- The Disaster Center (NH); http://www.disastercenter.com/newhamp/tornado.html
- Floodsmart, about the NFIP; *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
- 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
- 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 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[18]:

- 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.

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

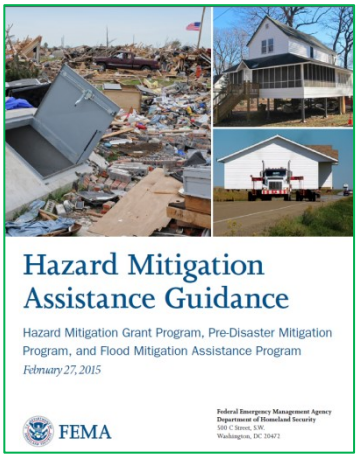
Eligible Activities	HMGP	PDM	FMA
1. Mitigation Projects	✓	✓	✓
Property Acquisition and Structure Demolition	✓	✓	✓
Property Acquisition and Structure Relocation	✓	✓	✓
Structure Elevation	✓	✓	✓
Mitigation Reconstruction	✓	✓	✓
Dry Floodproofing of Historic Residential Structures	✓	✓	✓
Dry Floodproofing 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[(1)]	✓	✓	✓
2. Hazard Mitigation Planning	✓	✓	✓
Planning Related Activities	✓		
3. Technical Assistance			✓
4. Management Cost	✓	✓	✓

[(1)] 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

[18] 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

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:

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

Appendix C: The Extent of Hazards

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

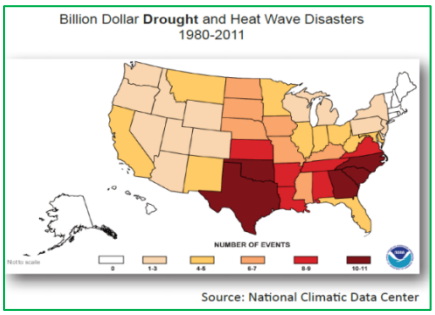
*DAM FAILURE

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[1]. A dam failure occurs when water overtops the dam, or there is structural failure of the dam which causes there to be a breech and an unintentional release of water. Dams are classified in the following manner[19]:

Classification	Description	Inspection Intervals
Non-Menace	A dam that is not a menace because it is in a location and of a size that failure or misoperation of the dame 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
Low Hazard	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
Significant Hazard	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 pro 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
High Hazard	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

[1] NH DES http://des.nh.gov/organization/divisions/water/dwgb/wrpp/documents/primer_chapter11.pdf
[19] 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/hist

*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.[20]

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
		7.5
		8

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.

[20] Modified Mercalli Scale/Richter Scale Chart; MO DNR, http://www.dnr.mo.gov/geology/geosrv/geores/richt_mercali_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.[21]

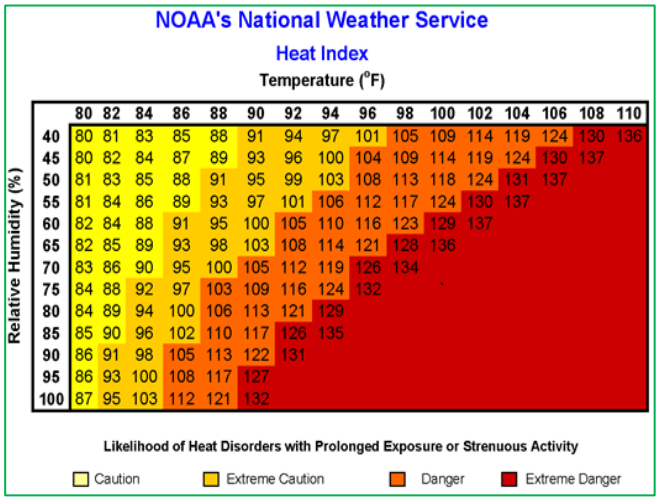
*Extreme Temperatures

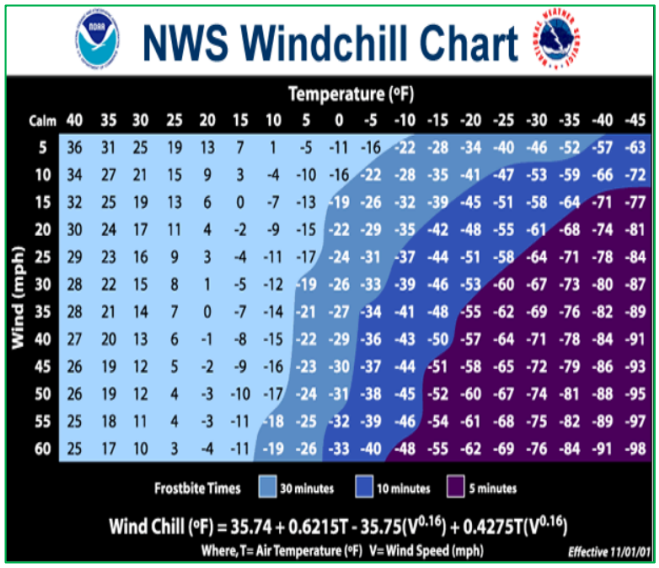
Extreme Heat

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 (UHI) effect. The chart above explains the likelihood of heat disorders that may result from high heat.[22]





[21] Mitigation Ideas, A Resource for Reducing Risk to Natural Hazards, FEMA, January 2013
[22] NOAA; http://www.nws.noaa.gov/os/heat/index.shtml

