Town of Canaan,
New Hampshire
Hazard Mitigation Plan

Town of Canaan
Hazard Mitigation
Committee

Prospect Hill Road – August 2008

Upper Valley Lake Sunapee
Regional Planning
Commission

May 2011 Update

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I. INTRODUCTION

A. BACKGROUND

The New Hampshire Homeland Security & Emergency Management (NH HSEM) has a goal for all communities within the State of New Hampshire to establish local hazard mitigation plans as a means to reduce future losses from natural or human-made hazard events before they occur. The NH has provided funding to the Upper Valley Lake Sunapee Regional Planning Commission (UVLSRPC), to update local Hazard Mitigation Plans with several of its communities. UVLSRPC assisted the Town of Canaan in preparation of their first plan which was approved by FEMA in February 2004. The UVLSRPC began updating the Hazard Mitigation Plan in August 2010. The *Canaan Hazard Mitigation Plan* serves as a strategic planning tool for use by the Town of Canaan in its efforts to reduce future losses from natural and/or human-made hazard events before they occur. This *Plan* does *not* constitute a section of the Master Plan.

The Canaan Hazard Mitigation Committee prepared the *Canaan Hazard Mitigation Plan* update with the assistance and professional services of the Upper Valley Lake Sunapee Regional Planning Commission (UVLSRPC) under contract with the New Hampshire Homeland Security & Emergency Management operating under the guidance of the Federal Emergency Management Agency (FEMA). After a public meeting held in the Canaan Town Offices, the Canaan Select Board adopted the updated plan as shown in Appendix E.

B. PURPOSE

The Canaan Hazard Mitigation Plan is a planning tool for use by the Town of Canaan in its efforts to reduce future losses from natural and/or human-made hazards. This plan does not constitute a section of the Town Master Plan, nor is it adopted as part of the Zoning Ordinance.

C. HISTORY

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

- Establish a national disaster mitigation program that will reduce loss of life and property, human suffering, economic disruption, and disaster assistance costs resulting from disasters, and

- Provide a source of pre-disaster mitigation funding that will assist States and local governments in accomplishing that purpose.

DMA 2000 amends the Robert T. Stafford Disaster Relief and Emergency Assistance Act by, among other things, adding a new section: 322 – Mitigation Planning. This places new emphasis on local mitigation planning. It requires local governments to prepare and adopt jurisdiction-wide hazard mitigation plans as a condition to receiving Hazard Mitigation Grant Program (HMGP) project grants. Local governments should review and if necessary, update the mitigation plan annually. A five-year update is required to continue program eligibility.

Why develop a Mitigation Plan?
Planning ahead to lessen or prevent a disaster will reduce the human, economic, and environmental costs. The State of NH is vulnerable to many types of hazards, including floods, hurricanes, winter storms, wildfires, wind events, and earthquakes. All of these types of events can have significant economic, environmental, and social impacts. The full cost of the damage resulting from the impact of natural hazards – personal suffering, loss of lives, disruption of the economy, and loss of tax base – is difficult to quantify and measure.

D. SCOPE OF THE PLAN

The scope of the *Canaan Hazard Mitigation Plan* includes the identification of natural hazards affecting the Town, as identified by the Canaan Hazard Mitigation Committee. The hazards were reviewed under the following categories as outlined in the State of New Hampshire Hazard Mitigation Plan:

- Dam Failure
- Flooding
- Hurricane
- Tornado & Downburst
- Thunderstorm/Lightning/Hail
- Landslide
- Erosion
- Severe Winter Weather
- Earthquake
- Extreme Heat
- Drought
- Wildfire
- Urban Fire
- Natural Contaminants
- Hazardous Materials Spill
- Terrorism

E. METHODOLOGY

Using the *Local Multi-Hazard Mitigation Planning Guidance* (2002) developed by the Federal Emergency Management Agency (FEMA), the Canaan Hazard Mitigation Committee, in conjunction with the UVLSRPC, developed the content of the updated *Canaan*

Hazard Mitigation Plan. Many FEMA resources and multiple State and Federal websites were also used as well. The Committee held a total of three meetings (two were publicly posted) beginning in August 2010 and ending in September 2010. Meetings were posted at the Town Offices inviting the general public. Notices were sent to the Town Offices of neighboring towns to invite town officials. For meeting agendas see Appendix C: Meeting Documentation.

The public will continue to have the opportunity to be involved in future revisions as meetings will be posted publicly. The Canaan Board of Selectmen adopted the Plan, contingent upon FEMA final approval, as shown in Appendix E.

There is an opportunity for partnerships between local boards, most notably the Conservation Commission and Planning Board, to implement the recommendations in this Plan.

- The Town of Canaan participates in a Mutual Aid Compact with neighboring communities for emergency response.
- Opportunities exist for partnership with the Upper Valley Subcommittee of the Connecticut Valley Joint Commissions communities including Canaan.
- UVLSRPC is working or has worked with other Upper Valley neighboring communities to update local hazard mitigation plans, including Dorchester, Orange, Enfield, Hanover, and Lebanon.
- The office of the New Hampshire Homeland Security and Emergency Management had an opportunity to participate in and comment on this planning process, as well as review the draft plan.

The following hazard mitigation meetings were vital to the development of this Plan:

August 26, 2010
September 29, 2010
October 20, 2010
November 17, 2010

To complete the update of this Plan, the Hazard Mitigation Committee revisited the following planning steps. The format of the plan was changed to accommodate the most recent requirements since the original plan was completed. Each section was reviewed and revised during the Committee meetings and by research of the various relevant departments of the Town.

Step 1: Identify and Map the Hazards (August - September 2010)
Committee members identified areas where damage from natural disasters had previously occurred, areas of potential damage, and human-made facilities and infrastructure that were at risk for property damage and other risk factors. A GIS-generated base map provided by the UVLSRPC was used in the process.

Step 2: Determine Potential Damage (August - September 2010)
Committee members identified facilities that were considered to be of value to the Town for emergency management purposes, for provision of utilities and services, and for historic, cultural and social value. A GIS-generated map was prepared to show critical facilities identified by the Canaan Hazard Mitigation Committee. A summary listing of "Critical Facilities" is presented in Chapter IV. Costs were determined for losses for each type of hazard.

Step 3: Identify Mitigation Plans/Policies Already in Place (September 2010)
Using information and activities in the handbook, the Committee and UVLSRPC staff identified existing mitigation strategies which are already implemented in the Town related to relevant hazards. A summary chart and the results of this activity are presented in Chapter VI.

Step 4: Identify the Gaps in Protection/Mitigation (September-October 2010)
Existing strategies were then reviewed for coverage, effectiveness and implementation, as well as need for improvement. Some strategies are contained in the Emergency Action Plan and were reviewed as part of this step. The result of these activities is presented in Chapter VI.

Step 5: Determine Actions to be Taken (September-October 2010)
During an open brainstorming session, the Hazard Mitigation Committee developed a list of other possible hazard mitigation actions and strategies for the Town of Canaan. Ideas proposed included policies, planning, and public information. A list of potential mitigation strategies can be found in Chapter VII.

Step 6: Evaluate Feasible Options (September-October 2010)
The Hazard Mitigation Committee evaluated strategies based on eight criteria derived from the criteria listed in the evaluation chart found on page 27 of the *Guide to Hazard Mitigation Planning for New Hampshire Communities*. The eight criteria used for evaluation of potential mitigation strategies are listed in Chapter VII. Each strategy was rated (high (3), average (2), or low (1)) for its effectiveness in meeting each of the eight criteria (e.g., Does the mitigation strategy reduce disaster damage?). Strategies were ranked by overall score for preliminary prioritization then reviewed again under step eight. The ratings of the potential mitigation strategies can be found in Chapter VII.

Step 7: Coordinate with other Agencies/Entities (Ongoing)
UVLSRPC staff reviewed the Canaan Master Plan. This was done in order to determine if any conflicts existed or if there were any potential areas for cooperation. Town staff that is involved in preparing the updated Emergency Operations Plan participated in the hazard mitigation meetings, to avoid duplication and to share information.

Step 8: Determine Priorities (September-October 2010)
The Committee reviewed the preliminary prioritization list in order to make changes and determine a final prioritization for new hazard mitigation actions and existing protection strategy improvements identified in previous steps. UVLSRPC also presented recommendations for the Committee to review and prioritize. These are provided in Chapter VIII.

Step 9: Develop Implementation Strategy (October 2010)
Using the chart provided under step nine of the *Guide to Hazard Mitigation Planning for New Hampshire Communities*, the Committee created an implementation strategy which included person(s) responsible for implementation (who), a schedule for completion (when), and a funding source and/or technical assistance source (how) for each identified hazard mitigation actions. The prioritized implementation schedule can be found in Chapter VIII.

Step 10: Adopt and Monitor the Plan
UVLSRPC staff compiled the results of steps one through nine in a draft document, as well as helpful and informative materials from the *State of New Hampshire Natural Hazard Mitigation Plan* (2004), which served as a resource for the *Canaan Hazard Mitigation Plan*. The process for monitoring and updating the Plan can be found in Chapter IX.

F. HAZARD MITIGATION GOALS

The Town of Canaan Hazard Mitigation Committee reviewed the hazard mitigation goals for the State of New Hampshire, and revised them for Canaan. The goals were reviewed again during the update of the plan and determined to remain valid.

They are as follows:

1. To improve upon the protection of the general population, the citizens and visitors of the Town of Canaan, from all natural and human-made hazards.

2. To reduce the potential impact of natural and human-made disasters on the Town of Canaan's emergency response services, critical facilities, infrastructure, private property, economy, natural environment, and specific historic treasures and interests, as well as other tangible and intangible characteristics which add to the quality of life of the citizens and guests of the Town.

3. To improve community education regarding hazard mitigation and preparedness.

4. To reduce the Town's liability with respect to natural and man-made hazards generally.

5. To see cost-effective and creative hazard mitigation measures to accomplish the Town's goals and objectives.

6. To work in conjunction and cooperation with the State of New Hampshire's Hazard Mitigation Goals.

ACKNOWLEDGEMENTS

The following people participated in the update of this plan as the Hazard Mitigation Committee:

Bill Bellion, Emergency Management Director/Fire Chief
Sam Frank, Deputy Emergency Management Director/Police Chief
Mike Samson, Town Administrator
Robert Scott, Road Agent
Paul Hatch, NH Homeland Security and Emergency Management Office
Victoria Davis, Upper Valley Lake Sunapee Regional Planning Commission

The Hazard Mitigation Committee was composed of local officials, representatives from state agencies (NH HSEM), citizens of Canaan and staff representatives of the UVLSPRC for meeting facilitation and plan development. Neighboring communities, agencies, businesses, academia, non-profits and other interested parties were invited to participate through the public posting of meeting times and agendas or through invitation. Historical information, relevant data and potential future mitigation strategies were contributed by all parties involved in the planning process. For a record of all meeting topics see Appendix C: Meeting Documentation. The staff representative of the UVLSRPC gathered all information from local officials, agency representatives and public input and compiled the information to develop the Plan.

II. COMMUNITY PROFILE

A. INTRODUCTION[1]

Geographical Location and Information

The Town of Canaan is located in Grafton County with a total area of 55.0 square miles 3.31% is water. Canaan is drained by the Indian River and Mascoma River. The town center lies in the valley of the Indian River (a tributary of the Mascoma River) at the base of Mount Cardigan, which lies to the east in the neighboring Town of Orange. Mount Cardigan can be seen from many parts of town. The highest point in Canaan is the top of an unnamed ridge (elevation 2,270 feet) in the northeast corner of town, overlooking Derby Pond. Canaan lies almost fully within the Connecticut River watershed except for a tiny part of the northeast of the town, which is in the Merrimack River watershed. The town is crossed by U.S. Route 4 and New Hampshire Route 118.

The larger water bodies in Canaan are Goose Pond (554 acres partially within the Town of Hanover), Canaan Street Lake (303 acres), Clark Pond (136 acres), Crystal Lake Brook Pond (28 acres), Lary Pond (31 acres), Mirror Lake (22 acres), Bryant Pond (16 acres partly in the Town of Dorchester), Enfield Reservoir (16 acres), Little Goose Pond (13 acres), Bear Pond (>10 acres), and Derby Pond (>10 acres partly in the Town of Orange). Major streams through Canaan include Indian River, Mascoma River, Goose Pond Brook, and Orange Brook. Others are Lovejoy Brook, Crystal Lake Brook, Moose Brook, Gulf Brook, Haines Brook, Hoyt Brook, Clark Pond Brook, Kinkson Brook, and Straw Brook

Development Trends

The Town of Canaan and its residents desire to plan land use according to its natural capabilities, directing development towards suitable lands and away from “constrained” land such as wetlands, heavily vegetated steep slopes, and lands of high natural resource value. Town regulations direct development away from areas most vulnerable to natural hazards.

Due to the town’s proximity to the employment centers of Hanover and Lebanon, Canaan can expect population change reflective of employment fluctuations.

The Canaan water system, serving the village area consists of a gravity-fed main transporting water from the Canaan Street Lake and a drilled well down the hill to Canaan Village where it serves about 600 residents and local businesses. The water passes through slow

[1] Town of Canaan Master Plan (1987) and discussions with Committee; water body information from NH DES Shoreland Protection Program web site 08/10.

sand filtration boxes at the water treatment plant. The Cardigan Mountain School has a two public bedrock well systems serving approximately 600 and the Crescent Campsites has two public bedrock well systems serving a population of approximately 236. (*Canaan Street Lake Watershed Protection Plan*, Granite State Rural Water Association, August 2006).

A municipal sewer system was constructed in the late 1980s to service Canaan Village, Canaan Street, and Canaan Center. Currently, there is a moratorium on additions to the public sewerage and water systems.

Table II-1: AREA POPULATION TRENDS

Area	1970	1980	Avg. Annual Growth 70-80	1990	Avg. Annual Growth 80-90	2000	Avg. Annual Growth 90-00	30 Yr. Avg. Annual Rate
Canaan	1,923	2,456	2.48%	3,045	2.17%	3,319	0.87%	1.84%
Orford	793	928	1.58%	1,008	0.83%	1,091	0.79%	1.07%
Wentworth	376	527	3.43%	630	1.80%	798	2.39%	2.54%
Hanover	8,494	9,119	0.71%	9,212	0.10%	10,850	1.65%	0.82%
Dorchester	141	244	5.64%	392	4.86%	353	-1.04%	2.59%
Orange	103	197	6.70%	237	1.87%	299	2.35%	1.03%
Grafton	370	739	7.16%	923	2.25%	1,138	2.12%	3.25%
Enfield	2,345	3,175	3.08%	3,979	2.28%	4,618	1.50%	1.92%
Lyme	1,112	1,289	1.49%	1,496	1.50%	1,679	1.16%	1.38%
Grafton County	*54,914*	*65,806*	*1.83%*	*74,929*	*1.31%*	*81,743*	*0.87%*	*1.33%*
New Hampshire	*737,681*	*920,610*	*2.24%*	*1,109,252*	*1.88%*	*1,235,786*	*1.09%*	*1.73%*

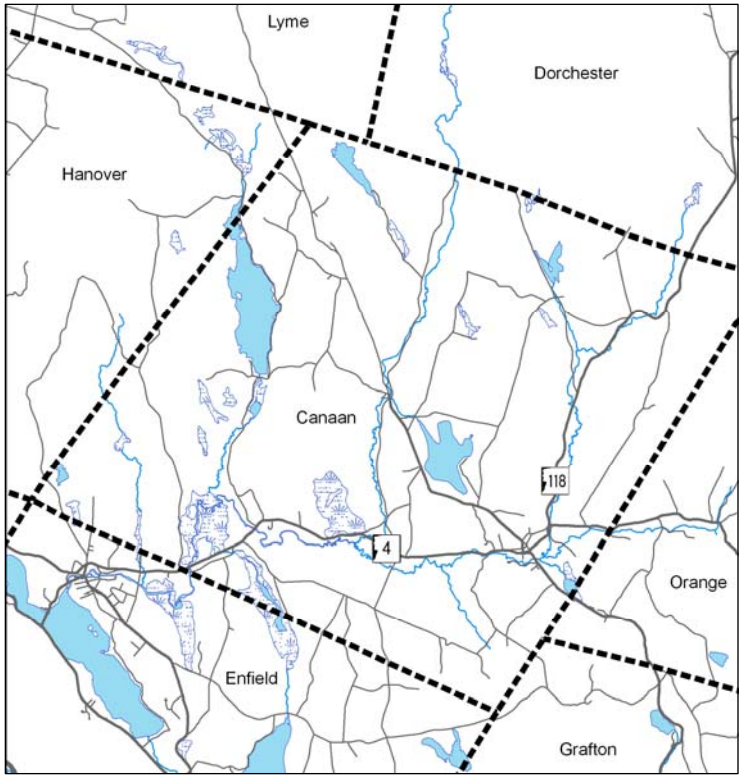
Source: US Census

Table II-2: POPULATION PROJECTIONS FOR CANAAN

	1970	1980	1990	2000	2010	2020	2030
Population	1,923	2,456	3,045	3,319	3,600	3,800	3,990
Decade Change in Population		27.7%	24.0%	9.0%	8.5%	5.6%	5.0%

Source: 1970 – 2000 US Census & 2010 – 2030 NH Office of Energy & Planning

Location Map



III. HAZARD IDENTIFICATION

The Canaan Hazard Mitigation Committee reviewed the list of hazards provided in the *State of New Hampshire Hazard Mitigation Plan*, and some hazard history for the State of New Hampshire and Grafton County in particular. A list of past hazard events in Canaan, Grafton County, and the State of New Hampshire can be found in the following discussion and tables. After reviewing this information and the Emergency Operations Plan, the Committee conducted a Risk Assessment. The resulting risk designations are provided in the heading of each hazard table below as well as a more detailed discussion further into this chapter.

A. WHAT ARE THE HAZARDS IN CANAAN?

Canaan is prone to a variety of natural and human-made hazards. The hazards that Canaan is most vulnerable to were determined through gathering historical knowledge of long time residents and Town officials; research into the CRREL Ice Jam Database, FEMA and NOAA documented disasters, and local land use restrictions; and from the input of representatives from state agencies (NH HSEM). The hazards affecting the Town of Canaan are dam failure, flooding, hurricane, tornado and downburst, thunderstorm (including lightning and hail), landslide, erosion, severe winter weather (including extreme cold and ice storms), earthquake, drought, extreme heat, wildfire, urban fire, natural contaminants to air and water, hazardous materials spills, and terrorism. Each of these hazards and the past occurrences of these hazards are described in the following sections. Hazards that were eliminated from assessment are those that have not had a direct impact on the Town of Canaan and are not anticipated to have an impact as determined by the Hazard Mitigation Committee, representatives from state agencies and citizens of the Town of Canaan.

Eliminated hazards include Expansive Soils, Subsidence, and Snow Avalanches due to factors such as topography, soils, and location of development. Discussions with the Natural Resource Conservation Service indicate that subsidence is not a concern in Canaan. Due to topography, snow avalanches are not a concern in Canaan.

