

TOWN OF SUNAPEE,
NEW HAMPSHIRE
**HAZARD
MITIGATION
PLAN**
UPDATE 2016



M/V Kearsarge, Sunapee Harbor – January, 2013

Prepared by:

Town of Sunapee Hazard Mitigation Committee and
Upper Valley Lake Sunapee Regional Planning Commission



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I. INTRODUCTION

A. BACKGROUND

The New Hampshire Department of Homeland Security and 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 man-made hazard events before they occur. The NH HSEM has provided funding to the Town of Sunapee, to update their local Hazard Mitigation Plan. UVLSRPC wrote the first Sunapee Hazard Mitigation Plan that was approved in 2008. The *Sunapee Hazard Mitigation Plan* serves as a strategic planning tool for use by the Town of Sunapee in its efforts to reduce future losses from natural and/or man-made hazard events before they occur. This *Plan* does *not* constitute a section of the Master Plan.

The Sunapee Hazard Mitigation Committee updated the *Sunapee Hazard Mitigation Plan* with the assistance and professional services of the Upper Valley Lake Sunapee Regional Planning Commission (UVLSRPC). After a public meeting held in the Sunapee Town Offices, the Sunapee Town Selectboard adopted the updated plan on December 28, 2015 as shown in Appendix F.

B. PURPOSE

The Sunapee Hazard Mitigation Plan is a planning tool for use by the Town of Sunapee in its efforts to reduce future losses from natural and/or man-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 any hazard mitigation grants. Local governments must review and if necessary, update the mitigation plan annually 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 *Sunapee Hazard Mitigation Plan* includes the identification of natural hazards affecting the Town, as identified by the Sunapee 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
- Severe Winter Weather
- Earthquake
- Drought
- Extreme Heat
- Erosion/Landslide
- Wildfire
- Natural Contaminants
- Hazardous Materials Spill
- Terrorism

E. METHODOLOGY

Using the *Local Mitigation Planning Handbook by FEMA (2013)*, the Sunapee Hazard Mitigation Committee, in conjunction with the UVLSRPC, developed the content of the *Sunapee Hazard Mitigation Plan Update 2015* by tailoring the nine-task process set forth in the handbook appropriate for the Town of Sunapee. Many FEMA resources and multiple State and Federal websites were also used as well. The Committee held a total of four posted meetings in 2013. All meetings were posted inviting the general public and notices were sent to the Town Offices of neighboring towns to invite town officials. The town officials in each of the neighboring towns of Newport, New London, Croydon, Goshen and Newbury were sent an email (Appendix C) inviting them to attend the hazard

mitigation committee meeting. The Town Manager invited department heads and town officials to attend the meetings, in addition the meeting schedule was posted in the town office and a public notice (Appendix C) was posted in the local paper and two bulletin boards, inviting all members of the town government, public and other interested parties to attend the meeting. The individuals who attended the meetings included local officials and town employees most of whom are residents of Sunapee. Though notices invited the general public to participate, no public attended the meetings.

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

- February 6, 2014
- February 20, 2014
- February 26, 2014
- March 20, 2014
- May 28, 2015

To complete this updated Plan, the Hazard Mitigation Committee followed the following planning tasks to re-evaluate the plan sections of the existing 2009 plan and to update it to reflect current information and issues:

Task 1: Determine the Planning Area and Resource (February 2014)

Sunapee is a rural town and chose to continue their planning as process as a single town. The Town chose to work with the Upper Valley Lake Sunapee Regional Planning Commission to provide technical support.

Task 2: Build the Planning Team (February 2014)

Members of the Committee included all relevant personnel as well as any interested citizens. This included a Planning Board member and Selectboard member to represent municipal organizations with general and land use planning authority.

Task 3: Create an Outreach Strategy (February 2014)

The Committee chose to provide public notices to the public to encourage participation at the public meetings. They also put a notice on the town website. Notices were also sent to each of the neighboring towns to invite them to participate in the meetings, send comments, or request a final plan. The final plan will also be available for public review prior to adoption.

Task 4: Review Community Capabilities (February 2014)

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 Sunapee Hazard Mitigation Committee. A summary listing of “Critical Facilities” is presented in Chapter IV. Costs were determined for losses for each type of hazard. 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.