EXTREME COLD

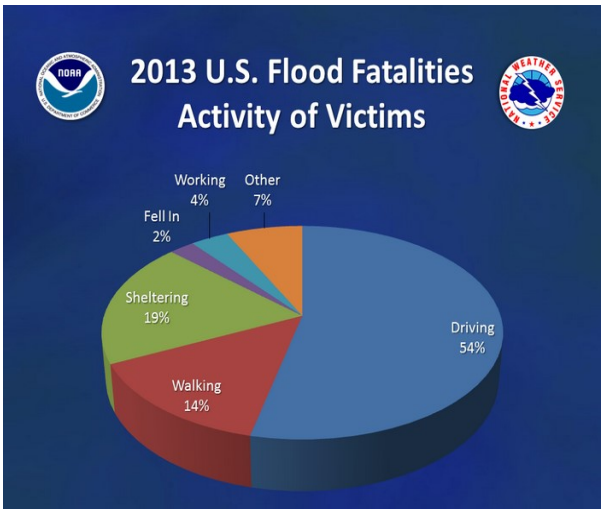
What constitutes extreme cold and its effects can vary across different areas of the country. In regions relatively unaccustomed to winter weather, near freezing temperatures are considered "extreme cold." Whenever temperatures drop decidedly below normal and as wind speed increases, heat can leave your 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.[23] The National Weather Service Chart (previous page) shows windchill as a result of wind and temperature.[24]

*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 stormwater 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.

[23] CDC; https://www.cdc.gov/disasters/winter/index.html
[24] National Weather Service; http://www.nws.noaa.gov/om/cold/wind_chill.shtml

FLOODING (DAM FAILURE)

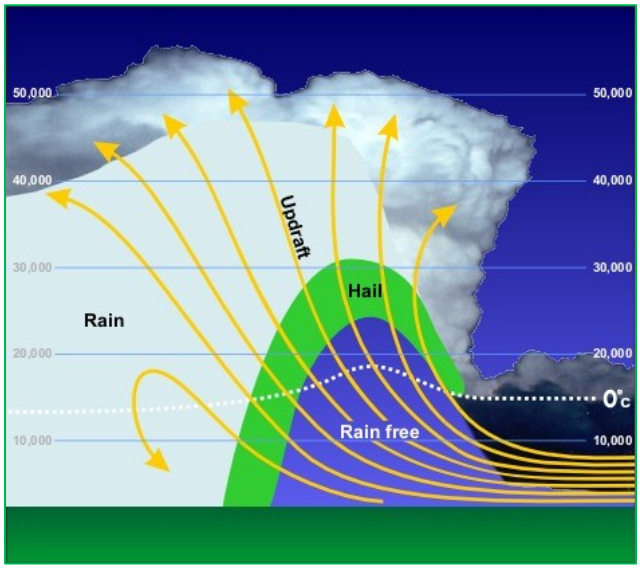
Flooding as a result of dam failure can be small enough to only affect the immediate area of the dam, or large enough to cause catastrophic results to cities, towns and human life that is below the dam. The extent of flooding depends largely on the size of the dam, the amount of water that is being held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

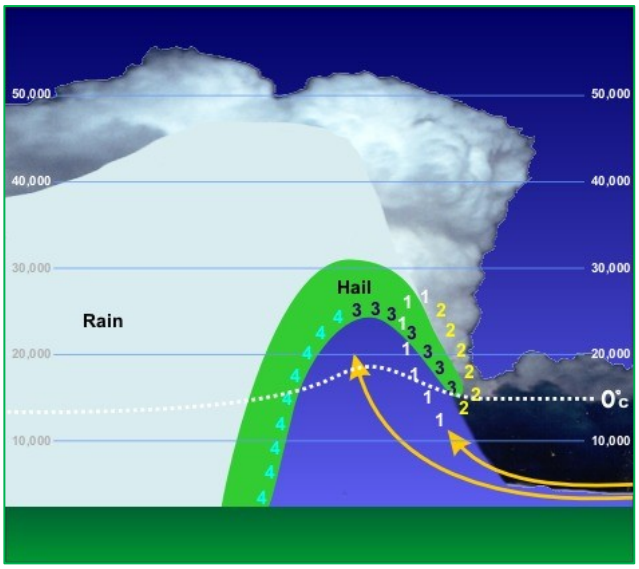
***HAILSTORM**

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 includes. It weighed 1 lb. 15 oz."[25]

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

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.[26] The charts below show how hail is formed.[27]





[25] NOAA National Severe Storms Laboratory; https://www.nssl.noaa.gov/education/svrwx101/hail/
[26] http://www.pinterest.com/pin/126171227030590678/
[27] 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.[28]

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.[29]

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, forum 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	

[28] NOAA; *http://www.nws.noaa.gov/glossary/index.php?letter=w*
[29] 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[30]) 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."[31]

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	**Very dangerous winds will produce some damage:** Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96-110 mph 83-95 kt 154-177 km/h	**Extremely dangerous winds will cause extensive damage:** Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3 (major)	111-129 mph 96-112 kt 178-208 km/h	**Devastating damage will occur:** 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	**Catastrophic damage will occur:** 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)	96-110 mph 83-95 kt 154-177 km/h	**Catastrophic damage will occur:** A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months