Landslides were added to the plan to include areas within the town where landslides have occurred or could potentially occur. Urban Fire was added as there are structural clusters in town where fire could be devastating. Natural Contaminants was added to reflect radon as examined in the State Plan and also including other natural contaminants found in the State.

B. DESCRIPTIONS OF HAZARDS

An assessment of each hazard relevant to Canaan is provided below. An inventory of previous and potential hazards is provided. Past events are shown in the following tables and the potential for future events is then discussed and shown on a map in Appendix D. The "risk" designation for each hazard was determined after evaluations discussed later in this chapter.

- Dam Failure
- Flooding
- Hurricane
- Tornado & Downburst
- Thunderstorm/Lightning/Hail
- Landslide
- Erosion
- Severe Winter Weather
- Earthquake
- Extreme Heat
- Drought
- Wildfire
- Urban Fire
- Natural Contaminants
- Hazardous Materials Spill
- Terrorism

Dam Failure

Dam failure results in rapid loss of water that is normally held by the dam. These kinds of floods pose a significant threat to both life and property. Appendix D is a map with the location of dams within Canaan with significant and high hazard potential and their inundation areas. It also shows a dam within the Town of Enfield which could impact Canaan—the Smith Pond Dam which if it were to fail, could inundate a portion of southwestern Canaan.

Table III-1: Dams – Potential Failure

DAMS – POTENTIAL FAILURE									
Dam #	**Class**	**Dam Name**	**Water Body**	**Owner**	**Status**	**Type**	**Impound-ment Area in Acres**	**Height of Dam (Ft)**	**Drainage Area in Acres**
036.01	H	Goose Pond Dam	Goose Pond Brook	NH Water Resources Council	Active	E	618.000	31.00	15.80
036.02	L	Canaan Street Lake Dam	Canaan Street Brook	Cardigan Mountain School	Active	C	291.000	14.00	2.20
036.03	-	Clark Pond Dam	Clark Pond Brook	Mr. Grigg	Breached	S/E	136.000	7.00	2.76
036.04	-	Mascoma River Sawmill Dam	Mascoma River	H.B. Roby Estate	Ruins	T/S	0.000	14.00	31.00
036.05	-	Mascoma River Ledge Dam	Mascoma River	T.C. Heffenreffer	Ruins	S/E	0.000	13.00	28.13

DAMS – POTENTIAL FAILURE									
Dam #	**Class**	**Dam Name**	**Water Body**	**Owner**	**Status**	**Type**	**Impound-ment Area in Acres**	**Height of Dam (Ft)**	**Drainage Area in Acres**
036.06	-	Indian River Dam	Indian River	Town of Canaan	Ruins	S/E	0.000	14.00	34.00
036.07	-	Mascoma River Tool Co. Dam	Mascoma River	L.F. Wendelstadt	Ruins	S/E	0.000	5.00	82.23
036.08	S	Harris Brook Reservoir Dam	Harris Brook	Enfield Water Department	Active	E	21.000	22.00	1.55
036.09	L	Lary Pond Dam	Trib. Indian River	David Barrett	Active	C	31.000	5.00	3.65
036.10	-	Trewald Crest Farm Pond Dam	Natural swale	Trewald Crest Farm, Inc.	Ruins	E	0.280	6.00	0.03
036.11	NM	Humphrey Farm Pond Dam	Natural swale	Peter & Ann Humphrey	Active	E	0.250	10.00	0.00
036.12	NM	farm pond	Natural swale	Lawrence & Ruth Talbert	Active	E	1.100	11.00	0.00
036.13	NM	farm pond dam	Natural swale	Muriel F. Cole	Active	E	1.400	12.00	0.00
036.14	NM	Remeor Farm Pond Dam	Natural swale	Remeor Farm	Active	E	0.220	10.00	0.00
036.15	NM	Mud Pond Dam	Natural swale	Myles Connor, Jr.	Active	E	0.700	18.00	0.00
036.16	NM	Caspersen Fire Pond Dam	Unknown	Finn Caspersen	Active	E	1.600	10.00	0.00
036.17	NM	Wildlife Pond Dam	Natural swale	Myles Connor, Jr.	Active	E	0.340	11.00	0.00
036.18	NM	Mitchell Dam	Runoff	Margaret & David Mitchell	Active	E	0.500	10.00	0.12
036.19	NM	Baumgartner/Roebuck Pond	Unnamed stream	Karen Baumgartner & Bill Roebuck	Active	E	0.330	10.50	0.01
036.20	NM	Bradley Recreation Pond	Runoff	Peter & Clara Bradley	Active	E	0.110	12.00	0.05
036.21	S	Canaan Sewage Lagoon	NA	Town of Canaan	Active	E	0.770	13.00	0.00
036.22	NM	Richardson Dam	Unnamed stream	Lemont Richardson	Active	E	0.450	9.50	0.04

Source: Dam information provided by the NH Dam Bureau in 2007; Significant & High Hazard dams must have an emergency action plan. The State of New Hampshire classifies dams into the following four categories: Blank- Non-Active; NM – Non-menace; L – Low hazard; S – Significant hazard; H – High Hazard E-Earth; C-Concrete

Past Dam Failure Events

There have been no dam failures in Canaan or any surrounding towns which impacted Canaan. Several dams are rated by the State as "non menace" or "low" hazard structures. This means there is no possibility for loss of life if any of these dams fail. A "low" hazard dam failure could cause some structural damage to buildings and roads though a "non menace" dam failure would not. There are 11 non-menace dams and two low hazard dams. There are two dams rated as "significant" hazard: Harris Brook Reservoir Dam and the Canaan Sewage Lagoon. This means there is a significant hazard potential because the dam is in a location and of a size that failure or mis-operation of the dam would result in any of the following: Major economic loss to structures or property; structural damage roads; major environmental or public health losses. There is one dam ranked having a high hazard potential: Gilson Road Detention Pond. These rankings were assigned by the NH Department of Environmental Services Dam Bureau. Any dam with a hazard rating of "significant" or "high" must map their area of potential inundation with the exception of lagoons.

The inundation area for these dams is depicted in Appendix D with the exception of the sewage lagoon which does not have a mapped inundation area. Also mapped is the inundation of Smith Pond Dam which is located in the Town of Enfield but which could impact the Town of Canaan. Table III-2 shows the probable structures with their 2006 assessment values (replacement values when possible) within the dam inundation areas.

Table III-2: Structures within Dam Inundation Areas

Dam	Houses		Mobile Homes		Commercial Structures		Institutional		TOTALS	
	Number	Value	Number	Value	Number	Value	Number	Value	Number	Value
Goose Pond Dam	19	$2,403,129	3	$98,259	0	0	0	0	22	$2,501,388
Harris Brook Reservoir Dam	2	407,044	0	0	0	0	0	0	2	407,044
Smith Pond Dam (Enfield)	33	3,921,700	8	354,300	6	1,312,900	1	69,800	48	5,658,700
TOTALS	**54**	**$6,731,873**	**11**	**$452,559**	**6**	**$1,312,900**	**1**	**$69,800**	**72**	**$8,567,132**

Potential Future Dam Failure Events

According to the State's Mitigation Plan (2004), Grafton County has a low risk of dam failure. The Committee determined dam failure is a low/medium risk in Canaan.

Flooding

Flooding is the 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 inadequate local drainage. Floods can cause loss of life, property damage, crop/livestock damage, and water supply contamination, and can disrupt travel routes on roads and bridges.

Floods in the Canaan area are most likely to occur in the spring due to the increase in rainfall and snowmelt; however, floods can occur at any time of the year. A sudden winter thaw or a major summer downpour can cause flooding. Floodplains indicate areas potentially affected by flooding. There are several types of flooding.

100-Year Floods The term "100-year flood" does not mean that flooding will occur once every 100 years, but is a statement of probability to describe how one flood compares to others that are likely to occur. What it actually means is that there is a one percent chance of a flood in any given year. These areas were mapped for all towns in New Hampshire by FEMA.

River Ice Jams Ice forming in riverbeds and against structures presents significant hazardous conditions when storm waters encounter these ice formations which may create temporary dams. These dams may create flooding conditions where none previously existed (i.e., as a consequence of elevation in relation to normal floodplains). Additionally, there is the impact of the ice itself on structures such as highway and railroad bridges. Large masses of ice may push on structures laterally and/or may lift structures not designed for such impacts.

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

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

Beaver Dams and Lodging Flooding associated with beaver dams and lodging can cause road flooding or damage to property.

Bank Erosion and Failure As development increases, changes occur that increase the rate and volume of runoff, and accelerate the natural geologic erosion process. Erosion typically occurs at the outside of river bends and sediment deposits in low velocity areas at the insides of bends. Resistance to erosion is dependent on the riverbank's protective cover, such as vegetation or rock riprap, or its soils and stability.

Past Flooding Events

Appendix D is a map which shows the locally identified flood area and the Flood Insurance Rate Map (FIRM) of 100-Year Special Flood Hazard Areas. Table III-3 shows the probable structures and their 2006 replacement values within the flood areas designated by the FIRM. The following tables provide a list of floods in the State, County, and Canaan.

Riverine flooding is the most common disaster event in the State of New Hampshire, according to the State of New Hampshire Natural Hazards Mitigation Plan. According to the Plan: "Localized street flooding occasionally results from severe thundershowers, or over larger areas, from more general rain such as tropical cyclones and coastal "northeasters." More general and disastrous floods are rare but some occur in the spring from large rainfall quantities combined with warm, humid winds that rapidly release water from the snowpack…General flooding is also caused by major hurricanes that closely follow major rainstorms…As a result, New Hampshire has a high flood risk. (*State of NH Natural Hazards Mitigation Plan, Pages 12-13*)

The 500-year flood zone is not shown on the map but includes portions of downtown Canaan.

Table III-3: Structures within the 100-Year Special Flood Hazard Areas

	Houses		**Mobile Homes**		**Commercial Structures**		**Town Structures**		**TOTALS**	
	#	**Value**	**#**	**Value**	**#**	**Value**	**#**	**Value**	**#**	**Value**
Downtown Area	12	$3,259,108	0	$0	1	$379,224	5	$423,430	18	$4,061,762
South of Goose Pond	19	2,403,129	3	98,259	0	0	0	0	22	2,501,388
Rte 118 North of Downtown	35	4,302,437	4	258,246	3	784,137	1	90,615	43	5,435,435
Route 4 West of Downtown	17	3,018,108	2	87,765	1	490,830	0	0	20	3,596,703
Switch Road Area	5	559,005	8	409,255	0	0	0	0	13	968,260
S/S Route 4/Mud Pond Rd	13	1,721,115	4	189,071	1	182,652	0	0	18	2,092,838
TOTALS	**101**	**$15,262,902**	**20**	**$1,042,596**	**5**	**$1,836,843**	**6**	**$514,045**	**134**	**$18,656,386**

Table III-4: FLOODING – FEMA DISASTER DECLARATIONS, LOCAL RECOLLECTIONS & CRREL ICE JAM INFORMATION

Hazard	Date	Location	Description of Areas Impacted	Damages
Flood/Hurricane	September 21, 1938	Statewide	Flooding in several locations	Unknown
Ice Jam	January 24, 1957	Mascoma River, West Canaan	NA	Unknown
Ice Jam	April 3, 1959	Mascoma River, West Canaan	NA	Unknown
Ice Jam	February 28, 1961	Mascoma River, West Canaan	NA	Unknown
Ice Jam	March 30, 1963	Mascoma River, West Canaan	NA	Unknown
Ice Jam	March 5, 1964	Mascoma River, West Canaan	NA	Unknown
Ice Jam	March 19, 1968	Mascoma River, West Canaan	NA	Unknown
Ice Jam	February 11, 1970	Mascoma River, West Canaan	NA	Unknown
Flood	June 1973	Localized flooding in Canaan	Flooding in several locations including downtown intersection	Unknown
Flooding	July - August 1986	Statewide	Severe summer storms: heavy rains, tornados flash flood, and severe winds (FEMA DR-771-NH)	
Flood / Severe Storm	April 16, 1987	Cheshire, Carroll, Grafton, Hillsborough, Merrimack, Rockingham, & Sullivan Counties, NH	FEMA Disaster Declaration # 789-DR (Presidentially Declared Disaster). Flooding of low-lying areas along river caused by snowmelt and intense rain.	$4,888,889 in damage.
Flood	August 7-11, 1990	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack & Sullivan Counties, NH	FEMA Disaster Declaration #876-DR. Flooding caused by a series of storm events with moderate to heavy rains.	$2,297,777 in damage.
Flooding	August 19, 1991	Statewide	Hurricane Bob - effects felt statewide	
Flooding	October - Nov. 1995	North/West NH	Grafton County Declared: FEMA DR-1144-NH	
Flood	October 29, 1996	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan Counties, NH	FEMA Disaster Declaration # 1144- DR. Flooding caused by heavy rains.	$2,341,273 in damage.
Flood	October 26th 2005	Cheshire, Grafton, Merrimack, Sullivan, and Hillsborough Counties	FEMA Disaster Declaration #1610-DR. Severe storms and flooding.	$30,000,000 in damages.
Flood	May 13 -17, 2006	Belknap, Carroll, Grafton, Hillsborough, Rockingham, Strafford Counties	FEMA Disaster Declaration #1643-DR	Unknown
Flood	April 16, 2007	All counties, NH	FEMA Disaster Declaration #1695. Severe storms and flooding.	$27M in damages; 2,005 NH residents applied for assistance

Potential Future Flooding Events

According to the State's Mitigation Plan, flooding is a high hazard risk in the county. The Committee determined flooding is a medium/high risk in Canaan.

Canaan has been a participating member of the National Flood Insurance Program (NFIP) since May 17, 1988. Updated maps for all towns within Grafton County were finalized in February 2008. All 100-Year Special Flood Areas in the town fall within the A Zone with no base flood elevations determined and the AE Zone with base flood elevations determined. These Special Flood Hazard Areas are shown a map in Appendix D. Appendix D displays the "Special Flood Hazards Areas." There are currently 28 NFIP flood insurance policy holders in the Town of Canaan with an insurance value in force of $3.5 million. A total of nine claims have been paid out since Canaan joined the program with a total loss value of $91,000. Two of these claims were repetitive losses for an insured residence and two of these claims were repetitive losses for a commercial entity (which appears not to have insurance as of 04/30/10 per repetitive loss information from the Flood Program at the NH Office of Energy and Planning). The total value of the repetitive loss claims is $64,978 or over 71% of the total claims paid out in Canaan.

Hurricane

A hurricane is an intense tropical weather system with a well-defined circulation and maximum sustained winds of 74 mph (64 knots) or higher. Hurricane winds blow in a large spiral around a relative calm center known as the "eye." The "eye" is generally 20 to 30 miles wide, and the storm may extend outward 400 miles. As a hurricane nears land, it can bring torrential rains, high winds, and storm surges. A single hurricane can last for more than 2 weeks over open waters and can run a path across the entire length of the eastern seaboard. August and September are peak months during the hurricane season that lasts from June 1 through November 30. Damage resulting from winds of this force can be substantial, especially considering the duration of the event, which may last for many hours (*NH Natural Hazard Mitigation Plan*; FEMA website).

Past Hurricane Events

There have been several hurricanes over the years which have impacted New England and New Hampshire. These are listed below. The Hurricane of 1938 substantial property damage and downed trees blocked roads.

Table III-5: HURRICANES & TROPICAL STORMS

HURRICANES AND TROPICAL STORMS				
Hazard	**Date**	**Location**	**Description of Areas Impacted**	**Damages**
Hurricane	August, 1635	n/a		Unknown
Hurricane	October 18-19, 1778	n/a	Winds 40-75 mph	Unknown
Hurricane	October 9, 1804	n/a		Unknown
Gale	September 23, 1815	n/a	Winds > 50mph	Unknown
Hurricane	September 8, 1869	n/a		Unknown
Hurricane	September 21, 1938	Southern New England	Flooding caused damage to road network and structures. 13 deaths, 494 injured throughout NH. Disruption of electric and telephone services for weeks. 2 Billion feet of marketable lumber blown down. Total storm losses of $12,337,643 (1938 dollars). 186 mph maximum winds.	Unknown
Hurricane (Carol)	August 31, 1954	Southern New England	Category 3, winds 111-130 mph. Extensive tree and crop damage in NH, localized flooding	Unknown
Hurricane (Edna)	September 11, 1954	Southern New England	Category 3 in Massachusetts. This Hurricane moved off shore but still cost 21 lives and $40.5 million in damages throughout New England. Following so close to Carol it made recovery difficult for some areas. Heavy rain in NH	Unknown
Hurricane (Donna)	September 12, 1960	Southern and Central NH	Category 3 (Category 1 in NH). Heavy flooding in some parts of the State.	Unknown
Tropical Storm (Daisy)	October 7, 1962	Coastal NH	Heavy swell and flooding along the coast	Unknown
Tropical Storm (Doria)	August 28, 1971	New Hampshire	Center passed over NH resulting in heavy rain and damaging winds	Unknown
Hurricane (Belle)	August 10, 1976	Southern New England	Primarily rain with resulting flooding in New Hampshire. Category 1	Unknown
Hurricane (Gloria)	September, 1985	Southern New England	Category 2, winds 96-110 mph. Electric structures damaged; tree damages. This Hurricane fell apart upon striking Long Island with heavy rains, localized flooding, and minor wind damage in NH	Unknown

HURRICANES AND TROPICAL STORMS				
Hazard	**Date**	**Location**	**Description of Areas Impacted**	**Damages**
Hurricane (Bob)	August 19, 1991	Southern New England	Structural and electrical damage in region from fallen trees. 3 persons were killed and $2.5 million in damages were suffered along coastal New Hampshire. Federal Disaster FEMA-917-DR	Unknown
Hurricane (Edouard)	September 1, 1996	Southern New England	Winds in NH up to 38 mph and 1 inch of rain along the coast. Roads and electrical lines damaged	Unknown
Tropical Storm (Floyd)	September 16-18, 1999	Southern New England	FEMA DR-1305-NH. Heavy Rains; Canaan received damage	Unknown
Hurricane (Katrina)	August 29, 2005 & continuing	East Coast of US and more	FEMA-3258-EM. Heavy rains and flooding devastating SE US	Unknown
Tropical Storm (Tammy)	October 5-13, 2005	East Coast of US	Remnants of Tammy contributed to the October 2005 floods which dropped 20 inches of rain in some places in NH.	Unknown

Potential Future Hurricane Events

Hurricane events will affect the entire Town. It is impossible to predict into the future what damage will occur in the Town. According to the State's mitigation plan, Grafton County has a low risk for hurricanes. The Committee determined the hurricane risk to be low/medium in Canaan.

Tornado & Downburst

"A tornado is a violent windstorm characterized by a twisting, funnel shaped cloud. These events are spawned by thunderstorms and, occasionally by hurricanes, and may occur singularly or in multiples. They develop when cool air overrides a layer of warm air, causing the warm air to rise rapidly. Most vortices remain suspended in the atmosphere. Should they touch down, they become a force of destruction." (*NH Natural Hazard Mitigation Plan*). The Fujita Scale is the standard scale for rating the severity of a tornado as measured by the damage it causes. Most tornadoes are in the F0 to F2 Class. Building to modern wind standards provides significant property protection from these hazard events. New Hampshire is located within Zone 2 for Design Wind Speed for Community Shelters, which suggests that buildings should be built to withstand 160 mph winds.