Task 5: Conduct a Risk Assessment (February 2014):

The Committee determined natural and human-made hazards affecting the Town and updated a description, location, and extent of those previous and potential hazards. Existing and future assets were updated to determine vulnerability to potential hazard events. Critical facilities needed during an emergency were identified and given values based on tax data. It was also determined if these facilities are in a hazard zone or not. Other facilities identified are those needed to continue the daily operation of the municipality and those that have dense populations or valued historical structures and vulnerable natural areas.

Task 6: Develop a Mitigation Strategy (February 2014):

The Committee evaluated the goals in the previous plan and determined they were still appropriate. They then determined actions that they could take to meet those goals to reduce their risk to hazard events. They discussed existing regulations, ordinances, and the Master Plan and how they could continue to incorporate hazard mitigation strategies into these documents to include hazard mitigation in land use planning. Committee members agreed to pursue this integration with appropriate municipal boards.

Task 7: Keep the Plan Current:

The plan will be reviewed after every major event to evaluate the effectiveness of the plan. It will also be updated at least every five years as required.

Task 8: Review and Adopt the Plan:

The Committee will incorporate any feedback from Committee members, municipal officials, residents, businesses and institutions, and neighboring communities. The plan will be assessed by using FEMA’s Local Mitigation Plan Review Tool prior to sending to NH Homeland Security and Emergency Management for preliminary review. If HSEM considers the plan to meet the requirements, they will forward the draft plan to FEMA for their review. Once FEMA determines the plan meets requirements, the municipality will hold a public meeting to obtain further comments and review the final draft. If there are no major suggested changes, the municipal government will adopt the plan and the adoption form will be sent to HSEM and then to FEMA to receive a final approval of the plan.

Task 9: Create a Safe and Resilient Community:

The municipality will implement the plan by committing to task accomplishment as indicated in the plan. The municipality will take advantage of available funding opportunities such as FEMA’s mitigation grant programs. The process for monitoring and updating the Plan can be found in Chapter IX.

UVLSRPC staff compiled the results of tasks one through nine in a draft document, as well as helpful and informative materials from the *State of New Hampshire Multi-Natural Hazard Mitigation Plan Update 2013*, which served as a resource for the *Sunapee Hazard Mitigation Plan Update 2015*.

F. HAZARD MITIGATION GOALS

The Sunapee Hazard Mitigation Committee reviewed the hazard mitigation goals set forth in the previous Hazard Mitigation Plan and revised them as follows:

1. To identify, introduce and implement cost effective Hazard Mitigation measures so as to accomplish the Town’s goals and to raise awareness and acceptance of hazard mitigation opportunities generally.
2. To improve upon the protection of the general population, the citizens, and visitors of the Town of Sunapee from natural and human-made hazards.
3. To reduce the potential impact of natural and human-made disasters to:
 - the Town of Sunapee’s Critical Support Services,
 - Critical Facilities in the Town of Sunapee,
 - the Town of Sunapee’s infrastructure,
 - private property,
 - the Town’s economy,
 - the Town’s natural environment, and
 - the Town’s specific historic treasures and interests.
4. To improve the Town’s Disaster Response and Recovery capability as a hazard mitigation strategy to be prepared for emergencies and reduce their impact.
5. To plan necessary investments in the infrastructure in the Town of Sunapee to as a hazard mitigation strategy.

G. ACKNOWLEDGEMENTS

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

- Donna Nashawaty, Town of Sunapee Town Manager
- Scott Hazelton, Town of Sunapee Highway Director
- Howard Sargent, Town of Sunapee Emergency Management Director
- David Cahill, Town of Sunapee Police Chief
- David Bailey, Town of Sunapee Water and Sewer Department

- Elizabeth Lufkin, Field Representative, NH Homeland Security and Emergency Management
- Victoria Davis, Planner, Upper Valley Lake Sunapee Regional Planning Commission
- Adam Ricker, Assistant Planner, Upper Valley Lake Sunapee Regional Planning Commission

The Hazard Mitigation Committee was composed of local officials, citizens of Sunapee and a staff representative of the UVLSRPC for meeting facilitation and plan development. Neighboring communities were invited to participate, submit comments, and request copies of the final plan. They were provided with the dates of three meetings. The general public was invited to attend three meetings by public postings at the town office, the town hall, the General Store, and on the town website. These were posted 10 days prior to the first posted meeting date and remained until the last meeting occurred. No towns or other parties inquired about the update process or attended any of the meetings and no comments were submitted to be incorporated into the plan.