TROPICAL STORMS

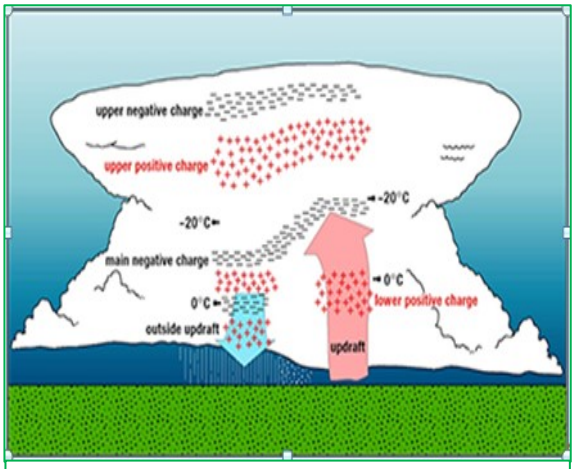
A tropical depression becomes a tropical storm when its maximum sustained winds are between 39-73 mph. Although tropical storms have winds of less than 74 miles per hour, like hurricanes, they can do significant damage. The damage most felt by tropical storms is from the torrential rains they produce 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.[32]

[30] National Hurricane Center; http://www.nhc.noaa.gov/aboutsshws.php
[31] National Hurricane Center, NOAA; http://www.nhc.noaa.gov/aboutsshws.php
[32] 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."[33]



"A conceptual model shows the electrical charge distribution inside deep convention (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

Thunder, a result of lightning, is created when the "lightning channel heats the air to around 18,000 degrees Fahrenheit..."[34] 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.

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."[35]

[33]NOAA National Severe Storms Laboratory, https://www.nssl.noaa.gov/education/svrwx101/lightning
[34]Ibid
[35]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

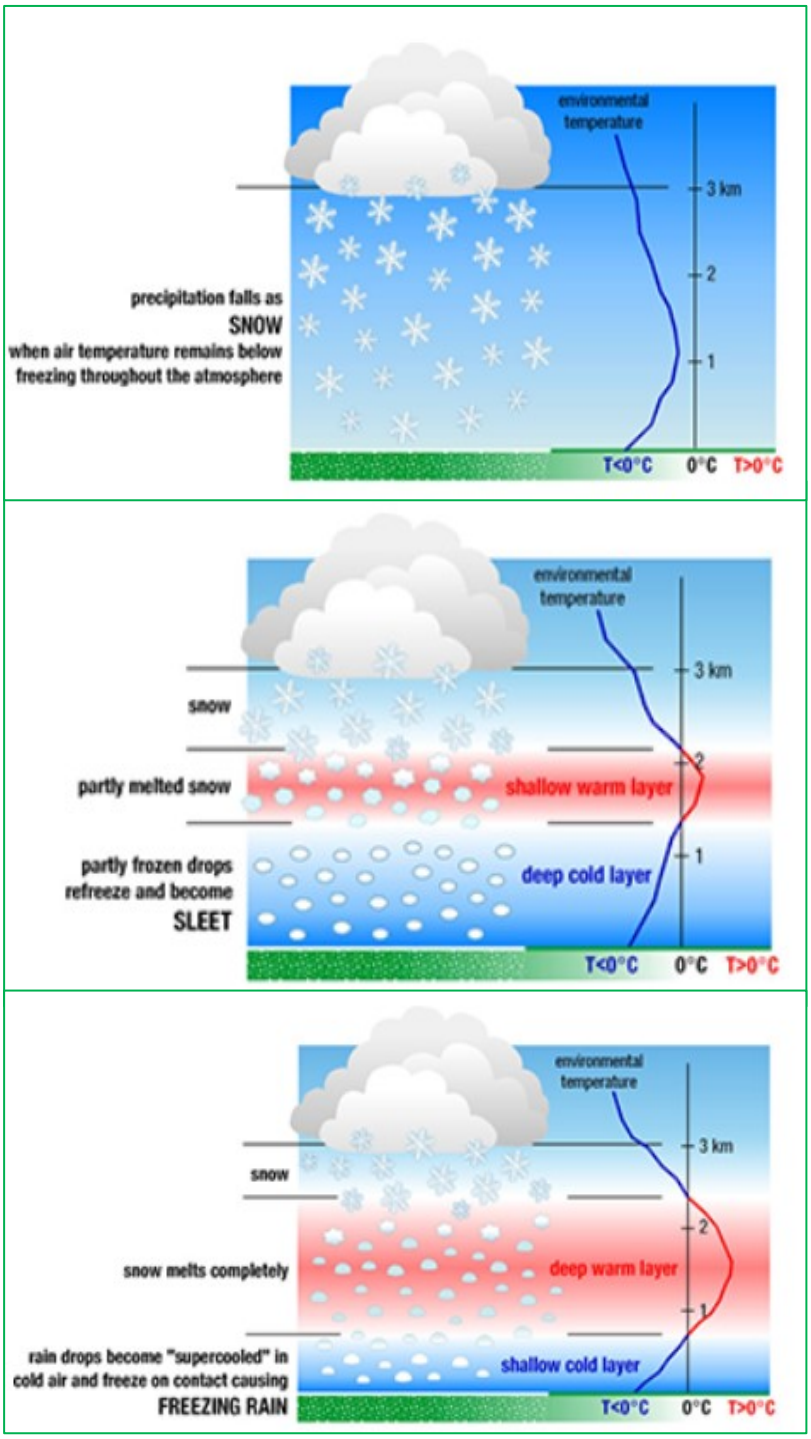
A winter storm can range from moderate snow to blizzard conditions. Blizzard conditions are considered blinding wind-driven snow over 35 mph that lasts several days. A severe winter storm deposits four or more inches of snow during a 12-hour period or six inches of snow during a 24-hour period.