Significantly high winds occur especially during tornadoes, hurricanes, winter storms, and thunderstorms. Falling objects and downed power lines are dangerous risks associated with high winds. In addition, property damage and downed trees are common during severe wind occurrences. A downburst is a severe, localized wind blasting down from a thunderstorm. These "straight line" winds are distinguishable from tornadic activity by the pattern of destruction and debris. Downbursts fall into two categories: 1. Microburst, which covers an area less than 2.5 miles in diameter, and 2. Macroburst, which covers an area at least 2.5 miles in diameter. Most downbursts occur with thunderstorms, but they can be associated with showers too weak to produce thunder.

Past Tornado & Downburst Events

The following table displays tornadoes occurring in Grafton County between 1950 and 1995 as provided by the "Tornado Project" (www.tornadoproject.com) and the *NH Natural Hazard Mitigation Plan*. The Canaan Hazard Mitigation Committee could not recall any tornado events that have impacted the Town of Canaan. The Committee recalled several other wind events as shown in the following table. Power line damage greatly impacts the downtown area cutting off power to residences and local businesses.

Table III-6: WIND EVENTS IN CANAAN AND GRAFTON COUNTY

TORNADOES & DOWNBURSTS			
	Date	**Fujita Scale**	**Damages**
Tornado	July 14, 1963	F1	No deaths or injuries; costs unknown
Tornado	June 27, 1964	F0	No deaths or injuries; costs unknown
Tornado	August 11, 1966	F2	No deaths or injuries; costs unknown
Tornado	August 25, 1969	F1	No deaths or injuries; costs unknown
Tornado	July 21, 1972	F1	No deaths or injuries; costs unknown
Tornado	May 11, 1973	F2	No deaths or injuries; costs unknown
Tornado	June 11, 1973	F0	No deaths or injuries; costs unknown
Downburst	July 6, 1999	NA	Two roofs blown off structures; power outages; downed trees, utility poles, and wires
Tornado	August 13, 1999	F1	No deaths or injuries; costs unknown
Downburst	June 2005	NA	Damage along Goose Pond Road
Downburst/Nor'easter	April 15, 2007	NA	Numerous trees were knocked down as well as power lines in Canaan
Nor'easter	January 2010	NA	Knocked down trees and power lines in overlapping area with April 2007 Nor'easter
Major wind	April 2010	NA	Knocked down trees and power lines

Potential Future Tornado & Downburst Events

It is impossible to predict where a tornado or wind event will occur or what damage it will inflict. However, Canaan seems to have a southeast to northwest pattern across town. The FEMA website places the State of NH in the Zone 2 Wind Zone which provides that a community shelter should be built to a 160 mph "design wind speed." According to the State's mitigation plan, Grafton County has a medium risk for tornadoes. The Committee determined there is a high risk for tornadoes and downbursts in Canaan.

Thunderstorms

A thunderstorm is a rain shower during which you hear thunder. Since thunder comes from lightning, all thunderstorms have lightning. A thunderstorm is classified as "severe" when it contains one or more of the following: hail three-quarter inch or greater, winds gusting in excess of 50 knots (57.5 mph), or a tornado. Hail is a form of precipitation that occurs when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere where they freeze into ice. When the hail particle becomes heavy enough to resist the updraft, it falls to the ground. The resulting wind and hail can cause death, injury, and property damage.

An average thunderstorm is 15 miles in diameter and lasts an average of 30 minutes. Winter thunderstorms are rare because the air is more stable, strong updrafts cannot form because the surface temperatures during the winter are colder.

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

Past Thunderstorm Events

There have been lightning strikes in Canaan, but the Committee has recollection of little damage.

Potential Future Thunderstorm Events

It is inevitable that thunderstorms will occur in Canaan's future. Lightning, hail, or wind from a thunderstorm could impact the entire Town. It is not possible to estimate possible damage. According to the State's mitigation plan, Grafton County has a medium risk of a lightning hazard. The risk for future thunderstorm damage was determined by the Committee to be medium/high risk in Canaan.

Landslide

A landslide is the downward or outward movement of slope-forming materials reacting under the force of gravity, including mudslides, debris flows, and rockslides. Formations of sedimentary deposits along rivers also create potential landslide conditions. Landslides can damage or destroy roads, railroads, electrical and phone lines, and other structures.

Past Landslide Events:

There is a landslide area along Ball Park Road in Canaan. A slide in past years occurred, but it did not block the road and there are no buildings in the slide area. There has also been slide activity along Route 118 road banks during flood events.

Potential Future Landslide Events:

The best predictor of future landslides is past landslides. If any landslide events were to occur, they would be most likely in areas of very steep slope. There is little development in these areas, so no future structural damage cost due to this natural hazard is anticipated although there could be road or utility pole damage. The Committee delineated three areas where a landslide could potentially occur: along Ball Park Road where some slide activity has occurred in the past, along the road banks on Route 118, and along South Road east of the Wescott Road junction where it is very steep. Although there are no buildings here, a landslide could block the road. The Committee determined there is a low risk for landslide damage.

Erosion

Soil erosion, although a natural process, can be greatly accelerated by improper construction practices. Because of the climate in New Hampshire and the general nature of our topography, eroded soils can be quickly transported to a wetland, stream, or lake. The New Hampshire Department of Environmental Services (DES) regulates major construction activities to minimize impacts upon these resources. A properly conducted construction project should not cause significant soil erosion.

Soil becomes vulnerable to erosion when construction activity removes or disturbs the vegetative cover. Vegetative cover and its root system play an extremely important role in preventing erosion by: (1) Shielding the soil surface from the impact of falling rain drops; (2) Reducing the velocity of runoff; (3) Maintaining the soil's capacity to absorb water, and (4) Holding soil particles in place.

Because of the vegetation's ability to minimize erosion, limiting its removal can significantly reduce soil erosion. In addition, decreasing the area and duration of exposure of disturbed soils is also effective in limiting soil erosion. The designer must give special consideration to the phasing of a project so that only those areas actively under construction have exposed soils. Other factors influencing soil erosion are: (1) Soil types, (2) Land slope, (3) Amount of water flowing onto the site from up-slope, and (4) Time of year of disturbance.

Past Erosion Events

There have been several erosion events in Canaan. Many were primarily road washes associated with flooding and are addressed in that section. There are also several road washes associated with major storms, most recently in August 2008, April 2007 and October 2005. Roads receiving erosion damage that have been mitigated to relieve future damage include NH Route 118, Cider Mill Road, Ivey Road, Prospect Hill Road, and Clark Hill Road.

Table III-7: EROSION AREAS

Date	Location/Hazard	Description	Damages
Every rain	Codfish Hill Road	Houses on both sides of road; needs better drainage	Road worsens during each rain
Hard rains	Potato Road	Road floods and erodes as it is below flood elevation	Road wash
Spring	Roberts Road	Road washes during rainy season	Road wash
Occasional	Fernwood Farms Road	Eroded two years ago and another precedent occurrence; inadequate ditching	Road wash
Potential	River Road	Wet bank could slide into road	Potential landslide
Continual	Ballpark Road	Bank has slid down into road when wet filling the ditch	Road blockage from slide

Potential Erosion Events

Due to the topography and types of soils of the town, there is always potential for erosion. As properties are developed there will be less vegetative buffer to protect the town from erosion during rainstorms. Several roads have inadequate drainage as noted in Table III-7 which allows road washing during rain. The Committee determined that erosion is a low/medium risk in Canaan.

Severe Winter Weather

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

Heavy Snow Storms A heavy snowstorm is generally considered to be one which deposits four or more inches of snow in a twelve-hour period… A blizzard is a winter storm characterized by high winds, low temperatures, and driving snow. According to the official

definition given in 1958 by the U.S. Weather Bureau, the winds must exceed 35 miles per hour and the temperatures must drop to 20°F (-7°C) or lower. Therefore, intense Nor'easters, which occur in the winter months, are often referred to as blizzards. The definition includes the conditions under which dry snow, which has previously fallen, is whipped into the air and diminishes visual range. Such conditions, when extreme enough, are called "white outs."

Ice Storms Freezing rain occurs when snowflakes descend into a warmer layer of air and melt completely. When these liquid water drops fall through another thin layer of freezing air just above the surface, they don't have enough time to refreeze before reaching the ground. Because they are "supercooled," they instantly refreeze upon contact with anything that that is at or below 0 degrees C, creating a glaze of ice on the ground, trees, power lines, or other objects. A significant accumulation of freezing rain lasting several hours or more is called an ice storm. This condition may strain branches of trees, power lines and even transmission towers to the breaking point and often creates treacherous conditions for highway travel and aviation. Debris impacted roads make emergency access, repair and cleanup extremely difficult.

"Nor'easters" Nor'easters can occur in the eastern United States any time between October and April, when moisture and cold air are plentiful. They are known for dumping heavy amounts of rain and snow, producing hurricane-force winds, and creating high surfs that cause severe beach erosion and coastal flooding. A Nor'easter is named for the winds that blow in from the northeast and drive the storm up the east coast along the Gulf Stream, a band of warm water that lies off the Atlantic coast.

There are two main components to a Nor'easter: Gulf Stream low-pressure system (counter-clockwise winds) generate off the coast of Florida. The air above the Gulf Stream warms and spawns a low-pressure system. This low circulates off the southeastern U.S. coast, gathering warm air and moisture from the Atlantic. Strong northeasterly winds at the leading edge of the storm pull it up the east coast. As the strong northeasterly winds pull the storm up the east coast, it meets with cold Arctic high-pressure system (clockwise winds) blowing down from Canada. When the two systems collide, the moisture and cold air produce a mix of precipitation.

Winter conditions make Nor'easters a normal occurrence, but only a handful actually gather the force and power to cause problems inland. The resulting precipitation depends on how close you are to the converging point of the two storms. Nor'easter events which occur toward the end of a winter season may exacerbate the spring flooding conditions by depositing significant snow pack at a time of the season when spring rains are poised to initiate rapid snow pack melting.

Past Extreme Winter Weather Events

Extreme winter weather events occur annually in Canaan but usually have minimal impacts on infrastructure and property. The following table provides a list of past extreme winter weather events in New Hampshire and Canaan.

Table III-8: EXTREME WINTER WEATHER

EXTREME WINTER WEATHER				
Hazard	**Date**	**Location**	**Description of Areas Impacted**	**Damages**
Ice Storm	December 17-20, 1929	New Hampshire	Unprecedented disruption and damage to telephone, telegraph and power system. Comparable to 1998 Ice Storm (see below)	Unknown
Ice Storm	Dec. 29-30, 1942	New Hampshire	Glaze storm; severe intensity	Unknown
Blizzard	February 14-17, 1958	New Hampshire	20-30 inches of snow in parts of New Hampshire	Unknown
Snow Storm	March 18-21, 1958	New Hampshire	Up to 22 inches of snow in south central NH	Unknown
Snow Storm	December 10-13, 1960	New Hampshire	Up to 17 inches of snow in southern NH	Unknown
Snow Storm	January 18-20, 1961	New Hampshire	Up to 25 inches of snow in southern NH	Unknown
Snow Storm	February 2-5, 1961	New Hampshire	Up to 18 inches of snow in southern NH	Unknown
Snow Storm	January 11-16, 1964	New Hampshire	Up to 12 inches of snow in southern NH	Unknown
Blizzard	January 29-31, 1966	New Hampshire	Third and most severe storm of 3 that occurred over a 10-day period. Up to 10 inches of snow across central NH	Unknown
Snow Storm	December 26-28, 1969	New Hampshire	Up to 41 inches of snow in west central NH; ice storm took out power around Goose Pond Road for a week.	Unknown
Snow Storm	February 18-20, 1972	New Hampshire	Up to 19 inches of snow in southern NH	Unknown
Snow Storm	January 19-21, 1978	New Hampshire	Up to 16 inches of snow in southern NH; Rip Road in Canaan particularly hard hit.	Unknown
Blizzard	February 5-7, 1978	New Hampshire	New England-wide. Up to 25 inches of snow in central NH	Unknown
Ice Storm	January 8-25, 1979	New Hampshire	Major disruptions to power and transportation	Unknown
Snow Storm	February, 1979	New Hampshire	President's Day storm	Unknown
Snow Storm	April 5-7, 1982	New Hampshire	Up to 18 inches of snow in southern NH	Unknown

EXTREME WINTER WEATHER				
Hazard	**Date**	**Location**	**Description of Areas Impacted**	**Damages**
Ice Storm	February 14, 1986	New Hampshire	Fiercest ice storm in 30 yrs in the higher elevations in the Monadnock region. It covered a swath about 10 miles wide from the MA border to New London NH	Unknown
Extreme Cold	November-December, 1988	New Hampshire	Temperature was below 0 degrees F for a month	Unknown
Ice Storm	March 3-6, 1991	New Hampshire	Numerous outages from ice-laden power lines in southern NH	Unknown
Snow Storm	1997	New Hampshire	Power outages throughout Canaan due to heavy snowfall	Unknown
Ice Storm	January 15, 1998	New Hampshire	Federal disaster declaration DR-1199-NH, 20 major road closures, 67,586 without electricity, 2,310 without phone service, $17+ million in damages to Public Service of NH alone	Unknown
Snow Storm	February 10-12, 2005	Several NH counties including Grafton	Heavy snow. Federal Disaster Declaration FEMA-3208-NH	
Wind Storm	April 15, 2007	Several NH counties including Grafton	Debris removal. Federal Disaster Declaration FEMA-1695-DR-NH	

Potential Future Severe Winter Events

All areas of Canaan are at risk from ice storms, but particularly the higher elevations.

There is the potential for severe winter damage every year. The event would affect the entire Town. A bridge on Indian Pond Road is being impacted by the annual frost. The bridge is half stone and half culvert. The stone portion is being shifted annually due to frost making the bridge less stable.

According to the State's mitigation plan, Grafton County has a high risk for severe winter weather. The Committee determined severe winter weather to be a medium/high risk in Canaan.

Earthquake

New England is considered a moderate risk earthquake zone. An earthquake is a rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric and phone lines, and cause landslides, flash floods and fires. The magnitude and intensity of an earthquake is determined by the use of scales such as the Richter scale and the Mercalli scale.

Past Earthquake Events

The following is a list of earthquakes which impacted New England, New Hampshire, and Canaan.

Potential Future Earthquake Damage:

A United States Geographic Survey mapping tool on the web (geohazards.cr.usgs.gov/ projects) projects a 5 – 6 peak ground acceleration (pga) with 10% probability of exceedance in 50 years for the Town of Canaan. This pga rating is equivalent to a Modified Mercalli Intensity of "V" with moderate perceived shaking and very light potential damage. An earthquake event would impact the entire Town. According to the State's mitigation plan, Grafton County has a medium risk for earthquakes. The Committee determined the risk to be medium in Canaan.

Table III-9: EARTHQUAKES

EARTHQUAKES			
Date	**Location**	**Magnitude**	**Damage**
1638	Central NH	Estimated 6.5-7	
October 29, 1727	Off NH/MA coast	NA	Widespread damage Massachusetts to Maine: cost unknown
December 29, 1727	Off NH/MA coast	NA	Widespread damage Massachusetts to Maine: cost unknown
November 18, 1755	Cape Ann, MA	Estimated 6.0	Much damage: cost unknown
1800s	Statewide	NA	Unknown
1900s	Statewide	NA	Unknown
March 18, 1926	Manchester, NH	Felt in Hillsborough Co	Unknown
Dec 20, 1940	Ossipee, NH	Both earthquakes 5.5	Damage to homes, water main rupture: cost unknown.
December 24, 1940	Ossipee, NH	NA	Unknown
December 28, 1947	Dover-Foxcroft, ME	4.5	Unknown
June 10, 1951	Kingston, RI	4.6	Unknown
April 26, 1957	Portland, ME	4.7	Unknown
April 10, 1962	Middlebury, VT	4.2	Unknown
June 15, 1973	Near Quebec Border	4.8	Unknown
January 19, 1982	West of Laconia	4.5	Structure damage 15 miles away in Concord: cost unknown
October 20, 1988	Near Berlin, NH	4	Unknown
April 2002	Plattsburg, NY	5.1	Felt though no damage in Canaan

Extreme Heat

Extreme heat is characterized by abnormally high temperatures and/or longer than average time periods of high temperatures. These event conditions may impact the health of both humans and livestock.

Past Extreme Heat Events

In the summer of 2008, Rescue personnel assisted several residents having breathing difficulties due to extreme heat. The following table lists the extreme heat events in the past which included the Northeast and New Hampshire.

Table III-10: EXTREME HEAT

Date	Location	Description	Damage
July, 1911	New England	11-day heat wave in New Hampshire	Unknown
Late June to September, 1936	North America	Temps to mid 90s in the northeast	Unknown
June - August, 1999	Northeast	Mean temperatures well above long-term average	Unknown
Early August, 2001	New Hampshire	Mid 90s and high humidity	Unknown
August 2-4, 2006	New Hampshire	Regional heat wave and severe storms	Unknown
July 2010	Northeast	Regional heat wave	Unknown

Potential Future Extreme Heat Events

Extreme heat would impact the entire city though those with air conditioning in their homes would have less impact. The costs of extreme heat are most likely to be in human life. The elderly are especially susceptible to extreme heat. The State did not develop a county risk factor for extreme heat in its *NH Hazard Mitigation Plan*. The Committee determined extreme heat to be a low/medium risk in Canaan.

Drought

A drought is defined as a long period of abnormally low precipitation. The effects of drought are indicated through measurements of soil moisture, groundwater levels and stream flow; however, not all of these indicators will be low during a drought. Costs can include loss of agricultural crops and livestock.

Past Drought Events

The following is a list of past drought events which impacted the State and Canaan. There were also local drought problems with private dug wells in 1980 and 1995.

Table III-11: DROUGHT

DROUGHT			
Date	**Location**	**Description**	**Damages**
1929-1936	Statewide	Regional. Recurrence Interval 10 to > 25 years	Unknown
1939-1944	Statewide	Severe in southeast and moderate elsewhere. Recurrence Interval 10 to > 25 years	Unknown
1947-1950	Statewide	Moderate. Recurrence Interval 10 to > 25 years	Unknown
1960-1969	Statewide	Regional longest recorded continuous spell of less than normal precipitation. Encompassed most of the Northeastern US. Recurrence Interval > 25 years	Unknown
2001-2003	Statewide; Canaan	Affected residential wells and agricultural water sources	Unknown

Potential Future Drought Events

Drought will affect the entire Town. The damage will depend upon the crops being grown at the time of the drought. No cost has been assigned to residential wells going dry though new wells may have to be dug or drilled. According to the State's mitigation plan, Grafton County has a medium risk for drought. The Committee determined drought to be a medium risk in Canaan.