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.

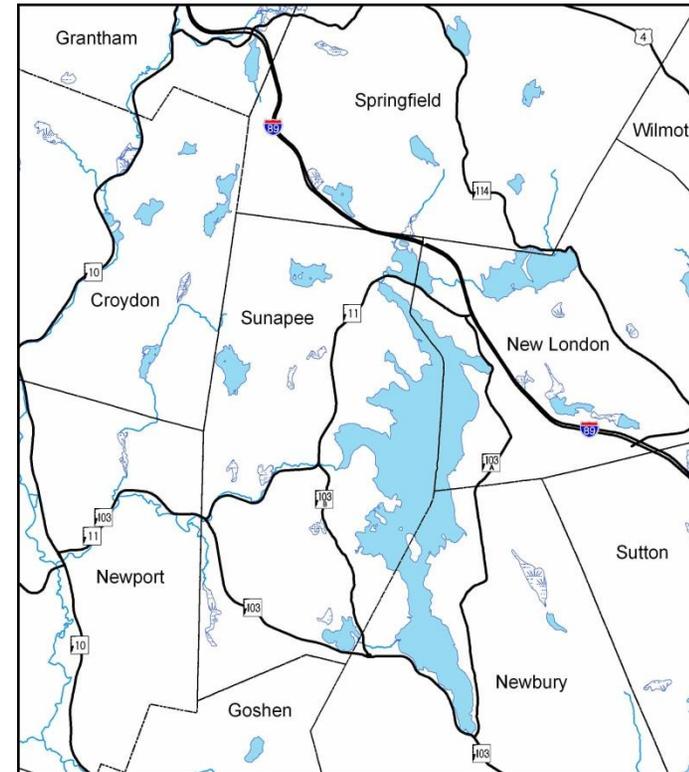
II. COMMUNITY PROFILE

A. INTRODUCTION¹

The Town of Sunapee is located in Sullivan County as shown in the following map illustration. Interstate 89 cuts across the northeast corner of Sunapee, and the nearest exit is in New London on Route 11. The State roads through the Town are Routes 11, 103, and 103B. The Town is about 16,500 acres including almost 2,500 acres of water due to the many lakes and ponds.

Lake Sunapee is the largest lake in the town with a total of 4,090 acres with over half in the Town of Sunapee and the remainder of the lake in Newbury and New London. Otter Pond is 185 acres just above Lake Sunapee. Most of this pond is within Sunapee with a portion in New London. Mountain View Lake is just over 100 acres, Perkins Pond is 157 acres, Ledge Pond is 110 acres, and Wendell Pond is 11 acres. There are several other small ponds and wetlands in Sunapee including the Wendell Marsh Wildlife Management Area. Streams include Tucker Creek, Trask Brook, Ledge Pond Brook, and the Sugar River. The Town of Sunapee is entirely within the Sugar River Watershed.

Sunapee Harbor and the Sugar River have played a major role in the town's history and development. Although Sunapee's earliest occupation was agriculture, manufacturing sprang up along the Sugar River falls to harness the water's power. There is also a long history of tourism in the Lake Sunapee area which began in the mid-1800's with the introduction of steamboats and trains. During this time there were many "Grand Hotels" and a few private residences around the lake, catering to the city people who arrived to spend the summer on Lake Sunapee.



¹ Town of Sunapee Master Plan (2003)

Tourism is still a major industry in Sunapee due to the lakes and nearby skiing on Mount Sunapee in the Town of Newbury. Sunapee Harbor features a collection of shops and restaurants. Live music is regularly scheduled on weekends and two cruise boats offer a scenic trip around the lake. For lodging, there are a number of waterfront cottages, as well as inns and bed and breakfasts.