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."[36]



Types of Severe Winter Weather
NOAA – National Severe Storms Laboratory

[36] NOAA, National Severe Storms Laboratory, https://www.nssl.noaa.gov/education/svrwx101/winter/types/

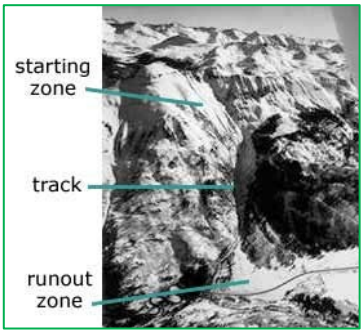
The Sperry-Piltz Ice Accumulation Index (SPIA) (below) is designed to help utility companies better prepare for predicated ice storms.[37]

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

ICE DAMAGE INDEX	* AVERAGE NWS ICE AMOUNT (in inches) *Revised-October, 2011	WIND (mph)	DAMAGE AND IMPACT DESCRIPTIONS
0	< 0.25	< 15	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
1	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	
2	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	
3	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	
4	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	
5	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."[38]

"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."[39]

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.

[37] The Weather Channel, http://www.weather.com/news/weather-winter/rating-ice-storms-damage-sperry-piltz-20131202
[38] Copyright Richard Armstrong, NSIDC, http://nsidc.org/cryosphere/snow/science/avalanches.html
[39] NSIDC, http://nsidc.org/cryosphere/snow/science/avalanches.html; image credit: Betsy Armstrong

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."[40]

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.[41]

North American Public Avalanche Danger Scale

Avalanche danger is determined by the likelihood, size and distribution of avalanches.

Danger Level		Travel Advice	Likelihood of Avalanches	Avalanche Size and Distribution
5 Extreme		Avoid all avalanche terrain.	Natural and human-triggered avalanches certain.	Large to very large avalanches in many areas.
4 High		Very dangerous avalanche conditions. Travel in avalanche terrain not recommended.	Natural avalanches likely; human-triggered avalanches very likely.	Large avalanches in many areas; or very large avalanches in specific areas.
3 Considerable		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.
2 Moderate		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.
1 Low		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.

***TORNADO & DOWNBURST**

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.

[40] Copyright Richard Armstrong, NSIDC, http://nsidc.org/cryosphere/snow/science/avalanches.html
[41] http://www.avalanche.org/danger_card.php

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.

EF SCALE	OLD F-SCALE	TYPICAL DAMAGE
EF-0 (65-85mph)	**F0** (65-73 mph)	**Light damage.** Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
EF-1 (86-110 mph)	**F1** (74-112 mph)	**Moderate damage.** Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF-2 (111-135 mph)	**F2** (113-157 mph)	**Considerable damage.** 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
EF-3 (136-165 mph)	**F3** (158-206 mph)	**Severe damage.** 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.
EF-4 (166-200 mph)	**F4** (207-260 mph)	**Devastating damage.** Well-constructed houses and whole frame houses completely leveled; cars through and small missiles generated.
EF-5 (>200 mph)	**F5** (261-318 mph)	**Incredible damage.** 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	**F6-F12** (319 mph to speed of sound)	**Inconceivable damage.** 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.

"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."[42] 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.

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.[43]

[42] Enhance Fujita Scale, http://www.wunderground.com/resources/severe/fujita_scale.asp
[43] NOAA - http://www.srh.noaa.gov/jetstream/tstorms/wind.html

*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:[44] For the purpose of statistical analysis, the US Forest Service recognizes the cause of fires according to the bottom chart to the right:[45]

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

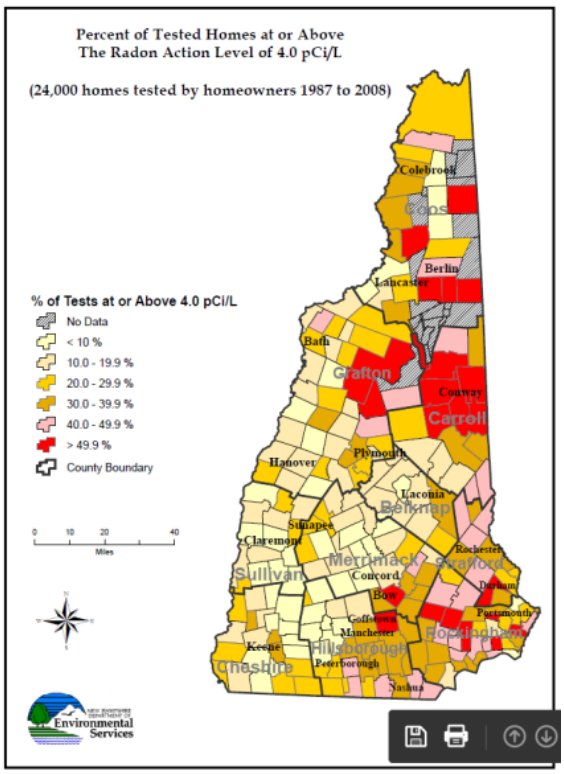
The definition according to the International Wildland-Urban Interface Code of wildfire is “an uncontrolled fire spreading through vegetative fuels exposing and possibly consuming structures”. In addition, the IWUIC goes on to define the wildland urban interface area as “that geographical area where structures and other human development meets or intermingles with wildland or vegetative fuels.[46]

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.

*RADON

Although not usually included in local hazard mitigation plans in New Hampshire, the Canaan hazard mitigation Planning Team decided that radon is worthy of mention in this plan.