Wildfire

Wildfire is defined as any unwanted and unplanned fire burning in the forest, shrub or grass. Wildfires are frequently referred to as forest fires, shrub fires or grass fires, depending on their location. They often occur during drought and when woody debris on the forest floor is readily available to fuel the fire. The threat of wildfires is greatest where vegetation patterns have been altered by past unsafe land-use practices, fire suppression and fire exclusion. Vegetation buildup can lead to more severe wildfires.

Increased severity over recent years has decreased capability to extinguish wildfires. Wildfires are unpredictable and usually destructive, causing both personal property damage and damage to community infrastructure, cultural and economic resources. Negative short term effects of wildfires include destruction of timber, forage, wildlife habitats, scenic vistas and watersheds. Some long term effects include erosion and lowered water quality.

There are many types and causes of fires. Wildfires, arson, accidental fires and others all pose a unique danger to communities and individuals. Since 1985, approximately 9,000 homes have been lost to urban/wild land interface fires across the United States (Northeast States Emergency Consortium: www.nesec.org). The majority of wildfires usually occur in April and May, when home owners are cleaning up from the winter months, and when the majority of vegetation is void of any appreciable moisture making them highly flammable.

The threat of wildland fires for people living near wildland areas or using recreational facilities in wilderness areas is real. Dry conditions at various times of the year and in various parts of the United States greatly increase the potential for wildland fires. Advance planning and knowing how to protect buildings in these areas can lessen the devastation of a wildland fire. To reduce the risk to wildfire, it is necessary to consider the fire resistance of structures, the topography of property and the nature of the vegetation in the area.

Past Wildfire Events

There have been very few wildfires in the Town of Canaan. There is strict enforcement of outside burning and fire permits. The greatest danger is weather driven during periods of drought especially in spring before the grass has greened up or a dry fall with a heavy accumulation of downed leaves.

Potential Future Wildfire Events

There are many large, contiguous forest tracts in Canaan. Where development interfaces with the forested areas is called the "urban interface." These are the areas where structures could be impacted by a wildfire. The Committee considers all structures within Canaan to be in an urban interface, and wildfire could affect the entire Town in structural and timber loss. According to the State's mitigation plan, the county has a high probability of wildfire. Forested, high elevation areas in Canaan are particularly vulnerable to wildfire events. Prolonged drought increases the likelihood of such events. The Committee determined that the risk of wildfire in Canaan is medium.

Urban Fire

The risk of life or property loss from fires in urban or clustered structural settings is influenced by a variety of factors. Some factors include building construction materials, the type of occupancy and the type of items stored within the structure, fire response time, the availability of adequate fire flows of water, and adequate emergency ingress and egress. This can impact how far and fast the fire can spread between buildings.

Potential high loss of life may result in public gathering places and lodging establishments where large groups of people tend to gather. Businesses, factories and shopping areas may suffer a large property or monetary loss due to a major fire. Other areas may also have the potential for high, fire-related losses.

Residential neighborhoods with large concentrations of houses with wood shingle or shake roofs are at a greater fire risk than neighborhoods where the majority of the residences utilize fire retardant roofing material. Inadequate fire flow (water available to fight a fire) can also hamper the Fire Department's success in suppressing a fire.

Past Urban Fire Events

The Town of Canaan has not experienced this hazard.

Potential Future Urban Fire Damage:

A structural conflagration will produce varying levels of damage or disruption to critical facilities. There are clusters of structures in the Canaan village area, the Canaan Lake area, and at the Cardigan Mountain School. The Committee determined that the risk of urban fire is low/medium in Canaan.

Natural Water & Air Contaminants

Radium, radon and uranium are grouped together because they are radionuclides, unstable elements that emit ionizing radiation. These three particular substances are a health risk only if taken into the body by ingestion or inhalation. They occur naturally in the environment, uranium and radium as solids in rock while radon exists as a gas. Radionuclides are undetectable by taste, odor, or color, so only analytical testing can determine if they are present in water. Because they are associated with rock, wells drilled into bedrock are more likely to contain elevated levels of radionuclides than shallow or dug wells.

Radon gas can also be found in the soil. Openings between the soil and buildings, such as foundation cracks and where pipes enter, provide conduits for radon to move into structures. The difference in air pressure, caused by heated indoor air moving up and out of buildings, results in a flow of soil gas toward the indoors, allowing radon to potentially accumulate in structures. Air quality in a home can also be tested for radon.

There are many other natural contaminants which can render drinking water unsafe such as arsenic. The Drinking Water and Groundwater Bureau of the NH Department of Environmental Services has several fact sheets available to address these natural materials and suggests which materials to be included in testing. See their list of fact sheets at http://www.des.state.nh.us/dwg.htm.

Past Natural Water & Air Contaminant Events

There have been no known events related to natural water and air contamination in Canaan although there has been radon recorded in the area.

Table III-12: RADON

RADON					
County	**# Tests**	**G. Mean**	**Maximum**	**% > 4.0 pCi/l**	**% > 12.0 pCi/l**
Belknap	744	1.3	22.3	14.4	1.3
Carroll	1042	3.5	478.9	45.4	18
Cheshire	964	1.3	131.2	15.6	2.3
Coos	1072	3.2	261.5	41	17
Grafton	**1286**	**2.0**	**174.3**	**23.2**	**5.2**
Hillsborough	2741	2.1	202.3	29.6	6.8
Merrimack	1961	2.0	152.8	25.2	6
Rockingham	3909	3.0	155.3	40	9.5
Strafford	1645	3.4	122.8	44	13
Sullivan	466	1.4	29.4	15.7	2.1
STATEWIDE	**15860**	**2.4 pCi/L**	**478.9 pCi/L**	**32.4**	**8.6**

Source: Summary Table of Short-term Indoor Radon Test Results in NH's Radon Database 11/04/2003

Potential Future Natural Air & Water Contaminant Damage:

Although there are no known records of illness that can be attributed to radium, radon, or uranium or other contaminants in Canaan, residents should be aware that they are present. Houses with granite and dirt cellars are at increased risk to radon gas infiltration. According to the table above, Grafton County radon levels are below average for the State. According to the State's mitigation plan, Grafton County has a medium probability of a radon related hazard.

In addition radium, radon, and uranium as well as other natural materials can be present in drinking water. Residents, especially with bedrock wells, should be aware of the possibility of water contamination and the availability of testing and remediation. The Committee determined that the risk of natural contaminants is a low/medium risk in Canaan.

Hazardous Materials Spills

Hazardous materials spills or releases can cause damage of loss to life and property. Short or long-term evacuation of local residents and businesses may be required, depending on the nature and extent of the incident.

Past Hazardous Waste Spill Events

There have been no significant hazardous waste spills in Canaan.

Potential Future Hazardous Waste Spill Events

There conceivably could be other spills near any home in Canaan due to home heating fuel delivery. The property owner is responsible for clean-up. The State oversees these reported spills. Also, Route 4 is a major travel lane through the town where trucks could be transporting hazardous materials.

The Committee determined that the risk of hazardous materials spills is a medium risk in Canaan.

Terrorism

Terrorism has been defined in many ways. The word terrorism is derived from the Latin term "terrere" which means to frighten. Under current United States law, set forth in the US Patriot Act, acts of domestic terrorism are those which: "(A) involve acts dangerous to human life that are a violation of the criminal laws of the United States or of any State; (B) appear to be intended— (i) to

intimidate or coerce a civilian population; (ii) to influence the policy of a government by intimidation or coercion; or (iii) to affect the conduct of a government by mass destruction, assassination, or kidnapping; and (C) occur primarily within the territorial jurisdiction of the United States."

Past Terrorism Events

There have been no terrorism events within Canaan in the past.

Future Terrorism Events

The Committee determined that the risk of terrorism is a medium risk in Canaan.

C. HAZARD RISK RATINGS

The Town of Canaan Hazard Mitigation Committee reviewed each potential hazard and rated the probability of occurrence and vulnerability (cost if the hazard actually occurs) to come up with an overall risk rating. The ratings were based on past occurrences of hazards affecting the State of New Hampshire, Grafton County, and the Town of Canaan. Severe Winter Weather was ranked at a high risk in Canaan.

Assessing Probability

The Town of Canaan Hazard Mitigation Committee reviewed each potential hazard and rated the probability of occurrence and vulnerability (cost if the hazard actually occurs) to come up with an overall risk rating. The ratings were based on past occurrences of hazards affecting the State of New Hampshire, Grafton County, and the Town of Canaan. Tornado/Downburst, Flooding, Thunderstorm, and Severe Winter were ranked the highest risk in Canaan.

Canaan has made recent efforts to reduce the vulnerability to hazards. Several road culverts were increased in size to accommodate rain water including along Clark Hill, Ibey Road, Prospect Hill Road, Fernwood Farms Road, and South Road.

Assessing Probability

The process involved assigning a number to each hazard type based on its potential of occurring determined using the committee's knowledge of past events. For relative comparison the ratings were designated as shown below:

1 – Unlikely: may occur after 25 years
2 – Possible: may occur within 10-25 years
3 – Likely: may occur within 10 years

An n/a score was given if there was insufficient evidence to make a decision. As a comparison, the plan also identifies the probability of occurrence from the State Hazard Plan for Grafton County as shown in Table III-13. The Committee determined probability of each hazard event is shown in the second column of Table III-15.

Table III-13: PROBABILITY OF HAZARD IN GRAFTON COUNTY FROM STATE PLAN

Flood	Dam Failure	Drought	Wildfire	Earth-quake	Land-slide	Radon	Tornado	Hurricane	Lightning	Severe Winter	Avalanche
H	L	**L**	**M**	M	M	M	**L**	**M**	**L**	H	L

Assessing Vulnerability

A relative scale of 1 to 3 was used to determine the potential impact and cost for human death and injury, property losses and damages, and business/agricultural impact *if the hazard occurred*: 1 – limited damage and cost; 2 - moderate amount of damage and cost, and 3 – high damage and cost.

Table III-14: COMMITTEE ASSESSMENT OF VULNERABILITY

Committee Assessment of Vulnerability	Human Impact	Property Impact	Economic Impact	Vulnerability
	Probability of death or injury	Physical losses and damages	Cottage businesses & agriculture	Avg. of human/ property/ business impact
Dam Failure	3	3	3	3.0
Flooding	2	3	2	2.3
Hurricane	3	3	3	3.0
Tornado & Downburst	3	3	3	3.0
Thunderstorm/Lightning/Hail	2	2	2	2.0
Landslide	1	1	1	1.0
Erosion	1	2	1	1.3
Severe Winter/Ice Storms	2	2	2	2.0
Earthquake	3	3	3	3.0
Extreme Heat	2	1	1	1.3
Drought	2	2	2	2.0
Wildfire	2	2	2	2.0
Urban Fire	2	3	3	2.7
Natural Contaminants	2	1	1	1.3
HazMat Spills	3	2	2	2.3
Terrorism	3	3	3	3.0

Assessing Risk

The vulnerability and probability values were multiplied to arrive at the estimated overall risk the hazard has on the community. The overall risk or threat posed by a hazard over the next 25 years was determined to be high, medium, or low. The last column of Table III-15 provides the result of this evaluation.

HIGH (3)**:** There is strong potential for a disaster of major proportions during the next 25 years; or history suggests the occurrence of multiple disasters of moderate proportions during the next 25 years. The threat is significant enough to warrant major program effort to prepare for, respond to, recover from, and mitigate this hazard. This hazard should be a major focus of the City's emergency management training and exercise program.

MEDIUM (2): There is moderate potential for a disaster of less than major proportions during the next 25 years. The threat is great enough to warrant modest effort to prepare for, respond to, recover from, and mitigate this hazard. This hazard should be included in the City's emergency management training and exercise program.

LOW (1)**:** There is little potential for a disaster during the next 25 years. The threat is such as to warrant no special effort to prepare for, respond to, recover from, or mitigate this hazard. This hazard need not be specifically addressed in the City's emergency management training and exercise program except as generally dealt with during hazard awareness training.

Table III-15: RISK ASSESSMENT

Hazards	Probability based on Committee Review	Vulnerability based on Committee Review	Risk Rating (Probability x Vulnerability)	Risk
Dam Failure	1	3.0	**3.0**	Low/Medium
Flooding	3	2.3	**6.9**	**Medium/High**
Hurricane	1	3.0	**3.0**	Low/Medium
Tornado/Downburst	3	3.0	**9.0**	**High**
Thunderstorm	3	2.0	**6.0**	**Medium/High**
Landslide	1	1.0	**1.0**	Low
Erosion	3	1.3	**3.9**	Low/Medium
Severe Winter	3	2.0	**6.0**	**Medium/High**
Earthquake	1	3.0	**4.0**	Medium
Extreme Heat	3	1.3	**3.9**	Low/Medium
Drought	2	2.0	**4.0**	Medium
Wildfire	2	2.0	**4.0**	Medium
Urban Fire	1	2.7	**2.7**	Low/Medium
Natural Contaminants	3	1.3	**3.9**	Low/Medium
Hazardous Materials Spill	2	2.3	**4.6**	Medium
Terrorism	1	3.0	**4.0**	Medium
0-1.9 Low 2-3.9 Low/Med 4-5.9 Medium 6-7.9 Med/High 8-9 High				

IV. CRITICAL FACILITIES & LOCATIONS

The Critical Facilities list identified by the Hazard Mitigation Committee is divided into three categories. The first category contains facilities needed for emergency response in the event of a disaster. The second category contains non-emergency response facilities that are not required in an event, but that are considered essential for the everyday operation of the Town of Canaan. The third category contains facilities and structures that the Committee wishes to protect in the event of a disaster. All facilities could be subject to earthquakes. Most would be subject to hurricanes, and tornados or downbursts; the term "Wind Events" is used for the latter hazards in the following tables. Values were obtained from Town tax records using the "building market cost new" figures for main structures plus assessed value for accessory structures for 2006.

Table IV-1: EMERGENCY RESPONSE FACILITIES, SERVICES & STRUCTURES

Critical Facility	Hazard Vulnerability	Value	Comments
Police Station/Emergency Operations Center	HazMat, Wind Events	$688K	
Fire Station (Emergency Shelter)	HazMat, Wind Events		
Canaan Elementary School (potential Emergency Shelter)	Flooding, Wind Events	3 Million	
Mascoma Valley Regional High School (potential Emergency Shelter)	Flooding (access to school), Wind Events	10 Million	
St. Mary's Rectory (potential Emergency Shelter)	HazMat, Wind Events	481K	
Canaan United Methodist Church (potential Emergency Shelter)	HazMat, Wind Events	424K	
Assembly of God (potential Emergency Shelter)	HazMat, Wind Events	414K	
Town Highway Garage	Flooding, HazMat, Wind Events	Inc. w/Police & Fire	
Water Treatment Facility	Wind Events	134K	
Wastewater Treatment Facility	Wind Events	100K	
Transfer Station	Flooding, HazMat, Wind Events	24K	
Evacuation Routes and Bridges	All hazards	Unknown	None

Table IV-2: NON-EMERGENCY RESPONSE FACILITIES AND SERVICES

Critical Facility	Hazard Vulnerability	Value	Comments
Town Offices/Library	HazMat, Wind Events	$416K	
Indian River Middle School	Wind & Earthquake	Part of High School	
Cardigan Mountain School	Wind & Earthquake	20 Million	
U.S. Post Office	Wind & Earthquake	NA	

Table IV-3: FACILITIES AND POPULATIONS TO PROTECT

Critical Facility	Hazard Vulnerability	Comments
Daycare facilities	All Hazards	
Indian River Apartments, Indian River Road	Wind & Earthquake	
Grange/Mascoma Senior Center, Route 4	Wind & Earthquake; Flooding (500-yr)	
Country Village Mobile Home Park, Stevens Road	Wind & Earthquake	
Smith Trailer Park, Smith Road	Flooding, Dam Inundation, Wind & Earthquake	
Canaan Street Historic District	Wind & Earthquake	

A probable area for new development is in the downtown area. However, there is a moratorium on building in the downtown area due to the limits of the municipal sewerage and water systems. There are currently 40 residential units on the waiting list to build in this area, and it is unknown when the moratorium will be lifted.

Table IV-4: HAZARD-PRONE AREAS AND THEIR DEVELOPMENT POTENTIAL

Vulnerable Area	Hazard Vulnerability	Development Trends/Potential	Comments
Downtown	Urban Fire; Flooding	40 units on waiting list to build	Moratorium on building

V. DETERMINING HOW MUCH WILL BE AFFECTED

A. IDENTIFYING VULNERABLE FACILITIES

It is important to determine which critical facilities and other structures are the most vulnerable and to estimate potential losses. The first step is to identify the facilities most likely to be damaged in a hazard event. To do this, the locations of critical facilities were compared to the location of past and potential hazard events. Facilities and structures located in federally and locally determined flood areas, wildfire prone areas, etc. were identified and included in the analysis. There is neither large land areas slated for potential development nor large development projects in the works, so vulnerability of undeveloped land was not analyzed. Most changes from the original plan are due to better mapping availability for floodplain location determination.

Table V-1: VULNERABILITY OF EXISTING STRUCTURES, INFRASTRUCTURE, AND NATURAL RESOURCES

Area	Hazard	Critical Facilities	Buildings	Infrastructure	Total Known Bldg Value
Downtown Area	Flooding	Town Highway Garage and Transfer Station	12 houses; 1 commercial; 5 town structures	Road; 2 bridges	$4.0 Million
South of Goose Pond	Flooding & Dam Inundation Area	None	19 houses; 2 mobile homes	Roads, 5 bridges	$2.5 Million
Rte 118 North of Downtown	Flooding	Sewage Treatment Plant	35 houses; 4 mobile homes; 4 commercial; State sheds	Roads, 3 bridges	$5.4 Million
Route 4 West of Downtown	Flooding	None	17 houses (2 camps); 2 mobile homes; 1 commercial	Roads; 3 bridges	$3.6 Million
Switch Road Area	Flooding	None	5 houses; 8 mobile homes	Roads; 3 bridges	$1 Million
S/S Route 4/Mud Pond Rd	Flooding	None	13 houses; 4 mobile homes; 1 commercial	Roads; 1 bridge	$2 Million
Harris Brook Reservoir Dam (aka Enfield)	Dam Inundation	None	2 houses	None	$0.4 Million
Smith Pond Dam (Enfield)	Dam Inundation	None	54 houses; 11 mobile homes; 6 commercial, 1 church	Roads; 1 bridge	$8.6 Million

B. IDENTIFYING VULNERABLE SPECIAL POPULATIONS

There are several centers of special populations in Canaan such as elderly housing or schools as identified in Table IV-3. The elderly and physically or mentally impaired residents are also located within the community, but scattered throughout the Town in their homes. Town-wide programs will have to take this into account. Town officials having knowledge of its residents will assist in protection of those with special needs.

C. POTENTIAL LOSS ESTIMATES

This section identifies areas in the town that are most vulnerable to hazard events and estimates potential losses from these events. It is difficult to ascertain the amount of damage caused by a natural hazard because the damage will depend on the hazard's extent and severity, making each hazard event quite unique. In addition, human loss of life was not included in the potential loss estimates, but could be expected to occur. FEMA's *Understanding Your Risks: Identifying Hazards and Estimating Losses* (August 2001) was used in estimating loss evaluations. The value of structures was determined by using Town records. The Town's tax maps were used to determine number of units within each hazard area. The land damage cost, structure content loss costs, and function loss cost were not determined.