There is a large base of seasonal residents who occupy cottages and homes along Sunapee's five major lakes. Approximately 6745 acres of the town is in current use as forest land, wetlands, and agricultural use. High points include Blueberry Mountain, Youngs Hill, Tucker Hill, Cemetery Hill, Baisdell Hill, Burkehaven Hill, Keyser Hill, Garnett Hill, Brown Hill, Mica Mine Hill, and Trow Hill.

Town facilities include the Town Hall at 23 Edgemont Road which houses the Town's administrative offices as well as the Water and Sewer Department. The Highway Department is located at 621 Route 11; the Transfer Station is at 89 Avery Road; the Hydroelectric Department is at 23 Edgemont Road. The Police Department and the Fire Department & Emergency Medical Services are located in the Sunapee Safety Services Building at 9 Sargent Road just off Route 11. The Abbott Library is currently at 542 Route 11, although construction has begun on a new library adjacent to the Fire Station. The Sunapee Public School System is comprised of the Elementary School at 22 School Street and the Middle High School on North Road.

There are many miles of mains throughout the Town of Sunapee which transmit sewage to a treatment plant located off Route 11 just south of Wendell Marsh. Pump stations throughout the town accommodate the transport of sewage to the treatment facility. The municipal sewage treatment plant is owned by the Town of Sunapee but shares capacity of the plant with the Town of New London. There are two municipal water systems serving Sunapee Village and Georges Mills. The treatment facilities are located on Harbor Hill and Georges Mills. The hydroelectric station is located on the Sugar River in Sunapee Village. The power generated from this station is sold to the Public Service Company of New Hampshire. About one-half of the homes in Sunapee are hooked up to municipal water and sewer with the remainder using on-site systems.

There are two electric companies serving the Town: Eversource and New Hampshire Electric Co-op. They each have sub-stations located in Sunapee on North Road.

B. DEVELOPMENT TRENDS

Examination of the U.S. Census Data indicates that population grew by 19 % from 1990-2000, and 2000-2010, the population increased by 9.2%. However, it is anticipated that the population change will decrease as shown in the population projections table.

The predominant development in Sunapee is residential. Most of this development is in year-round single family homes. The greatest density of development occurs in Sunapee Village, Wendell, Georges Mills, Grandliden, and along the lake and pond shores. The remaining development occurs along other road frontage. Commercial development also occurs primarily in the village centers and along the State highways 11 and 103. Several developments are being proposed: the Bell development above Ledge Pond near the Springfield town line (11-12 lots); near Trow Hill (12-14 lots); and near Prospect Hill (11-12 lots); Prospect Hills (49 acres) and Muzzy Hill (60 Acres). On Trow Hill there is a subdivision potential for 36 lots. On Brook Road and Route 103 into Newbury there is the potential for multi-family housing growth, as well. These properties are not located in any specific hazard area, although the Ledge Pond area seems to be more susceptible to lightning. The town has extended sewer services to Perkins Pond which increases the potential for development along the extension.

Several factors have played, and will continue to play, an important role in the development of Sunapee. These include the existing development pattern and availability of land for future development; the present road network; physical factors such as steep slopes, soil conditions, wetlands, and aquifers; and, land set aside for conservation. These factors have an impact, both individually and cumulatively, on where and how development occurs.

Large tracts of undeveloped land still exist in the northwest, west central, and southern portions of town. The largest type of existing land use is forest and wetlands, which comprises about three-quarters of the Town's land area. Steep slopes and other development constraints such as lack of road access constrain development in these areas. However, due to growth pressures in the region, the recreational lakes in Sunapee, and Sunapee's proximity to I-89, the Town is a desirable location for future development. Review and amendment of land use regulations will help the Town determine the density and location of future development taking into account many factors including known hazard event areas such as flood zones. It is the intent of the Hazard Mitigation Committee to work with the Planning Board to make sure development is discouraged from hazard areas.

In 2011 the town ordinance began requiring erosion control plans for construction on steep slopes (>15%) and/or where there is in excess of 100,000 sf cleared, this was in addition to the steep slopes ordinance that existed prior to the 2009 plan.