According to the NH Department of Evironmental Services (DES), *“Radon is a naturally-occurring radioactive gas that is commonly found in bedrock and in water from bedrock (drilled) wells in New Hampshire. Radon gas is colorless, odorless and tasteless. Radon gas finds its way into indoors air mainly by migrating from bedrock, through the soil and into the home via cracks or other openings in the foundation. Radon from bedrock wells is released into indoor air during showering, dishwashing and doing laundry. Dug wells and point wells tend to have minimal to no radon. The amount of radon released from stone building materials such as granite block foundations, fireplace materials, counter tops and floor or wall tiles is usually insignificant.”*[47]



[44] http://www.nwcg.gov/pms/pubs/glossary/s.htm
[45] https://www.fs.fed.us/cgi-bin/Directives/get_dirs/fsh?5109.14
[46] International Wildland-Urban Interface Code, 2012, International Code Council, Inc.
[47] Environmental Fact Sheer, Radon in Your Home, NH DES, https://www.des.nh.gov/organization/commissioner/pip/factsheets/dwgb/documents/dwgb-3-12.pdf

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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	**Presidential Emergency Declaration DR-4316:** 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	**Presidential Emergency Declaration DR-4206:** 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	**Presidential Emergency Declaration DR-4139:** 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	**Presidential Emergency Declaration DR-4105:** Nemo; heavy snow in February 2013.
DR-4095	Hurricane Sandy	October 26-November 8, 2012	Belknap, Carroll, Coos, Grafton & Sullivan	**Presidential Disaster Declaration DR-4095:** 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	**Presidential Disaster Declaration DR-4065:** Severe Storm and Flood Event May 29-31, 2012 Cheshire County.
DR-4049	Severe Storm & Snowstorm	October 29-30, 2011	Hillsborough & Rockingham	**Presidential Disaster Declaration DR-4049:** 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	**Presidential Disaster Declaration DR-4026:** 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	**Presidential Disaster Declaration DR-4006:** 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	**Presidential Disaster Declaration DR-1913:** 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	**Presidential Disaster Declaration: DR-1892:** 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	**Presidential Declaration DR-1812:** 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	**Presidential Declaration: DR-1799:** Severe storms and flooding beginning on September 6-7, 2008.
DR-1787	Severe Storms & Flooding	July 24-August 14, 2008	Belknap, Carroll & Grafton & Coos	**Presidential Declaration DR-1787:** Severe storms, tornado, and flooding on July 24, 2008.
DR-1782	Severe Storms, Tornado, & Flooding	24-Jul-08	Belknap, Carroll, Merrimack, Strafford & Rockingham	**Presidential Declaration DR-1782:** Tornado damage to several NH counties.
DR-1695	Nor'easter, Severe Storms & Flooding	April 15-23, 2007	All Ten NH Counties	**Presidential Disaster Declaration DR-1695:** 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	**Presidential Disaster Declaration DR-1643:** 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	**Presidential Disaster Declaration DR-1610:** 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	**Presidential Disaster Declaration DR-1489:** 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	**Presidential Disaster Declaration DR-1305:** 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	**Presidential Disaster Declaration DR-1231:**
DR-1199	Ice Storms	January 7-25, 1998	NA	**Presidential Disaster Declaration DR-1199:**
DR-1144	Severe Storms/Flooding	October 20-23, 1996	NA	**Presidential Disaster Declaration DR-1144:**
DR-1077	Storms/Floods	October 20-November 15, 1995	NA	**Presidential Disaster Declaration DR-1077:**
DR-923	Severe Coastal Storm	October 30-31, 1991	NA	**Presidential Disaster Declaration DR-923:**
DR-917	Hurricane Bob, Severe Storm	August 18-20, 1991	NA	**Presidential Disaster Declaration DR-917:**

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

Emergency Disaster Declarations

Number	Description	Date of Event	Counties	Description
EM-3360	Hurricane Sandy	October 26-31, 2012	All Ten NH Counties	**Presidential Emergency Declaration EM-3360:** 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	**Presidential Emergency Declaration EM-3344:** 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	**Presidential Emergency Declaration EM-3333:** Emergency Declaration for Tropical Storm Irene for in all ten counties.
EM-3297	Severe Winter Storm	11-Dec-08	All Ten NH Counties	**Presidential Emergency Declaration EM-3297:** Severe winter storm beginning on December 11, 2008.
EM-3258	Hurricane Katrina Evacuation	August 29-October 1, 2005	All Ten NH Counties	**Presidential Emergency Declaration EM-3258:** 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	**Presidential Emergency Declaration EM-3211**: 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 **$2,112,182.01** (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	**Presidential Emergency Declaration EM-3208:** 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 **$1,121,727.20** (Carroll: $91,832.72; Cheshire: $11,0021.18; Coos: $11,6508.10; Grafton: $213,539.52; Sullivan: $68,288.90; State of NH: $521,536.78) **EM 3208-002:**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	**Presidential Emergency Declaration EM-3207:** 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 **$3,658,114.66** (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	**Presidential Emergency Declaration EM-3193:** 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	**Presidential Emergency Declaration EM-3177:** 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	**Presidential Emergency Declaration EM-3166:** 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	**Presidential Emergency Declaration EM-3101:**
EM-3073	Flooding	15-Mar-79	NA	**Presidential Emergency Declaration EM-3073:**

Source:
Disaster Declarations for New Hampshire
http://www.fema.gov/disasters/grid/state-tribal-government/33?field_disaster_type_term_tid_1=All

Appendix E: Potential Mitigation Ideas[48]