Dam Failure – Low/Medium Risk - $2.8 Million Estimated Cost
Assuming a 28% structural damage to the buildings valued at $8.7 million, the damage could total an estimated $2.4 million.
Assuming a 78% structural damage to mobile homes valued at $0.45 million, the damage could total an estimated $351,000. The total damage could be approximately $2.8 million in damage.

Flooding – Medium/High Risk - $0.54 Million Estimated Cost
The total value of the buildings within the special flood hazard areas is $17.6 million Assuming a 28% structural damage to the residential and non-residential structures, the damage could total close to $0.5 Million. Assuming a 78% structural damage to the mobile homes, the damage could total $39,000. The total damage could be about $17.6 million.

Hurricane – Low/Medium Risk – No Recorded or Estimated Cost
It is random which structures would be impacted and how much. There is no standard loss estimation available and no record of past costs.

Tornado & Downburst – High Risk – No Recorded or Estimated Cost
Tornadoes, downbursts, and microbursts are relatively uncommon natural hazards in New Hampshire, although a microburst in 2007 caused substantial tree damage. On average, about six tornado events strike each year. In the State of NH, the average annual cost of tornadoes between 1950 and 1995 was $197,000 (The Disaster Center). These wind events occur in specific areas, so calculating potential Town-wide losses is not possible. There is no standard loss estimation model available for tornadoes due to their random nature.

Thunderstorm/Lightning/Hail – Medium/High Risk – No Recorded or Estimated Cost
According to the Federal Alliance for Safe Homes, in an average year, hail causes more than $1.6 billion worth of damage to residential roofs in the United States, making it, year in and year out, one of the most costly natural disasters. Lightning is one of the most underrated severe weather hazards, yet it ranks as the second-leading weather killer in the United States. More deadly than hurricanes or tornadoes, lightning strikes in America each year killing an average of 73 people and injuring 300 others, according to the National Weather Service. There is no cost estimation model for thunderstorms due to their random nature.

Landslide - Low Risk – No Recorded or Estimated Costs
The cost of a landslide is unknown. There are a few places in town where a landslide is possible thought none of significance have occurred in the past. Since there are no buildings in these areas, the damage would be confined to clearing a road or stream bank stabilization.

Erosion – Low/Medium Risk - No Recorded or Estimated Costs
Over the years, the Town of Canaan has spent a substantial amount of money on road improvement and repair due to erosion.

Severe Winter Weather – Medium/High Risk – No Recorded or Estimated Cost
Ice storms often cause widespread power outages by downing power lines, and these storms can also cause severe damage to trees. New England usually experiences at least one or two severe snowstorms, with varying degrees of severity, each year. All of these impacts are a risk to the community and put all residents, especially the elderly, at risk.

According to a study done for the Institute for Catastrophic Loss Reduction (Canada) and the Institute for Business and Home Safety (U.S.), the 1998 Ice Storm inflicted $1.2 billion (U.S.) worth of damage in the U.S. and Canada. In New Hampshire alone, over 67,000 people were without power (http://www.meteo.mcgill.ca/extreme/Research_Paper_No_1.pdf). The U.S. average insurance claim was $1,325 for personal property, $1,980 for commercial property, and $1,371 for automobiles.

Earthquake – Medium Risk – $2.25 Million Estimated Cost
Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric and phone lines, and precipitate landslide and flash flood events. Four earthquakes in NH between 1924 and 1989 had a magnitude of 4.2 or more. Two of these occurred in Ossipee, one west of Laconia, and one near the Quebec border. Buildings in Canaan have not been subject to any seismic design level requirement for construction and would be susceptible to structural damage. The dams, bridges, and roads would be vulnerable to a sizable earthquake event.

FEMA's *Understanding Your Risks: Identifying Hazards and Estimating Costs*, August 2001 provides that an earthquake with a 5% peak ground acceleration (as determined by the US Geologic Survey for the area) could cause damage to single family residences by around 10% of the structural value. If all buildings in Canaan were impacted by an earthquake, the estimated damage could be around $2,230,000.

Extreme Heat – Low/Medium Risk – No Recorded or Estimated Cost
Excessive heat kills more people in the U.S. than tornadoes, hurricanes, floods, and lightning combined. The elderly, very young, obese and those who work outdoors or have substance abuse problems are most at risk from succumbing to heat. Additionally, people in urban areas are more susceptible as asphalt and cement tend to hold in heat throughout the night (Federal Alliance of Safe Homes website). Canaan is a very rural, relatively undeveloped town; however, extreme heat is still an issue for most residents. The costs for this hazard are in terms of human suffering. It is not anticipated that there would be any structural or infrastructure costs.

Drought – Medium Risk – No Recorded or Estimated Cost
A long drought would cause damage to crops and dry up wells. There is no cost estimate for this hazard in Canaan.

Wildfire – Medium Risk – No Recorded or Estimated Cost
The risk of fire is difficult to predict based on location. About 72% of the Town is in the current use taxation program which indicates larger lots which are primarily forested. Forest fires are more likely to occur during drought years. In addition, areas and structures that are surrounded by dry vegetation that has not been suitably cleared are at high risk. Fire danger is generally universal, however, and can occur practically at any time. Dollar damage would depend on the extent of the fire and the number and type of buildings burned. Since the entire developed area of Canaan interfaces with forest, all structures are potentially vulnerable to wildfire. The estimated value of these structures is approximately $222 million. According to the Grafton County Forester, there are no reliable figures for the value of timber in New Hampshire; and excluding the last big fires of the early 1940s, the acres and timber values affected by fires would not be supportive of major investment in fire prevention in this region (v. fire-prone western regions).

Urban Fire – Low/Medium Risk – No Recorded or Estimated Cost
Due to the close proximity of buildings in the downtown area and at the Cardigan Mountain School campus, the Committee determined these two areas to be the most vulnerable to urban fire or a conflagration. The value of buildings in the downtown area is $18 million and the value of the school campus is about $10 million.

Natural Contaminants – Low/Medium Risk – No Recorded or Estimated Cost

The cost of a natural contamination hazard would be the health of individuals exposed to the contaminant. No cost estimate is provided for this hazard. This is anticipated to be by building and the owner would have to do mitigation depending on the type of contaminant and its avenue of entry into the building (air or water).

Hazardous Material Spills – Medium Risk – No Recorded or Estimated Cost

The cost of a hazardous material spill would depend upon the extent of the spill, the location of the spill in relation to population, structures, infrastructure, and natural resources, as well as the type of hazardous material. The cost of any clean-up would be imposed upon the owner of the material. However, other less tangible costs such as loss of water, soil, and air quality might be borne by the community. No cost estimate has been provided for this possible hazard. There are no significant hazardous waste generators in Canaan, so any spills would be from heating fuel delivery or transport of materials through the Town on Routes 10, 25, and 25C. These are major transportation routes in the area.

Terrorism – Medium Risk - No Recorded or Estimated Cost

The cost of any terrorism event is unpredictable and not estimated in this document.

VI. EXISTING MITIGATION ACTIONS

The next step involves identifying existing mitigation actions for the hazards likely to affect the Town and evaluating their effectiveness. Table VI-1 is a list of current policies, regulations and programs in the Town of Canaan that protect people and property from natural and human-made hazards as well as effectiveness and proposed improvements.

Table VI-1: EXISTING MITIGATION ACTIONS

Existing Mitigation Action & Description	Hazard Type/ Service Area	Responsi -ble Local Agent	Effective-ness (Low, Average, High)	2004 Plan Proposed Improvements/Changes since 2004 Hazard Mitigation Plan	2011 Plan Proposed Improvements
Town Master Plan – assess existing conditions of the town and makes recommendations to achieve community goals	All hazards/Entire Town	Planning Board	Low	Include reference to hazard mitigation and emergency management plans; include hazard mitigation recommendations especially in Natural Resources chapter/Plan in process of update	Update plan and include hazard mitigation and emergency management programs
National Flood Insurance Program (NFIP) Member – Provides flood insurance program and required local floodplain development ordinance	Flooding/Entire Town	Town Administrator	Average	Update mapping and develop local regulations; join Community Rating System/Current Committee feels mapping is adequate and they will continue trying to join the CRS	Develop tracking system of new development and potential impact on floodways; Continue trying to join CRS
Public Education – Provide materials to public about all hazards and NFIP	Flooding/Entire Town	Town Administrator	Low	Develop local materials and obtain more general informational materials for distribution, town website and newsletter/Not done due to lack of resources	Contact OEP Flood program to acquire educational materials for distribution; add information to town web site; include importance of wetland protection for flood control
Emergency Operations Plan – Provides operations guide to respond to emergencies including hazardous materials plan	All Hazards/Entire Town	EMD	Average	Update plan and incorporate the Cardigan Mountain School Emergency Plan/Not done due to lack of resources	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; conduct community resources survey

Existing Mitigation Action & Description	Hazard Type/ Service Area	Responsi -ble Local Agent	Effective-ness (Low, Average, High)	2004 Plan Proposed Improvements/Changes since 2004 Hazard Mitigation Plan	2011 Plan Proposed Improvements
Comprehensive Emergency Management Program (CEMPS) for schools - An integrated approach to mitigation, preparedness, response, and recovery.	All Hazards/Schools	SAU#62 Superin-tendant; Head-masters	Average	Not mentioned in 2004 plan	Provide refresher courses for faculty and staff.
Emergency Communications – Town radio system has a lot of dead spots due to topography	All Hazards/Entire Town	Dept. heads; Town Adm	High – Police; Low- all else	Obtain digital communication radios and repeater/Obtained some radios; no repeater due to lack or resources	Create inexpensive relay system to Hanover Dispatch
Emergency Power – Provide generators for back-up power; Fire and Police wired	All Hazards/Entire Town	SAU; Dept heads; Town Adm	Low	Need portable generator in Highway Garage/Not done due to lack of resources	Install transfer switches at Highway, & Town Offices; acquire three generators; work with schools to install generators
Stormwater Program – Guidelines for protecting water quality	Erosion/Entire Town	Bldg Inspector	Low	Complete plan to remain compliant with NPDES Phase II Regulations and require State's Best Management Practices/Town making efforts to meet State requirements	Seek better management and enforcement systems
Stormwater Management - Regular culvert maintenance	Flooding/Entire Town	Road Agent & Town Adm	High	Obtained software to monitor culvert maintenance history and needs and schedule future work	Learn newly acquired software
Conservation Commission Fund - acquisition and protection of lands	Flooding/Entire Town	Cons Comm	Average	None recommended in previous plan	Continue to seek conservation easements
Comprehensive Shoreland Protection Act - Restricts development near specific water bodies	Flooding & Erosion/4th order streams & ponds of 10+ acres	DES; Bldg Inspct; Select Bd; Town Adm	High	No proposed improvements in 2004 plan though it does mention community could do greater enforcement	Continue to encourage greater enforcement

Existing Mitigation Action & Description	Hazard Type/ Service Area	Responsi -ble Local Agent	Effective-ness (Low, Average, High)	2004 Plan Proposed Improvements/Changes since 2004 Hazard Mitigation Plan	2011 Plan Proposed Improvements
Dam EAPs & Dam Breach Exercises - Require determination of dam failure impact; drills	Dam Failure/Entire Town	NH DES; private owners; EMD	Average	No proposed improvements in 2004 plan	Determine call list for 911 alerts
Subdivision Regulations - Prohibit construction within the 100 year flood zones; Wetland setbacks	Wind Events/Entire Town Flood/Entire Town	Planning Board	Average	Consider road specifications, control of snow melt, excessive runoff, drainage and ditching; consider seismic design, design of building permit applications to show intent to move or construct/low town support	Consider road specifications, control of snow melt, excessive runoff, drainage and ditching; consider seismic design, design of building permit applications to show intent to move or construct
Water Supply Protection Program – Inventory and provide protection of drinking water sources	Erosion & Drought/ Goose Pond and Canaan Street Lake	Cons Com; PB; Water Sup Com; Town Adm	High	Develop regulations to protect wetlands/low town support	Develop new ordinances for water quality protection and obtain public support; develop secondary public water source
Fire Department – On-call	Fire/Entire Town	Fire Chief	High	Research further incentives for recruitment/Current Department does not have a problem with volunteers	New equipment; improve rural water protection
Fire Mutual Aid -	All Hazards/Entire Town	Fire Chief	High	Develop regional emergency services department to cut costs and pool resources; Continue to improve mutual aid pacts between emergency services departments in the surrounding communities (p29 old plan)//	Explore regional emergency services
Public Works Mutual Aid -		Road Agent	Average		
Police Mutual Aid -		Police Chief	High		
Police Department – Full-time department; includes animal control	All Hazards/Entire Town	Police Chief	Average	No recommendations in 2004 plan	Provide comprehensive staffing and on-going training; improve informational systems
Emergency Operations Center in Police Station - Site for emergency communications	All Hazards/Entire Town	EMD	Low	Obtain centralized radio communications (in progress at time of 2004 plan)/Done	Upgrade phone system; expand and reorganize EOC

Existing Mitigation Action & Description	Hazard Type/ Service Area	Responsi -ble Local Agent	Effective-ness (Low, Average, High)	2004 Plan Proposed Improvements/Changes since 2004 Hazard Mitigation Plan	2011 Plan Proposed Improvements
Public Works Winter Operations Plan - Maintenance standards and policies	Winter/Entire Town	Road Agent	Average	No recommendations in 2004 plan	Upgrade plow equipment; new salt and sand sheds; expand garage
Road Improvement Program	Erosion, Flooding, Severe Winter/Entire Town	Road Agent	High	Grafton Turnpike Road & West Farm Road/Road improvements made since last plan	See following table
Hazard Tree Maintenance – Remove hazard trees along road sides	Wind Events & Severe Winters/Entire Town	Road Agent	Average	Hire consulting forester; develop tree clearance maintenance programs/Road Agent maintains trees and hires assistance as needed	Continue to monitor trees for hazardous conditions and provide appropriate removal or trimming

Table VI-2: ROAD IMPROVEMENTS PROGRAM – PROPOSED IMPROVEMENTS

Location/Hazard	Problem	Mitigation Action
Codfish Hill Road	Road washes each time it rains	Reconstruct road with underdrain
Potato Road	Hard rain floods road and erodes shoulders	Reconstruct to elevation above flooding
Roberts Road	Road washes during rainy season	Improve drainage and reconstruct 300’
Fernwood Farms Road	Eroded two years ago and another time prior; ditches inadequate	Install ditches, enlarge culvert
River Road	Potential landslide due to wet bank	Stabilize bank
Ballpark Road	Wet bank sliding toward road	Stabilize bank with riprap

Table VI-3 examines the proposed improvements and evaluates them as 1: Low; 2: Average; and 3: High for effectiveness looking at several criteria as shown in the table. The totals are then ranked to prioritize the improvements to help the Committee focus on the most effective strategy improvements.

Table VI-3: PRIORITIZING EXISTING MITIGATION STRATEGY IMPROVEMENTS

Rank	Strategy Improvement	Reduce Damage	Community Objectives	Existing Regulations	Quickly Implemente	Socially Acceptable	Technically Feasible	Admin Possible	Benefit - Cost	TOTAL SCORE	Mitigate Existing or New Dev
1	**Dam EAPs & Dam Breach Exercises** – Determine call list for 911 alerts	3	3	3	3	3	3	3	3	24	Both
2	**Emergency Power** - Install transfer switches at Highway, & Town Offices; acquire three generators; work with schools to install generators	3	3	3	2	3	3	3	3	23	Both
3	**Stormwater Mangement** - Learn newly acquired software (culvert maintenance)	3	2	3	2	3	3	3	3	22	Both
4	**Emergency Communication** - Create inexpensive relay system to Hanover Dispatch	2	2	3	2	2	3	3	3	20	Both
4	**Police Department** - Provide comprehensive staffing and on-going training; improve informational systems	3	2	3	2	2	3	2	3	20	Both
4	**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	3	2	3	2	2	3	2	3	20	Both
5	**Comprehensive Emergency Management Programs for schools** - Provide refresher courses for faculty and staff.	2	2	3	2	3	3	1	3	19	Both
5	**Conservation Commission Fund** - Continue to seek conservation easements	1	2	3	3	2	3	3	2	19	Both
5	**Fire Department** - New equipment; improve rural water protection	3	2	3	2	2	3	2	2	19	Both
5	**Highway Department Winter Operations Program** - Upgrade plow equipment; new salt and sand sheds; expand garage	3	2	3	1	2	3	2	3	19	Both
5	**Road Improvements** – Codfish Hill Road; Potato Road; Roberts Road	3	2	3	1	2	3	2	3	19	Both
6	**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	2	2	3	3	2	2	2	2	19	Both
6	**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	2	2	3	2	2	2	2	3	18	Both

Rank	Strategy Improvement	Reduce Damage	Community Objectives	Existing Regulations	Quickly Implemente	Socially Acceptable	Technically Feasible	Admin Possible	Benefit - Cost	TOTAL SCORE	Mitigate Existing or New Dev
7	**National Flood Insurance** - Develop tracking system of new development and potential impact on floodways; Continue trying to join CRS	2	1	3	2	2	2	2	3	17	Both
7	**Mutual Aid** - Explore regional emergency services	3	2	3	1	1	3	1	3	17	Both
7	**Road Improvements** – Fernwood Farms Road; River Road; Ballpark Road	3	1	3	1	2	3	2	2	17	Both
8	**Water Supply Protection Program** - Develop new ordinances for water quality protection; develop secondary public water source	2	2	2	1	1	3	3	2	16	Both
9	**Town Master Plan** - Update plan and include hazard mitigation and emergency management programs	1	2	3	1	2	3	2	1	15	Both
10	**Stormwater Program** - Seek better management and enforcement systems	3	2	1	1	1	2	1	2	13	New
10	**Subdivision Regulations** – Consider road and driveway specifications	3	2	1	1	1	2	1	2	13	New

VII. GOALS AND NEWLY IDENTIFIED MITIGATION ACTIONS

A. GOALS & OBJECTIVES

The Canaan Hazard Mitigation Committee reviewed its goals and developed objectives to meet these goals. The goals and objectives were re-evaluated during the updating of the plan to insure they remain valid and effective.

Goals

1. To improve upon the protection of the general population, the citizens and visitors of the Town of Canaan, from all natural and human-made hazards.

2. To reduce the potential impact of natural and human-made disasters on the Town of Canaan's emergency response services, critical facilities, infrastructure, private property, economy, natural environment, and specific historic treasures and interests, as well as other tangible and intangible characteristics which add to the quality of life of the citizens and guests of the Town.

3. To improve community education regarding hazard mitigation and preparedness.

4. To reduce the Town's liability with respect to natural and man-made hazards generally.

5. To see cost-effective and creative hazard mitigation measures to accomplish the Town's goals and objectives.

6. To work in conjunction and cooperation with the State of New Hampshire's Hazard Mitigation Goals.

Objectives

- Protect structures and roads in known flood and erosion areas.
- Amend the master plan to address natural and human-made hazards and support land use regulations.
- Educate the public to prepare for all hazard emergencies.
- Provide emergency communication to effectively deal with mitigation and emergency management

B. POTENTIAL MITIGATION ACTIONS

Summary of New Strategies

The Canaan Hazard Mitigation Committee brainstormed potential mitigation actions at a meeting. Some proposed actions have been moved to the existing actions table as they are at least in part repetitive of items in that table. Other items have been deleted as they are not considered hazard mitigation, but specifically emergency management. Even though some emergency management items are addressed in this plan—very specific equipment needs have been eliminated.

Table VII-1: PROPOSED NEW MITIGATION ACTIONS

Proposed New Mitigation Action Description	Hazard Type/Service Area	Responsible Local Agent	If Recommended in 2004 Plan, why was it not put into place?
Drought Mitigation Plan – Regulate water use during dry periods to insure adequate drinking and fire fighting water supplies	Drought & Fire/Entire Town	EMD/Water Operator	NA
Building Codes – Adopt codes to meet State/Federal standards and provide safe structures	All Hazards/Entire Town	Building Inspector; Fire Chief	Lack of resources
Firewise – Provide link to educational materials on Town web page	Wildfire/Entire Town	EMD/Fire Chief	Lack of resources
Water Supply Mapping – Work with North Country Resource & Community Development	Drought & Fire/Entire Town	EMD/Fire Chief	Lack of resources
Emergency Shelters – Investigate new emergency shelters outside hazard areas with potential emergency power and shelter necessities	All Hazards/Entire Town	EMD; DEMD; Town Administrator	Lack of resources
Emergency Spill Plan – Develop plan to address hazardous on-site and transport spills. Provide necessary equipment and work with Mid	HazMat/Entire Town	EMD; DEMD	NA
Geographic Information Systems – Develop mapping of hazard areas overlay on tax maps for alarm and educational purposes	All Hazards/Entire Town	Town Administrator	NA

C. SUMMARY OF CRITICAL EVALUATION

The Canaan Hazard Mitigation Committee reviewed each of the newly identified mitigation strategies using the following factors:

- Does it reduce disaster damage?
- Does it contribute to community objectives?
- Does it meet existing regulations?

- Can it be quickly implemented?
- Is it socially acceptable?
- Is it technically feasible?
- Is it administratively possible?
- Does the action offer reasonable benefits compared to cost of implementation?

Each mitigation strategy was evaluated and assigned a score (High – 3; Average – 2; and Low – 1) based on the criteria. The Canaan Hazard Mitigation Committee assigned the following scores to each strategy for its effectiveness related to the critical evaluation factors listed above, and actions had the following scores, with the highest scores suggesting the highest priority.

Table VII-2: PRIORITIZING PROPOSED MITIGATION STRATEGIES

*Rank	Strategy	Reduce Damage	Community Objectives	Existing Regulations	Quickly Implemented	Socially Acceptable	Technically Feasible	Administration. Possible	Benefit - Cost	TOTAL SCORE	Mitigate Existing or New Development or Both
1	Water Supply Mapping	3	3	3	3	3	3	3	3	24	Both
2	Drought Mitigation Plan	1	2	3	3	2	3	3	3	20	Both
2	Firewise Education	3	3	3	2	2	3	2	2	20	Both
3	Emergency Shelters	1	3	3	2	3	2	2	3	19	Both
3	Emergency Spill Plan & Equipment	3	3	3	2	3	1	1	3	19	Both
4	Building Code Adoption	3	2	3	1	1	3	1	2	16	New
4	GIS Mapping of Hazard Areas	1	3	3	1	3	1	1	3	16	Both

** The Committee followed the recommended scoring system for hazard mitigation. However, they felt their top priorities are Emergency Shelters, Emergency Spill Plan, and Water Supply Mapping even though they did not all score the highest.*

VIII. PRIORITIZED IMPLEMENTATION SCHEDULE

The Canaan Hazard Mitigation Committee created the following action plan for implementation of priority mitigation strategies:

Table VIII-1: PRIORITIZED IMPLEMENTATION SCHEDULE FOR EXISTING PROGRAM IMPROVEMENTS

Mitigation Action	Who (Leadership)	When (Fiscal Year)	How (Funding Sources)	Cost (Estimated)
Dam EAPs & Dam Breach Exercises – Determine call list for 911 alerts	EMD	2011	Grants & Taxes	Staff time
Emergency Power - Install transfer switches at Highway, & Town Offices; acquire three generators; work with schools to install generators	EMD	2011	Grants & Taxes	$30K
Stormwater Management - Learn newly acquired software (culvert maintenance)	Road Agent	2011-12	Taxes – staff time	Staff time
Emergency Communication - Create inexpensive relay system to Hanover Dispatch	Department Heads; Town Administrator	2011	Grants & Taxes	$1K
Police Department - Provide comprehensive staffing and on-going training; improve informational systems	Police Chief	2011-2015	Grants & Taxes	$35K not inc. salary
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 Superintendant; EMD	2011	Grants & Taxes	$5K
Comprehensive Emergency Management Programs for schools - Provide refresher courses for faculty and staff.	SAU Superintendant; Headmasters	2012	Grants & Taxes	Staff time
Conservation Commission Fund - Continue to seek conservation easements	Conservation Commission	2011-2016	Current Use Penalties	Unknown
Fire Department - New equipment; improve rural water protection	Fire Chief	2011-2016	Grants & Taxes	$16K
Highway Department Winter Operations Program - Upgrade plow equipment; new salt and sand sheds; expand garage	Road Agent	2016-2020	Grants & Taxes	$105K
Road Improvements –				
Codfish Hill Road	Road Agent	Summer 2011	Grants & Taxes	$86,000
Potato Road		Summer 2012		$55,000
Roberts Road		Summer 2011		$7,600
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

Mitigation Action	Who (Leadership)	When (Fiscal Year)	How (Funding Sources)	Cost (Estimated)
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
Mutual Aid - Explore regional emergency services	Police Chief; Fire Chief; Road Agent; Town Administrator	2011-2016	Taxes	$3K Membership Dues
Road Improvements –				
Fernwood Farms Road	Road Agent	Summer 2011	Grants & Taxes	$80,000
River Road		Summer 2015		$75,000
Ballpark Road		Summer 2012		$75,000
Water Supply Protection Program - Develop new ordinances for water quality protection; develop secondary public water source	Conservation Commission; Water Supply Protection Committee; Town Administrator	2012	Grants & Taxes	Staff time
Town Master Plan - Update plan and include hazard mitigation and emergency management programs	Planning Board	2011-2016	Taxes	Staff/volunteer time
Stormwater Program - Seek better management and enforcement systems	Town Administrator	2015	Taxes	Staff time
Subdivision Regulations - Consider road and driveway specifications	Planning Board	2011-2016	Taxes	Staff/volunteer time

Table VIII-2: IMPLEMENTATION SCHEDULE FOR PROPOSED MITIGATION ACTIONS

Mitigation Action	Who (Leadership)	When (Deadline)	How (Funding Source)	Cost
Water Supply Mapping	Fire Chief	2015	NCRC&D Grant	$0
Drought Mitigation Plan	EMD/Water Operator	2015	Taxes	Staff Time
Firewise Education	Fire Chief	2012	Taxes	Staff Time
Emergency Shelters	EMD; DEMD; Town Administrator	2011	Taxes	Staff Time
Emergency Spill Plan & Equipment	EMD; DEMD; Town Administrator	2011	Taxes	Staff Time
Building Code Adoption	Building Inspector; Fire Chief	2012	Taxes	Staff Time
GIS Mapping of Hazard Areas	Town Administrator	2015	Grants & Taxes	

IX. ADOPTION & IMPLEMENTATION OF THE PLAN

A good plan needs to provide for periodic monitoring and evaluation of its successes and challenges, and to allow for updates of the Plan where necessary. In order to track progress and update the Mitigation Strategies identified in the Plan, the Town of Canaan will revisit the Hazard Mitigation Plan annually, or after a hazard event. The Canaan Emergency Management Director will initiate this review and should consult with the Hazard Mitigation Committee. Changes will be made to the plan to accommodate for projects that have failed, or that are not considered feasible after a review for their consistency with the evaluation criteria, the timeframe, the community's priorities, and funding resources. Priorities that were not ranked highest, but that were identified as potential mitigation strategies, will be reviewed as well during the monitoring and update of this plan, to determine feasibility for future implementation. The plan will be updated and submitted for FEMA approval at a minimum every five years as required by the Disaster Mitigation Act 2000.

A. IMPLEMENTATION THROUGH EXISTING PROGRAMS

The Plan will be adopted locally as an Annex to the updated Emergency Operations Plan (EOP), and it will be updated annually along with the EOP. In addition, the Board of Selectmen, during the Capital Improvement Process, will review and include any proposed structural projects outlined in this plan. As other Town documents are updated, they will include hazard risks and mitigation strategies from this plan. This would include the Town Master Plan.

B. CONTINUED PUBLIC INVOLVEMENT

The public will continue to be involved in the hazard mitigation planning process. In future years, a public meeting will be held (separate from the adoption meeting) to inform and educate members of the public and to take public comment for incorporation into any updates of the plan. Additionally information will be posted on the Town website.

The public has been involved in hazard mitigation planning through public hearings and the town meeting when explaining programs and expenses.

Copies of future updated Hazard Mitigation Plans will be sent to the following parties for review and comment:

- Emergency Management Directors, neighboring towns
- Field Representative, NH Homeland Security & Emergency Management
- Canaan Board of Selectmen and Planning Board
- Upper Valley Lake Sunapee Regional Planning Commission

RESOURCES USED IN THE PREPARATION OF THIS PLAN

Guide to Hazard Mitigation Planning for New Hampshire Communities, prepared for NH Bureau of Emergency Management (now NH Homeland Security & Emergency Management) by the Southwest Regional Planning Commission (October 2002)

FEMA *Multi-Hazard Mitigation Planning Guidance Under the Disaster Mitigation Act of 2000* (March 2004, Last Revised June 2007)

FEMA 386-1 *Getting Started: Building Support for Mitigation Planning* (September 2002)

FEMA 386-2 *Understanding Your Risks: Identifying Hazards and Estimating Costs* (August 2001)

FEMA 386-3 *Developing the Mitigation Plan: Identifying Mitigation Actions and Implementation Strategies* (April 2003)

Ice Storm '98 by Eugene L. Lecomte et al for the Institute for Catastrophic Loss Reduction (Canada) and the Institute for Business & Home Safety (U.S.) (December 1998)

Lucey, Bernie, P.E. NH Department of Environmental Services, Drinking Water & Groundwater Bureau, Phone Discussion 01/29/08

Town of Canaan Emergency Operations Plan (2004)

Town of Canaan Master Plan (2006)

NH Department of Environmental Services, Drinking Water & Groundwater Bureau Fact Sheets: *ARD-EHP-22 Radium, Radon, and Uranium: Health Information Summary (2007); WD-WSEB-3-11 Dissolved Mineral Radioactivity In Drinking Water (2004); WD-WSEB-2-1 Suggested Water Quality Testing for Private Wells (2003)*

NH Bureau of Emergency Management (now NH Homeland Security & Emergency Management)'s *State of New Hampshire Natural Hazard Mitigation Plan* (2004)

www.fema.gov/news/disasters.fema: Website for FEMA's Disaster List (last visited 07/14/10)

www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms: Website for National Oceanic & Atmospheric Administration Disaster List (last visited 07/14/10)

www.tornadoproject.com: Website for The Tornado Project (last visited 07/14/10)

www.crrel.usace.army.mil/: Website for Cold Regions Research and Engineering Laboratory Website (CRREL) (last visited 07/14/10)

www.nesec.org: Website for Northeast States Emergency Consortium (last visited 07/14/10)

http://earthquake.usgs.gov/research/hazmaps/products_data/2002/ceus2002.php: Website for area earthquake information

APPENDICES

APPENDIX A:

TECHNICAL RESOURCES

1) Agencies

New Hampshire Homeland Security & Emergency Management 271-2231
Federal Emergency Management Agency ..... (617) 223-4175
NH Regional Planning Commissions:
  Upper Valley Lake Sunapee Regional Planning Commission 448-1680
NH Executive Department:
  Governor's Office of Energy and Community Services 271-2611
  New Hampshire Office of State Planning 271-2155
NH Department of Cultural Affairs: 271-2540
  Division of Historical Resources 271-3483
NH Department of Environmental Services: 271-3503
  Air Resources 271-1370
  Waste Management 271-2900
  Water Resources 271-3406
  Water Supply and Pollution Control 271-3504
  Rivers Management and Protection Program 271-1152
NH Office of Energy and Planning 271-2155
NH Municipal Association 224-7447
NH Fish and Game Department 271-3421
NH Department of Resources and Economic Development: 271-2411
  Natural Heritage Inventory 271-3623
  Division of Forests and Lands 271-2214
  Division of Parks and Recreation 271-3255
NH Department of Transportation 271-3734
Northeast States Emergency Consortium, Inc. (NESEC) ..... (781) 224-9876
US Department of Commerce:
  National Oceanic and Atmospheric Administration:

National Weather Service; Gray, Maine 207-688-3216

US Department of the Interior:
US Fish and Wildlife Service 225-1411
US Geological Survey 225-4681
US Army Corps of Engineers ..... (978) 318-8087
US Department of Agriculture:
Natural Resource Conservation Service 868-7581

2) Mitigation Funding Resources

404 Hazard Mitigation Grant Program (HMGP) ..... NH Homeland Security & Emergency Management
406 Public Assistance and Hazard Mitigation ..... NH Homeland Security & Emergency Management
Community Development Block Grant (CDBG) ..... NH Homeland Security, NH OEP, also refer to RPC
Dam Safety Program ..... NH Department of Environmental Services
Disaster Preparedness Improvement Grant (DPIG) ..... NH Homeland Security & Emergency Management
Emergency Generators Program by NESEC‡ ..... NH Homeland Security & Emergency Management
Emergency Watershed Protection (EWP) Program ..... USDA, Natural Resources Conservation Service
Flood Mitigation Assistance Program (FMAP) ..... NH Homeland Security & Emergency Management
Flood Plain Management Services (FPMS) ..... US Army Corps of Engineers
Mitigation Assistance Planning (MAP) ..... NH Homeland Security & Emergency Management
Mutual Aid for Public Works ..... NH Municipal Association
National Flood Insurance Program (NFIP) † ..... NH Office of Energy and Planning
Power of Prevention Grant by NESEC‡ ..... NH Homeland Security & Emergency Management
Project Impact ..... NH Homeland Security & Emergency Management
Roadway Repair & Maintenance Program(s) ..... NH Department of Transportation
Section 14 Emergency Stream Bank Erosion & Shoreline Protection ..... US Army Corps of Engineers
Section 103 Beach Erosion ..... US Army Corps of Engineers
Section 205 Flood Damage Reduction ..... US Army Corps of Engineers
Section 208 Snagging and Clearing ..... US Army Corps of Engineers
Shoreland Protection Program ..... NH Department of Environmental Services
Various Forest and Lands Program(s) ..... NH Department of Resources and Economic Development
Wetlands Programs ..... NH Department of Environmental Services

‡NESEC – Northeast States Emergency Consortium, Inc. is a 501(c)(3), not-for-profit natural disaster, multi-hazard mitigation and emergency management organization located in Wakefield, Massachusetts. Please, contact NH OEM for more information.

† Note regarding National Flood Insurance Program (NFIP) and Community Rating System (CRS):
The National Flood Insurance Program has developed suggested floodplain management activities for those communities who wish to more thoroughly manage or reduce the impact of flooding in their jurisdiction. Through use of a rating system (CRS rating), a community's floodplain management efforts can be evaluated for effectiveness. The rating, which indicates an above average floodplain management effort, is then factored into the premium cost for flood insurance policies sold in the community. The higher the rating achieved in that community, the greater the reduction in flood insurance premium costs for local property owners. The NH Office of State Planning can provide additional information regarding participation in the NFIP-CRS Program.

3) Websites

Sponsor	Internet Address	Summary of Contents
Natural Hazards Research Center, U. of Colorado	http://www.colorado.edu/litbase/hazards/	Searchable database of references and links to many disaster-related websites.
Atlantic Hurricane Tracking Data by Year	http://wxp.eas.purdue.edu/hurricane	Hurricane track maps for each year, 1886 – 1996
National Emergency Management Association	http://nemaweb.org	Association of state emergency management directors; list of mitigation projects.
NASA – Goddard Space Flight Center "Disaster Finder:	http://www.gsfc.nasa.gov/ndrd/disaster/	Searchable database of sites that encompass a wide range of natural disasters.
NASA Natural Disaster Reference Database	http://ltpwww.gsfc.nasa.gov/ndrd/main/html	Searchable database of worldwide natural disasters.
U.S. State & Local Gateway	http://www.statelocal.gov/	General information through the federal-state partnership.
National Weather Service	http://nws.noaa.gov/	Central page for National Weather Warnings, updated every 60 seconds.
USGS Real Time Hydrologic Data	http://h20.usgs.gov/public/realtime.html	Provisional hydrological data
Dartmouth Flood Observatory	http://www.dartmouth.edu/artsci/geog/floods/	Observations of flooding situations.
FEMA, National Flood Insurance Program, Community Status Book	http://www.fema.gov/fema/csb.htm	Searchable site for access of Community Status Books

Sponsor	Internet Address	Summary of Contents
Florida State University Atlantic Hurricane Site	http://www.met.fsu.edu/explores/tropical.html	Tracking and NWS warnings for Atlantic Hurricanes and other links
National Lightning Safety Institute	http://lightningsafety.com/	Information and listing of appropriate publications regarding lightning safety.
NASA Optical Transient Detector	http://www.ghcc.msfc.nasa.gov/otd.html	Space-based sensor of lightning strikes
LLNL Geologic & Atmospheric Hazards	http://wwwep.es.llnl.gov/wwwep/ghp.html	General hazard information developed for the Dept. of Energy.
The Tornado Project Online	http://www.tornadoroject.com/	Information on tornadoes, including details of recent impacts.
National Severe Storms Laboratory	http://www.nssl.uoknor.edu/	Information about and tracking of severe storms.
Independent Insurance Agents of America IIAA Natural Disaster Risk Map	http://www.iiaa.iix.com/ndcmap.htm	A multi-disaster risk map.
Earth Satellite Corporation	http://www.earthsat.com/	Flood risk maps searchable by state.
USDA Forest Service Web	http://www.fs.fed.us/land	Information on forest fires and land management.

Appendix B:
HAZARD MITIGATION ASSISTANCE GRANTS

Hazard Mitigation Assistance (HMA) grant programs of the Department of Homeland Security (DHS) Federal Emergency Management Agency (FEMA), presents a critical opportunity to protect individuals and property from natural hazards while simultaneously reducing reliance on Federal disaster funds. The HMA programs provide pre-disaster mitigation grants annually to local communities. The statutory origins of the programs differ, but all share the common goal of reducing the loss of life and property due to natural hazards. Eligible applicants include State-level agencies including State institutions; Federally recognized Indian Tribal governments; Public or Tribal colleges or universities (PDM only); and Local jurisdictions that are participating in the National Flood Insurance Program (NFIP).