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 Storm water Management Planning
F6 ..... Adopt Policies to Reduce Storm water 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 Storm water Drainage System Capacity
F14 .... Conduct Regular Maintenance for Drainage Systems & Flood Control Structures
F15 .... Elevate of Retrofit Structures & Utilities
F16 .... Flood proof Residential & Non-Residential Structures
F17 .... Protect Infrastructure
F18 .... Protect Critical Facilities
F19 .... Construct Flood Control Measures
F20 .... Protect & Restore Natural Flood Mitigation Features
F21 .... Preserve Floodplains as Open Space
F22 .... Increase Awareness of Flood Risk & Safety
F23 .... 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

[48] 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
DRED.....Department of Resources & Economic Development
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
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

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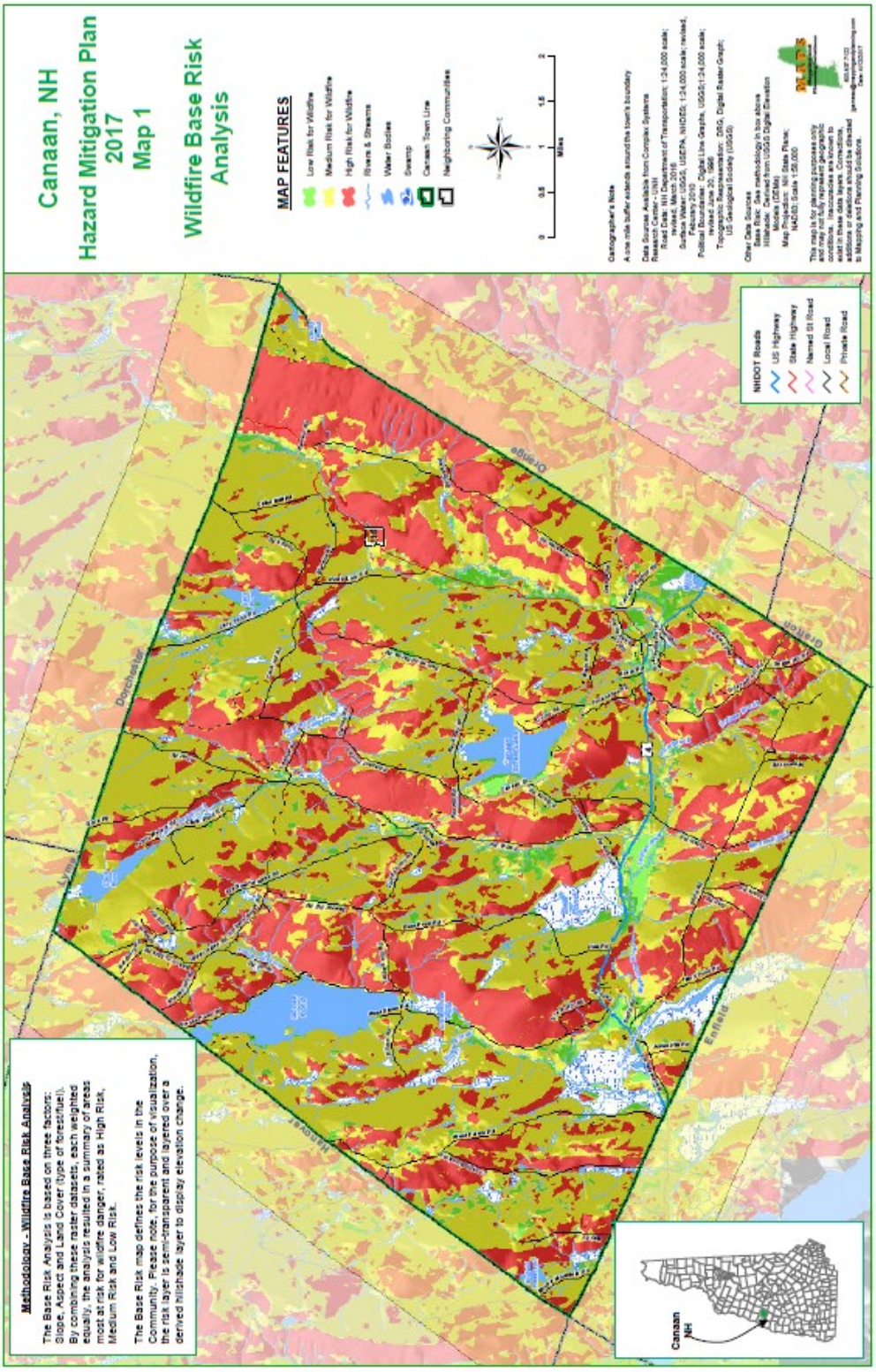