The HMA grant assistance includes four programs:

1. *The Pre-Disaster Mitigation (PDM) program*: This provides funds 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 awarded on a competitive basis.

2. *The Flood Mitigation Assistance (FMA) program*: This provides funds so that cost-effective measures can be taken to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insured under the NFIP. The long-term goal of FMA is to reduce or eliminate claims under the NFIP through mitigation activities.

3. *The Repetitive Flood Claims (RFC) program*: This program provides funding to reduce of eliminate the long-term risk of flood damage to structures insured by NFIP that have had one or more claim payments for flood damages. The long-term goal of the RFC program is to reduce or eliminate claims under the NFIP through mitigation activities that are in the best interest of the NFIP.

4. *The Severe Repetitive Loss (SRL) program*: This program provides funding to reduce or eliminate the long-term risk of flood damage to severe repetitive loss residential structures insured under the NFIP.

Potential eligible projects are shown in the following table by grant program. For further information on these programs visit the following FEMA websites:

PDM – www.fema.gov/government/grant/pdm/

FMA – www.fema.gov/government/grant/fma

RFC – www.fema.gov/government/grant/rfc

SRL – www.fema.gov/government/grant/srl

Mitigation Project:	**PDM**	**FMA**	**RFC**	**SRL**
1. Property Acquisition and Demolition or Relocation Project				
Property Elevation	**X**	**X**	**X**	**X**
2. Construction Type Projects				
Property Elevation	**X**	**X**	**X**	**X**
Mitigation Reconstruction[1]				**X**
Localized Minor Flood Reduction Projects	**X**	**X**	**X**	**X**
Dry Floodproofing of Residential Property[2]		**X**		**X**
Dry Floodproofing of Non-residential Structures		**X**	**X**	
Stormwater Management	**X**	**X**		
Infrastructure Protection Measure	**X**			
Vegetative Management/Soil Stabilization	**X**			
Retrofitting Existing Buildings and Facilities (Wind/Earthquake)	**X**			
Safe room construction	**X**			
3. Non-construction Type Projects				
All Hazard/Flood Mitigation Planning	**X**	**X**		

1. The SLR Program allows Mitigation Reconstruction projects located outside the regulatory floodway or Zone V as identified on the effective Flood Insurance Rate Map (FIRM), or the mapped limit of the 1.5-foot breaking wave zone. Mitigation Reconstruction is only permitted if traditional elevation cannot be implemented.
2. The residential structure must meet the definition of "Historic Structure" in 44 CFR§59.1.

Source: "Hazard Mitigation Assistance Program Guidance," FEMA, June 19, 2008

Appendix C

Meeting Documentation

PUBLIC MEETING AGENDAS:

Meeting #1: August 26, 2010 9:00 am – 10:30 am (1-1/2 hours)

- General discussion of requirements and in-kind match process
- Review goals of hazard mitigation plan and revise
- Review hazards (changes include adding erosion)
- Identify and map past/potential hazards (update map and lists in Appendix D & Section II)
- Flooding – Are there any non-FEMA flood areas?
- Specific past and potential erosion, drought, and natural contaminant events
- Potential development areas in town (see page 8)
- Identify critical facilities (update map and App. D)
- Determine Vulnerability to Hazards (handout)
- Determine Probability of Hazards (handout - score)
- Review Critical Facilities & hazard vulnerability (handout)
- Determine a two to three meetings (one day meeting with lunch or two two-hour meetings plus a one-hour draft review meeting)

Meeting #2 September 29, 2010 10 am – 2:30 pm (4 hours plus lunch)

- Review previously determined potential mitigation efforts (were they implemented? If not, are they still on the table to be implemented?)
- Evaluate the past mitigation efforts
- Develop a prioritized implementation schedule of proposed improvements of existing mitigation efforts

Meeting #3 October 20, 2010 10 am – Noon (1-1/2 hour)

- Brainstorm and evaluate potential mitigation effort
- Develop prioritized implementation schedule of potential mitigation efforts
- Discuss adoption and monitoring of plan

Meeting #4 November 17, 2010 10 am – 11 am (1 hour)

- Review and revise draft updated plan

Appendix D

Map of Hazard Areas and Critical Facilities

Hazard Areas and Community Facilities Canaan, NH

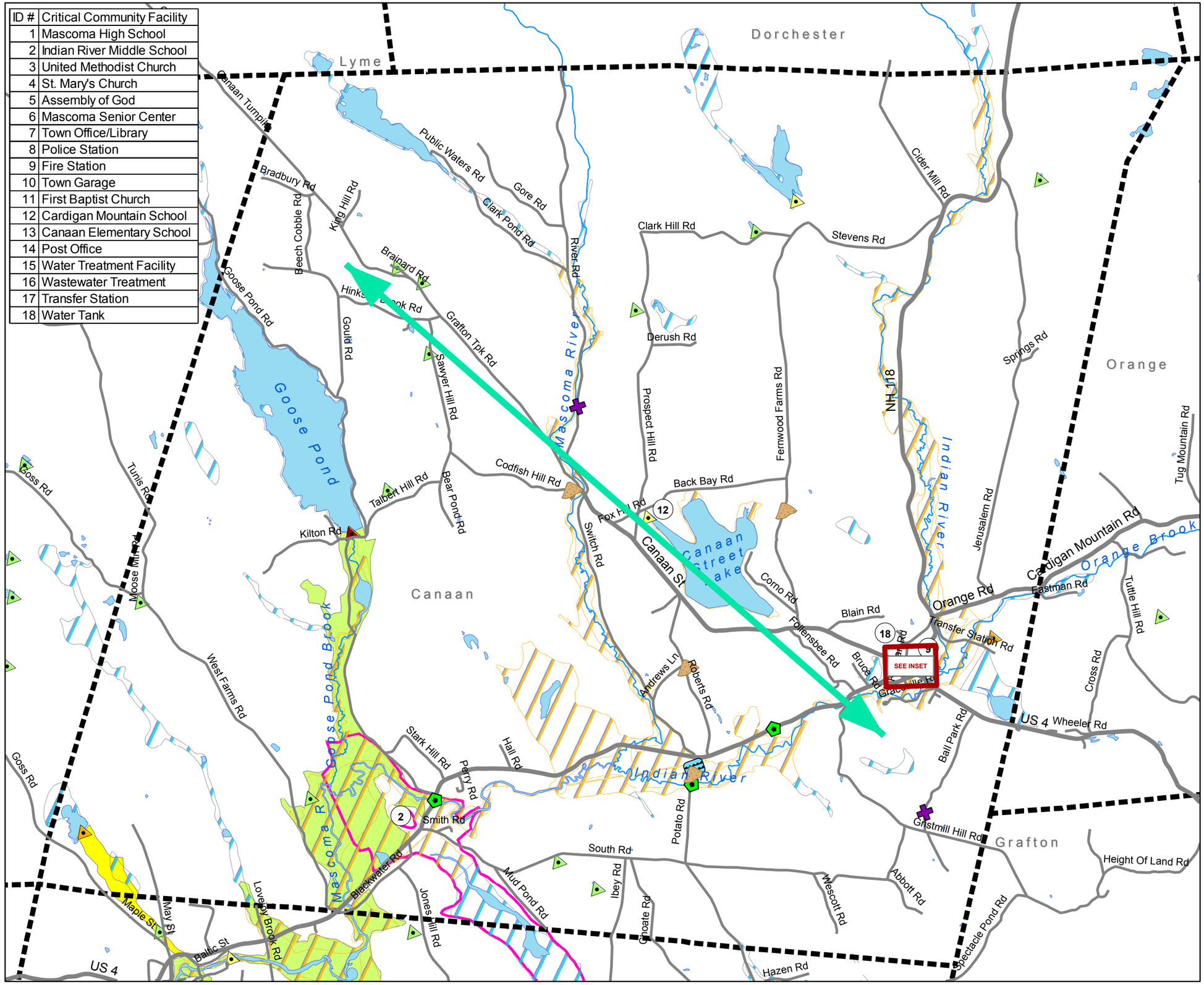
N E S W

0 0.5 1 1.5 2 Miles

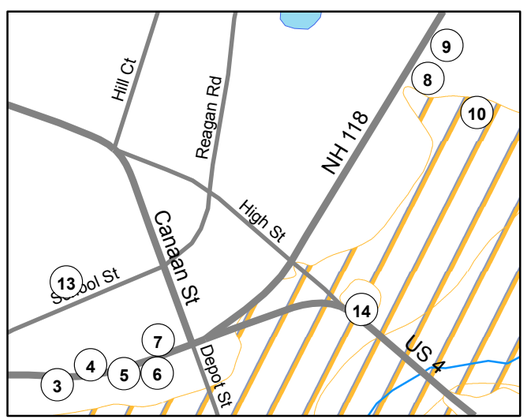
Legend

- Critical Facilities
- Flood Hazard Areas
  - Zone A
  - Zone AE
- **Dam Failure Flood Area**
  - Smith Pond Dam
  - Goose Pond Dam
  - Harris Brk Res Dam
- Dams by Hazard Potential
  - High
  - Significant
  - Low
  - Non Menace
- Erosion
- Flooding
- Ice Jam
- Landslide
- Roadways
  - State
  - Local
- Town Lines
- Waterbodies
- Rivers, Streams
- Prevailing Wind Directions for High-Wind Events

ID #	Critical Community Facility
1	Mascoma High School
2	Indian River Middle School
3	United Methodist Church
4	St. Mary's Church
5	Assembly of God
6	Mascoma Senior Center
7	Town Office/Library
8	Police Station
9	Fire Station
10	Town Garage
11	First Baptist Church
12	Cardigan Mountain School
13	Canaan Elementary School
14	Post Office
15	Water Treatment Facility
16	Wastewater Treatment
17	Transfer Station
18	Water Tank



Canaan Village



Map created November 2010 by UVLSRPC. Public roads from NH DOT, 2010. Dam inundation data from NH DES Dam Bureau, date varies. Flood hazard areas from digital Flood Insurance Rate Maps, FEMA, 2008. Critical Facilities developed by UVLSRPC with Town of Canaan, 2003, updated 2010. Local hazards developed by UVLSRPC with Town of Canaan, 2010.

Upper Valley Lake Sunapee Regional Planning Commission

Appendix E

FEMA Approval and Crosswalk;
Town Resolution of Adoption

From: Hilliard, Marilyn
To: Vickie Davis;
cc: Lance.Harbour@dos.nh.gov; Ndikum-Nyada, Brigitte; Johnson, Nan; Costa, Norma;
Subject: Canaan, NH Conditional Approval
Date: Tuesday, May 10, 2011 10:00:31 AM

Congratulations, Ms. Davis!

FEMA Region I has completed its review of the Canaan, NH Multi-Hazard Mitigation Plan and found it approvable pending adoption. With this approval, the jurisdiction meets the local mitigation planning requirements under 44 CFR 201 **pending receipt of the adoption documentation and an electronic copy of the final plan**. These items should be provided to your state mitigation planning point of contact who will ensure they are forwarded to FEMA. Acceptable electronic formats include a *.doc* or *.pdf* file and may be submitted on a CD. Upon FEMA's receipt of these documents, a formal letter of approval will be issued, along with the final FEMA crosswalk.

The FEMA letter of formal approval will confirm the Town'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 FEMA's Conditional Approval, the jurisdiction must update the entire plan and resubmit it for FEMA review. If you have questions or wish to discuss this determination further, please contact me at marilyn.hilliard@dhs.gov or 617-956-7536.

Thank you for submitting Canaan's Multi-Hazard Mitigation Plan and congratulations again on your successful community planning efforts.

marilyn.hilliard@fema.gov
Mitigation Division, FEMA Region I
99 High St., 6th fl., Boston, MA 02110
617-956-7536 phone
617-956-7574 fax

INSTRUCTIONS FOR USING THE PLAN REVIEW CROSSWALK FOR REVIEW OF LOCAL MITIGATION PLANS

Attached is a Plan Review Crosswalk based on the ***Local Multi-Hazard Mitigation Planning Guidance***, published by FEMA in July, 2008. This Plan Review Crosswalk is consistent with the *Robert T. Stafford Disaster Relief and Emergency Assistance Act* (Stafford Act), as amended by Section 322 of the *Disaster Mitigation Act of 2000* (P.L. 106-390), the *National Flood Insurance Act of 1968,* as amended by the *National Flood Insurance Reform Act of 2004* (P.L. 108-264) and *44 Code of Federal Regulations (CFR) Part 201 – Mitigation Planning,* inclusive of all amendments through October 31, 2007.

SCORING SYSTEM
N – Needs Improvement: The plan does not meet the minimum for the requirement. Reviewer's comments must be provided.
S – Satisfactory: The plan meets the minimum for the requirement. Reviewer's comments are encouraged, but not required.

Each requirement includes separate elements. All elements of a requirement must be rated "Satisfactory" in order for the requirement to be fulfilled and receive a summary score of "Satisfactory." A "Needs Improvement" score on elements shaded in gray (recommended but not required) will not preclude the plan from passing.

When reviewing single jurisdiction plans, reviewers may want to put an N/A in the boxes for multi-jurisdictional plan requirements. When reviewing multi-jurisdictional plans, however, all elements apply. States that have additional requirements can add them in the appropriate sections of the *Local Multi-Hazard Mitigation Planning Guidance* or create a new section and modify this Plan Review Crosswalk to record the score for those requirements. Optional matrices for assisting in the review of sections on profiling hazards, assessing vulnerability, and identifying and analyzing mitigation actions are found at the end of the Plan Review Crosswalk.

The example below illustrates how to fill in the Plan Review Crosswalk.:

Assessing Vulnerability: Overview

Requirement §201.6(c)(2)(ii): *[The risk assessment **shall** include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description **shall** include an overall summary of each hazard and its impact on the community.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan include an **overall summary** description of the jurisdiction's **vulnerability** to each hazard?	Section II, pp. 4-10	The plan describes the types of assets that are located within geographically defined hazard areas as well as those that would be affected by winter storms.		☐
B. Does the **new or updated** plan address the **impact** of each hazard on the jurisdiction?	Section II, pp. 10-20	The plan does not address the impact of two of the five hazards addressed in the plan. **Required Revisions:** • Include a description of the impact of floods and earthquakes on the assets. **Recommended Revisions:** This information can be presented in terms of dollar value or percentages of damage.	☐	
		SUMMARY SCORE	☐	

LOCAL MITIGATION PLAN REVIEW SUMMARY

The plan cannot be approved if the plan has not been formally adopted. Each requirement includes separate elements. All elements of the requirement must be rated "Satisfactory" in order for the requirement to be fulfilled and receive a score of "Satisfactory." Elements of each requirement are listed on the following pages of the Plan Review Crosswalk. A "Needs Improvement" score on elements shaded in gray (recommended but not required) will not preclude the plan from passing. Reviewer's comments must be provided for requirements receiving a **"Needs Improvement"** score.

Prerequisite(s) (Check Applicable Box)	**NOT MET**	**MET**
1. Adoption by the Local Governing Body: §201.6(c)(5) OR		
2. Multi-Jurisdictional Plan Adoption: §201.6(c)(5) **AND**		
3. Multi-Jurisdictional Planning Participation: §201.6(a)(3)		

Planning Process	**N**	**S**
4. Documentation of the Planning Process: §201.6(b) and §201.6(c)(1)		

Risk Assessment	**N**	**S**
5. Identifying Hazards: §201.6(c)(2)(i)		
6. Profiling Hazards: §201.6(c)(2)(i)		
7. Assessing Vulnerability: Overview: §201.6(c)(2)(ii)		
8. Assessing Vulnerability: Addressing Repetitive Loss Properties. §201.6(c)(2)(ii)		
9. Assessing Vulnerability: Identifying Structures, Infrastructure, and Critical Facilities: §201.6(c)(2)(ii)(B)		
10. Assessing Vulnerability: Estimating Potential Losses: §201.6(c)(2)(ii)(B)		
11. Assessing Vulnerability: Analyzing Development Trends: §201.6(c)(2)(ii)(C)		
12. Multi-Jurisdictional Risk Assessment: §201.6(c)(2)(iii)		

*States that have additional requirements can add them in the appropriate sections of the *Local Multi-Hazard Mitigation Planning Guidance* or create a new section and modify this Plan Review Crosswalk to record the score for those requirements.

SCORING SYSTEM

Please check one of the following for each requirement.

N – Needs Improvement: The plan does not meet the minimum for the requirement. Reviewer's comments must be provided.

S – Satisfactory: The plan meets the minimum for the requirement. Reviewer's comments are encouraged, but not required.

Mitigation Strategy	**N**	**S**
13. Local Hazard Mitigation Goals: §201.6(c)(3)(i)		
14. Identification and Analysis of Mitigation Actions: §201.6(c)(3)(ii)		
15. Identification and Analysis of Mitigation Actions: NFIP Compliance. §201.6(c)(3)(ii)		
16. Implementation of Mitigation Actions: §201.6(c)(3)(iii)		
17. Multi-Jurisdictional Mitigation Actions: §201.6(c)(3)(iv)		

Plan Maintenance Process	**N**	**S**
18. Monitoring, Evaluating, and Updating the Plan: §201.6(c)(4)(ii)		
19. Incorporation into Existing Planning Mechanisms: §201.6(c)(4)(ii)		
20. Continued Public Involvement: §201.6(c)(4)(iii)		

Additional State Requirements*	**N**	**S**
Insert State Requirement		
Insert State Requirement		
Insert State Requirement		

LOCAL MITIGATION PLAN APPROVAL STATUS

PLAN NOT APPROVED	
See Reviewer's Comments	
PLAN APPROVED	

LOCAL MITIGATION PLAN REVIEW CROSSWALK

Local Mitigation Plan Review and Approval Status

Jurisdiction: Town of Canaan, New Hampshire	**Title of Plan:** Canaan Hazard Mitigation Plan	**Date of Plan:** November 2010
Local Point of Contact: Victoria Davis	**Address:** 10 Water Street, Suite 225 Lebanon, NH 03766	
Title: Planner		
Agency: Upper Valley Lake Sunapee Regional Planning Commission		
Phone Number: 603-448-1680	**E-Mail:** vdavis@uvlsrpc.org	

State Reviewer:	**Title:**	**Date:**

FEMA Reviewer:	**Title:**	**Date:**
Date Received in FEMA Region [Insert #]		
Plan Not Approved		
Plan Approved		
Date Approved		

Jurisdiction:	**DFIRM**		**NFIP Status***			
	In Plan	**NOT in Plan**	**Y**	**N**	**N/A**	**CRS Class**
1. Town of Canaan, New Hampshire Current FIRM 2/20/08			x			
2.						
3.						
4.						
5. [ATTACH PAGE(S) WITH ADDITIONAL JURISDICTIONS]						

*** Notes:** **Y = Participating** **N = Not Participating** **N/A = Not Mapped**

LOCAL MITIGATION PLAN REVIEW CROSSWALK

PREREQUISITE(S)

1. Adoption by the Local Governing Body

***Requirement §201.6(c)(5)*:** *[The local hazard mitigation plan **shall** include] documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council).*

Element	**Location in the Plan** (section or annex and page #)	Reviewer's Comments	SCORE NOT MET	SCORE MET
A. Has the local governing body adopted **new or updated** plan?				
B. Is supporting documentation, such as a resolution, included?				
		SUMMARY SCORE		

2. Multi-Jurisdictional Plan Adoption

***Requirement §201.6(c)(5)*:** *For multi-jurisdictional plans, each jurisdiction requesting approval of the plan **must** document that it has been formally adopted.*

Element	**Location in the Plan** (section or annex and page #)	Reviewer's Comments	SCORE NOT MET	SCORE MET
A. Does the **new or updated** plan indicate the specific jurisdictions represented in the plan?				
B. For each jurisdiction, has the local governing body adopted the **new or updated** plan?				
C. Is supporting documentation, such as a resolution, included for each participating jurisdiction?				
		SUMMARY SCORE		

3. Multi-Jurisdictional Planning Participation

***Requirement §201.6(a)(3)*:** *Multi-jurisdictional plans (e.g., watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process … Statewide plans will not be accepted as multi-jurisdictional plans.*

Element	**Location in the Plan** (section or annex and page #)	Reviewer's Comments	SCORE NOT MET	SCORE MET
A. Does the **new or updated** plan describe **how** each jurisdiction participated in the plan's development?				
B. Does the updated plan identify all participating jurisdictions, including new, continuing, and the jurisdictions that no longer participate in the plan?				
		SUMMARY SCORE		

PLANNING PROCESS: *§201.6(b): An open public involvement process is essential to the development of an effective plan.*

4. Documentation of the Planning Process

Requirement §201.6(b): *In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process* ***shall*** *include:*
(1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
(2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and
(3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Requirement §201.6(c)(1): *[The plan* ***shall*** *document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.*

Element	**Location in the Plan** (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the plan provide a narrative description of the process followed to prepare the **new or updated** plan?	pp. 3-5			
B. Does the **new or updated** plan indicate who was involved in the **current** planning process? (For example, who led the development at the staff level and were there any external contributors such as contractors? Who participated on the plan committee, provided information, reviewed drafts, *etc*.?)	p. 6			
C. Does the **new or updated** plan indicate how the public was involved? (Was the public provided an opportunity to comment on the plan during the drafting stage and prior to the plan approval?)	p. 6			
D. **Does the new or updated plan discuss the** opportunity for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process?	p. 6			
E. Does the planning process describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information?	pp. 46-49			
F. Does the updated plan document how the planning team reviewed and analyzed each section of the plan and whether each section was revised as part of the update process?	p. 3; p. 46-49; p. 53			
		SUMMARY SCORE		

RISK ASSESSMENT: *§201.6(c)(2): The plan shall include a risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.*

5. Identifying Hazards

Requirement §201.6(c)(2)(i): *[The risk assessment **shall** include a] description of the type … of all natural hazards that can affect the jurisdiction.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan include **a description** of the types of **all natural hazards** that affect the jurisdiction?	pp. 10-35			
		SUMMARY SCORE		

6. Profiling Hazards

Requirement §201.6(c)(2)(i): *[The risk assessment **shall** include a] description of the … location and extent of all natural hazards that can affect the jurisdiction. The plan **shall** include information on previous occurrences of hazard events and on the probability of future hazard events.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the risk assessment identify the **location** (*i.e.*, geographic area affected) of each natural hazard addressed in the **new or updated** plan?	pp. 10-35; Appendix D			
B. Does the risk assessment identify the **extent** (*i.e.*, magnitude or severity) of each hazard addressed in the **new or updated** plan?	pp. 10-35			
C. Does the plan provide information on **previous occurrences** of each hazard addressed in the **new or updated** plan?	pp. 10-35			
D. Does the plan include the **probability of future events** (*i.e.*, chance of occurrence) for each hazard addressed in the **new or updated** plan?	pp. 35-38			
		SUMMARY SCORE		

7. Assessing Vulnerability: Overview

Requirement §201.6(c)(2)(ii): *[The risk assessment **shall** include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description **shall** include an overall summary of each hazard and its impact on the community.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan include an **overall summary** description of the jurisdiction's **vulnerability** to each hazard?	p. 42-45			
B. Does the **new or updated** plan address the **impact** of each hazard on the jurisdiction?	pp. 42-45			
		SUMMARY SCORE		

8. Assessing Vulnerability: Addressing Repetitive Loss Properties

Requirement §201.6(c)(2)(ii): *[The risk assessment] **must** also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged floods.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the new or updated plan describe vulnerability in terms of the types and numbers of *repetitive loss properties* located in the identified hazard areas?	p. 17	***Note: This requirement becomes effective for all local plans approved after October 1, 2008.***		
		SUMMARY SCORE		

9. Assessing Vulnerability: Identifying Structures

Requirement §201.6(c)(2)(ii)(A): *The plan **should** describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area … .*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan describe vulnerability in terms of the **types and numbers** of **existing** buildings, infrastructure, and critical facilities located in the identified hazard areas?	pp. 13, 15, 41-45	***Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.***		
B. Does the **new or updated** plan describe vulnerability in terms of the **types and numbers** of **future** buildings, infrastructure, and critical facilities located in the identified hazard areas?	p. 41	***Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.***		
		SUMMARY SCORE		

10. Assessing Vulnerability: Estimating Potential Losses

Requirement §201.6(c)(2)(ii)(B): *[The plan **should** describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate … .*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan estimate **potential dollar losses** to vulnerable structures?	p. 41-45	***Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.***		
B. Does the **new or updated** plan describe the **methodology** used to prepare the estimate?	p. 39	***Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.***		
		SUMMARY SCORE		

11. Assessing Vulnerability: Analyzing Development Trends

Requirement §201.6(c)(2)(ii)(C): *[The plan **should** describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan describe land uses and development trends?	pp. 7-8; p. 41	***Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.***		
		SUMMARY SCORE		

12. Multi-Jurisdictional Risk Assessment

Requirement §201.6(c)(2)(iii): *For multi-jurisdictional plans, the risk assessment **must** assess each jurisdiction's risks where they vary from the risks facing the entire planning area.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan include a risk assessment for each participating jurisdiction as needed to reflect unique or varied risks?				
		SUMMARY SCORE		

MITIGATION STRATEGY: *§201.6(c)(3): The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.*

13. Local Hazard Mitigation Goals

Requirement §201.6(c)(3)(i): *[The hazard mitigation strategy **shall** include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A Does the **new or updated** plan include a description of mitigation **goals** to reduce or avoid long-term vulnerabilities to the identified hazards?	p. 5-6; 52			
		SUMMARY SCORE		

14. Identification and Analysis of Mitigation Actions

Requirement §201.6(c)(3)(ii): *[The mitigation strategy **shall** include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan identify and analyze a **comprehensive range** of specific mitigation actions and projects for each hazard?	pp. 46-49; 53			
B Do the identified actions and projects address reducing the effects of hazards on **new** buildings and infrastructure?	pp. 50-51; p. 54			
C. Do the identified actions and projects address reducing the effects of hazards on **existing** buildings and infrastructure?	pp. 50-51; p. 54			
		SUMMARY SCORE		

15. Identification and Analysis of Mitigation Actions: National Flood Insurance Program (NFIP) Compliance

Requirement: §201.6(c)(3)(ii): *[The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate.*

Element	**Location in the Plan** (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the new or updated plan describe the jurisdiction (s) participation in the NFIP?	p. 17	***Note: This requirement becomes effective for all local mitigation plans approved after October 1, 2008.***		
B. Does the mitigation strategy identify, analyze and prioritize actions related to continued compliance with the NFIP?	pp. 46	***Note: This requirement becomes effective for all local mitigation plans approved after October 1, 2008.***		
		SUMMARY SCORE		

16. Implementation of Mitigation Actions

Requirement: §201.6(c)(3)(iii): *[The mitigation strategy section **shall** include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization **shall** include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.*

Element	**Location in the Plan** (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** mitigation strategy include how the actions are **prioritized**? (For example, is there a discussion of the process and criteria used?)	p. 50-51 & pp. 53-54			
B. Does the **new or updated** mitigation strategy address how the actions will be implemented and administered, including the responsible department, existing and potential resources and the timeframe to complete each action?	pp. 55-57			
C. Does the **new or updated** prioritization process include an emphasis on the use of a **cost-benefit review** to maximize benefits?	pp. 50-51, 54			
D. Does the **updated** plan identify the completed, deleted or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (*i.e.*, deferred), does the updated plan describe why no changes occurred?	pp. 46-49; p. 53			
		SUMMARY SCORE		

17. Multi-Jurisdictional Mitigation Actions

Requirement §201.6(c)(3)(iv): *For multi-jurisdictional plans, there* ***must*** *be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A Does the **new or updated** plan include identifiable **action items** for each jurisdiction requesting FEMA approval of the plan?				
B. Does the **updated** plan identify the completed, deleted or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (*i.e.*, deferred), does the updated plan describe why no changes occurred?				
		SUMMARY SCORE		

PLAN MAINTENANCE PROCESS

18. Monitoring, Evaluating, and Updating the Plan

Requirement §201.6(c)(4)(i): *[The plan maintenance process* ***shall*** *include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan describe the method and schedule for **monitoring** the plan, including the responsible department?	p. 58			
B. Does the **new or updated** plan describe the method and schedule for **evaluating** the plan, including how, when and by whom (*i.e.* the responsible department)?	p. 58			
C. Does the **new or updated** plan describe the method and schedule for **updating** the plan within the five-year cycle?	p. 58			
		SUMMARY SCORE		

19. Incorporation into Existing Planning Mechanisms

Requirement §201.6(c)(4)(ii): *[The plan **shall** include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan identify other local planning mechanisms available for incorporating the mitigation requirements of the mitigation plan?	pp. 46-49; p. 53			
B. Does the **new or updated** plan include a process by which the local government will incorporate the mitigation strategy and other information contained in the plan (*e.g.*, risk assessment) into other planning mechanisms, when appropriate?	pp. 46-49; p. 53			
C. Does the **updated** plan explain how the local government incorporated the mitigation strategy and other information contained in the plan (*e.g.*, risk assessment) into other planning mechanisms, when appropriate?	pp. 46-49; p. 53			
		SUMMARY SCORE		

Continued Public Involvement

Requirement §201.6(c)(4)(iii): *[The plan maintenance process **shall** include a] discussion on how the community will continue public participation in the plan maintenance process.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan explain how **continued public participation** will be obtained? (For example, will there be public notices, an on-going mitigation plan committee, or annual review meetings with stakeholders?)	p. 58			
		SUMMARY SCORE		

MATRIX A: PROFILING HAZARDS

This matrix can assist FEMA and the State in scoring each hazard. Local jurisdictions may find the matrix useful to ensure that their plan addresses each natural hazard that can affect the jurisdiction. **Completing the matrix is not required**.

Note: First, check which hazards are identified in requirement §201.6(c)(2)(i). Then, place a checkmark in either the N or S box for each** applicable **hazard. An "N" for any element of any identified hazard will result in a "Needs Improvement" score for this requirement. List the hazard and its related shortcoming in the comments section of the Plan Review Crosswalk.

Hazard Type	Hazards Identified Per Requirement §201.6(c)(2)(i)	A. Location		B. Extent		C. Previous Occurrences		D. Probability of Future Events	
	Yes	N	S	N	S	N	S	N	S
Avalanche	☐	☐	☐	☐	☐	☐	☐	☐	☐
Coastal Erosion	☐	☐	☐	☐	☐	☐	☐	☐	☐
Coastal Storm	☐	☐	☐	☐	☐	☐	☐	☐	☐
Dam Failure	☐	☐	☐	☐	☐	☐	☐	☐	☐
Drought	☐	☐	☐	☐	☐	☐	☐	☐	☐
Earthquake	☐	☐	☐	☐	☐	☐	☐	☐	☐
Expansive Soils	☐	☐	☐	☐	☐	☐	☐	☐	☐
Levee Failure	☐	☐	☐	☐	☐	☐	☐	☐	☐
Flood	☐	☐	☐	☐	☐	☐	☐	☐	☐
Hailstorm	☐	☐	☐	☐	☐	☐	☐	☐	☐
Hurricane	☐	☐	☐	☐	☐	☐	☐	☐	☐
Land Subsidence	☐	☐	☐	☐	☐	☐	☐	☐	☐
Landslide	☐	☐	☐	☐	☐	☐	☐	☐	☐
Severe Winter Storm	☐	☐	☐	☐	☐	☐	☐	☐	☐
Tornado	☐	☐	☐	☐	☐	☐	☐	☐	☐
Tsunami	☐	☐	☐	☐	☐	☐	☐	☐	☐
Volcano	☐	☐	☐	☐	☐	☐	☐	☐	☐
Wildfire	☐	☐	☐	☐	☐	☐	☐	☐	☐
Windstorm	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other _____	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other _____	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other _____	☐	☐	☐	☐	☐	☐	☐	☐	☐

To check boxes, double click on the box and change the default value to "checked."

Legend:

§201.6(c)(2)(i) Profiling Hazards
A. Does the risk assessment identify the location (*i.e.*, geographic area affected) of each hazard addressed in the **new or updated** plan?
B. Does the risk assessment identify the extent (*i.e.*, magnitude or severity) of each hazard addressed in the **new or updated** plan?
C. Does the plan provide information on previous occurrences of each natural hazard addressed in the **new or updated** plan?
D. Does the plan include the probability of future events (*i.e.*, chance of occurrence) for each hazard addressed in the plan?

MATRIX B: ASSESSING VULNERABILITY

This matrix can assist FEMA and the State in scoring each hazard. Local jurisdictions may find the matrix useful to ensure that the new or updated plan addresses each requirement. **Completing the matrix is not required**.

Note: First, check which hazards are identified in requirement §201.6(c)(2)(i). Then, place a checkmark in either the N or S box for each ***applicable*** *hazard. An "N" for any element of any identified hazard will result in a "Needs Improvement" score for this requirement. List the hazard and its related shortcoming in the comments section of the Plan Review Crosswalk. Note: Receiving an N in the shaded columns will not preclude the plan from passing.*

To check boxes, double click on the box and change the default value to "checked."

Hazard Type	Hazards Identified Per Requirement §201.6(c)(2)(i)	§201.6(c)(2)(ii) Assessing Vulnerability: Overview					§201.6(c)(2)(ii) Assessing Vulnerability: Identifying Structures				§201.6(c)(2)(ii) Assessing Vulnerability: Estimating Potential Losses				
		A. Overall Summary Description of Vulnerability		B. Hazard Impact			A. Types and Number of Existing Structures in Hazard Area (Estimate)		B. Types and Number of Future Structures in Hazard Area (Estimate)		A. Loss Estimate		B. Methodology		
	Yes	N	S	N	S		N	S	N	S	N	S	N	S	
Avalanche	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Coastal Erosion	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Coastal Storm	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Dam Failure	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Drought	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Earthquake	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Expansive Soils	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Levee Failure	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Flood	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Hailstorm	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Hurricane	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Land Subsidence	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Landslide	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Severe Winter Storm	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Tornado	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Tsunami	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Volcano	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Wildfire	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Windstorm	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Other _____	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Other _____	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	
Other _____	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐	☐	

Legend:

§201.6(c)(2)(ii) Assessing Vulnerability: Overview

A. Does the **new or updated** plan include an overall summary description of the jurisdiction's vulnerability to each hazard?

B. Does the **new or updated** plan address the impact of each hazard on the jurisdiction?

§201.6(c)(2)(ii)(A) Assessing Vulnerability: Identifying Structures

A. Does the **new or updated** plan describe vulnerability in terms of the types and numbers of existing buildings, infrastructure, and critical facilities located in the identified hazard areas?

B. Does the **new or updated** plan describe vulnerability in terms of the types and numbers of future buildings, infrastructure, and critical facilities located in the identified hazard areas?

§201.6(c)(2)(ii)(B) Assessing Vulnerability: Estimating Potential Losses

A. Does the **new or updated** plan estimate potential dollar losses to vulnerable structures?

B. Does the **new or updated** plan describe the methodology used to prepare the estimate?

MATRIX C: IDENTIFICATION AND ANALYSIS OF MITIGATION ACTIONS

This matrix can assist FEMA and the State in scoring each hazard. Local jurisdictions may find the matrix useful to ensure consideration of a range of actions for each hazard. **Completing the matrix is not required.**

Note: First, check which hazards are identified in requirement §201.6(c)(2)(i). Then, place a checkmark in either the N or S box for each ***applicable*** *hazard. An "N" for any identified hazard will result in a "Needs Improvement" score for this requirement. List the hazard and its related shortcoming in the comments section of the Plan Review Crosswalk.*

Hazard Type	Hazards Identified Per Requirement §201.6(c)(2)(i)	A. Comprehensive Range of Actions and Projects	
	Yes	N	S
Avalanche	☐	☐	☐
Coastal Erosion	☐	☐	☐
Coastal Storm	☐	☐	☐
Dam Failure	☐	☐	☐
Drought	☐	☐	☐
Earthquake	☐	☐	☐
Expansive Soils	☐	☐	☐
Levee Failure	☐	☐	☐
Flood	☐	☐	☐
Hailstorm	☐	☐	☐
Hurricane	☐	☐	☐
Land Subsidence	☐	☐	☐
Landslide	☐	☐	☐
Severe Winter Storm	☐	☐	☐
Tornado	☐	☐	☐
Tsunami	☐	☐	☐
Volcano	☐	☐	☐
Wildfire	☐	☐	☐
Windstorm	☐	☐	☐
Other _____	☐	☐	☐
Other _____	☐	☐	☐
Other _____	☐	☐	☐

To check boxes, double click on the box and change the default value to "checked."

Legend:
§201.6(c)(3)(ii) Identification and Analysis of Mitigation Actions
A. Does the **new or updated** plan identify and analyze a comprehensive range of specific mitigation actions and projects for each hazard?

Town of Canaan, New Hampshire
Board of Selectmen
A Resolution Approving the Canaan Hazard Mitigation Plan Update

WHEREAS, the Town of Canaan received assistance from the Upper Valley Lake Sunapee Regional Planning Commission through funding from the NH Homeland Security and Emergency Management to prepare a hazard mitigation plan; and

WHEREAS, several planning meetings to develop the hazard mitigation plan were held between August 2010 and November 2010 and then presented to the Board of Selectmen for review and discussion on MAY 24, 2011; and

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

WHEREAS, the Board of Selectmen held a public meeting on MAY 24, 2011 to formally approve and adopt the Canaan Hazard Mitigation Plan Update.

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

APPROVED and SIGNED this 24 day of MAY, 2011.

TOWN OF CANAAN
BOARD OF SELECTMEN

Robert Reagan
Chair

(seal)

Marcia Wilson

ATTEST:

MICHAEL SAMSON