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MAP 2 – HISTORIC WILDFIRES & THE WILDLAND URBAN INTERFACE

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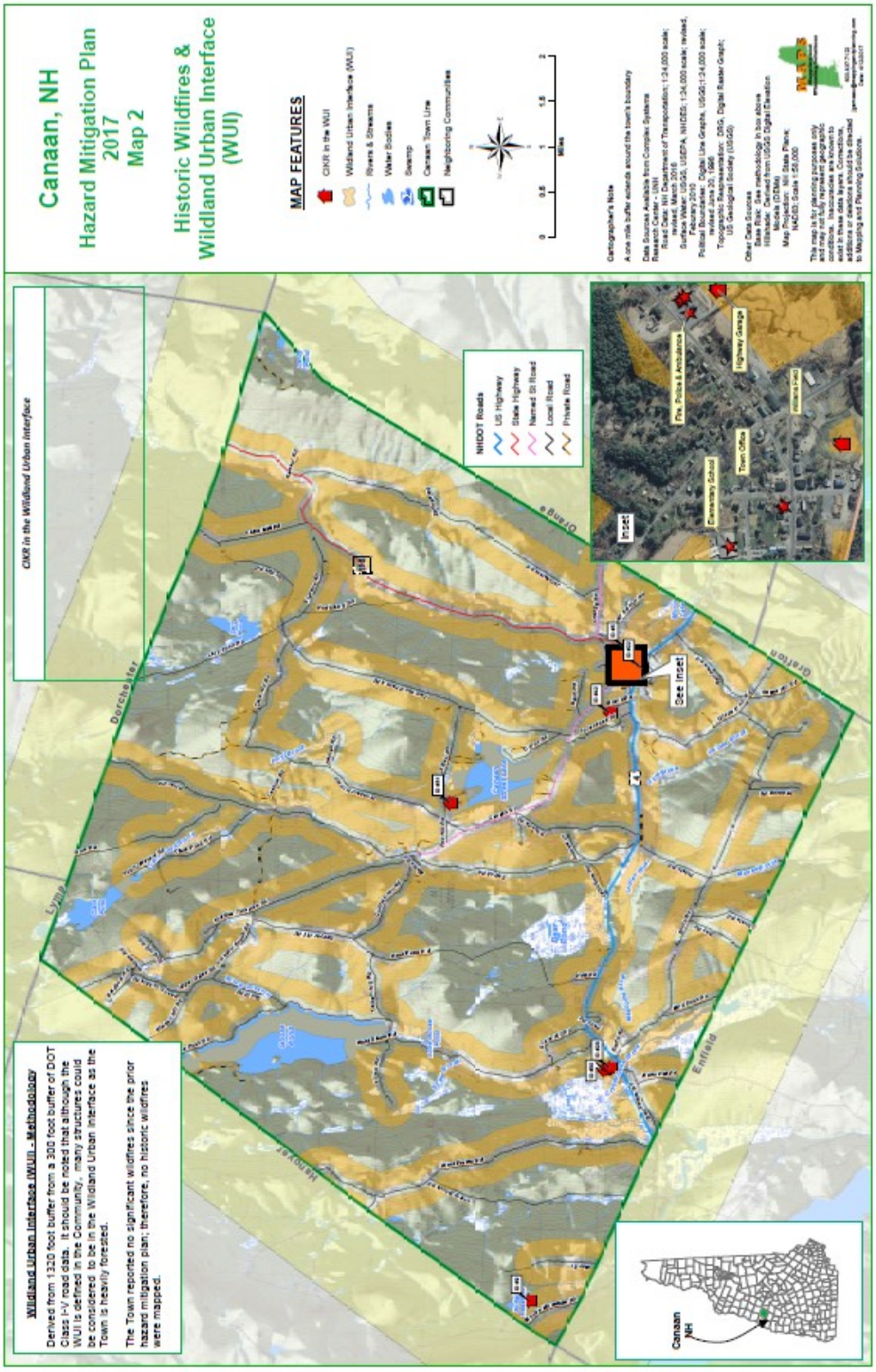

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MAP 3 – PAST & POTENTIAL AREAS OF CONCERN

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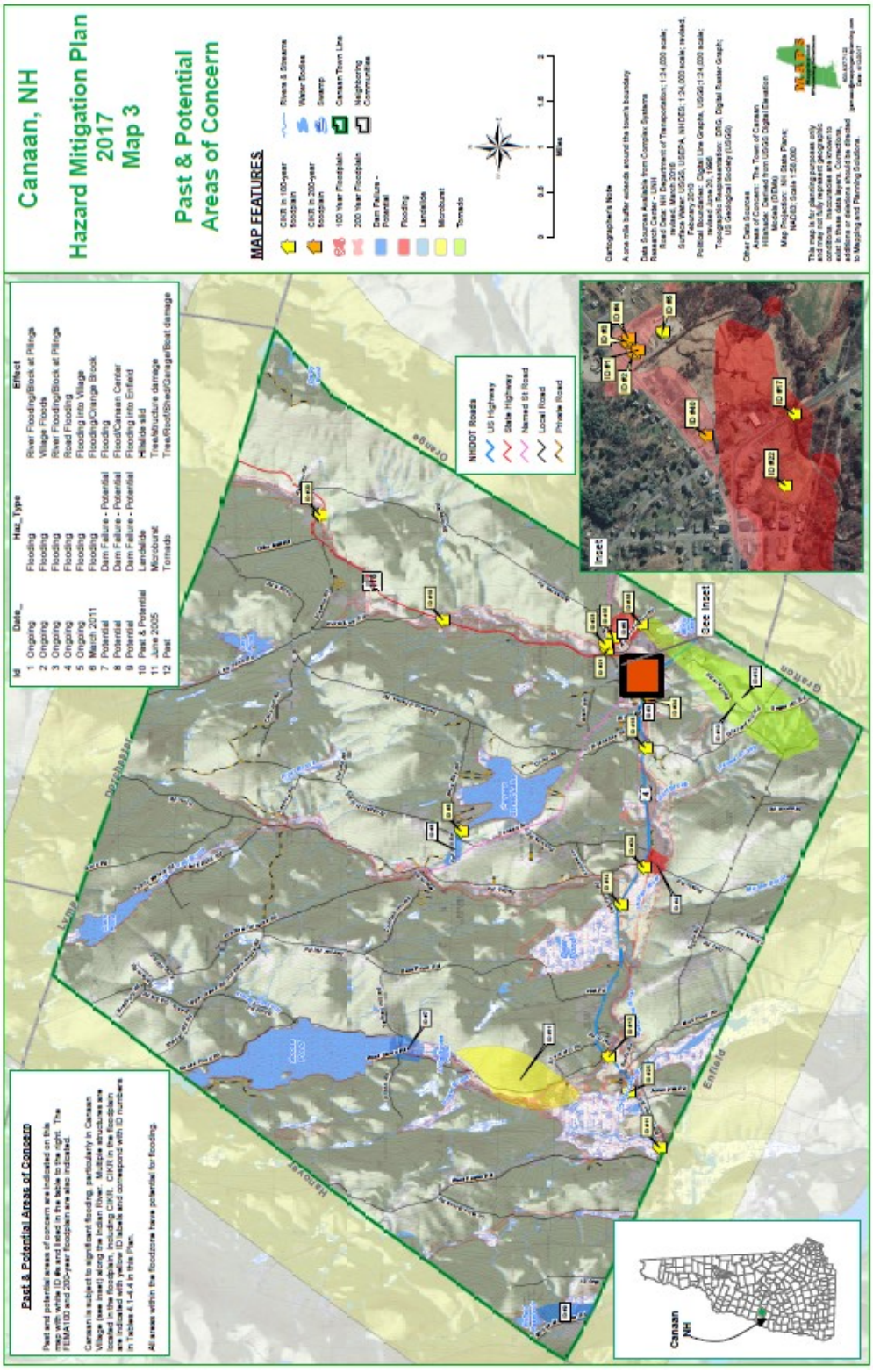

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MAP 4 – CRITICAL INFRASTRUCTURE & KEY RESOURCES

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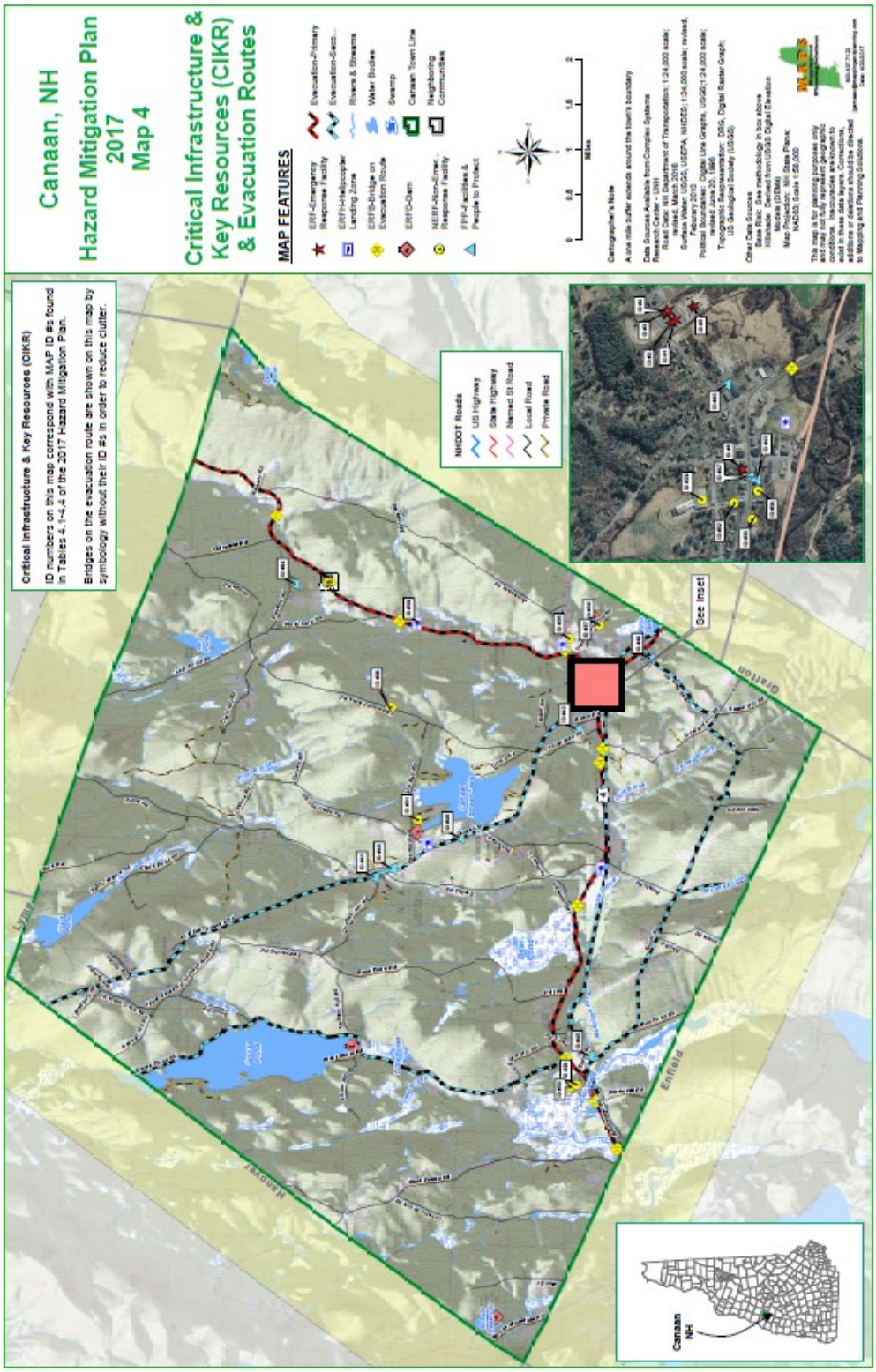

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Canaan Public Safety Building
Photo Credit: http://www.canaannh.org

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