The town did note that there is a 44 parcel subdivision on Trow Hill in the conceptual stages that could increase the vulnerability of erosion due to the steeper terrain in the area. As it currently stands currently, the committee did not feel that the approved subdivisions and buildings have increased the vulnerability of the town. If the conceptual subdivision moves forward and is approved, the vulnerability to erosion would be increased, but the subdivision has not yet been formally applied for or approved.

Development Activity in Sunapee through the end of 2014:

<u>Year</u>	<u>New Homes</u>	<u>Total Building Permits</u>	<u>Subdivision Cases</u>	<u>New Lots</u>	<u>Merged Lots</u>
2009	8	121	4	5	1
2010	15	113	7	17	0
2011	12	94	7	6	1
2012	10	110	7	1	2
2013	14	112	7	5	1
2014	12	117	8	9	0

**Please note that our total subdivision cases include subdivision and annexations which you may also know as lot line adjustments. Merged lots are the cases where two lots have become one and are also included in the overall number of cases.

Table II-1: AREA POPULATION TRENDS

Area	1980	1990	2000	2010
Sunapee	2,312	2,559	3,055	3,365
Croydon	457	627	661	764
Goshen	549	742	741	810
New London	2935	3180	4116	4,397
Newbury	961	1347	1702	2,072
Newport	6229	6110	6269	6,507
Springfield	532	788	945	1,311
<i>Sullivan County</i>	<i>36,063</i>	<i>38,592</i>	<i>40,458</i>	<i>43,742</i>
<i>New Hampshire</i>	<i>920,610</i>	<i>1,109,252</i>	<i>1,235,786</i>	<i>1,316,472</i>

Source: US Census

Table II-2: POPULATION GROWTH IN SUNAPEE

	1980	1990	2000	2010
Population	2,312	2,559	3,055	3,365
Decade Change in Population		10%	19.4%	9.2%

Source: 1980 – 2010 US Censuses

Table II-3: POPULATION PROJECTIONS FOR SUNAPEE

Area	2015	2020	2025	2030	2035	2040
Sunapee	3,456	3,564	3,655	3,748	3,817	3,858
Change in Population 5 yr.	2.7%	3.1%	2.6%	2.5%	1.8%	1.1%
Change in Population 10 yr.		5.9%		5.2%		2.9%

Source: State of New Hampshire, Regional Planning Commissions, Office of Energy and Planning - County Population Projections, 2013

III. HAZARD IDENTIFICATION

The Sunapee 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 Sullivan County in particular. A list of past hazard events in Sunapee, Sullivan 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 SUNAPEE?

Sunapee is prone to a variety of natural and human-made hazards. The hazards that Sunapee 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 potentially affecting the Town of Sunapee are dam failure, flooding, hurricane, tornado & downburst, thunderstorm (including lightning and hail), severe winter weather, earthquake, drought, extreme heat, erosion, landslide, wild and structure fire, natural contaminants, 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 Sunapee and are not anticipated to have an impact as determined by the Hazard Mitigation Planning Committee, representatives from state agencies and citizens of the Town of Sunapee. Eliminated hazards include Land Subsidence, Expansive Soils, and Snow Avalanches.

B. DESCRIPTIONS OF HAZARDS

An assessment of each hazard relevant to Sunapee 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. The “risk” designation for each hazard was determined after evaluations discussed later in this chapter.

- Dam Failure
- Flooding
- Hurricane
- Tornado & Downburst
- Thunderstorm/Lightning/Hail
- Severe Winter Weather
- Earthquake
- Drought
- Extreme Heat
- Erosion/Landslide
- Wildfire
- 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 shows the location of active dams in Sunapee.

NH DES assigns a hazard designation to each dam in the state depending upon the potential damage it would cause if the dam failed:

- A “high hazard potential” is indicated if the dam is in a location and of a size that failure or mis-operation of the dam would result in the following: major economic loss to structures or property; structural damage to roads; major environmental; or public health losses; and probable loss of human life.
- A “significant hazard potential” would mean 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 to roads; major environmental or public health losses.
- A “low” hazard dam failure could cause some structural damage to buildings and roads.
- A “non-menace” dam failure would not cause any significant damage.

“High” and “Significant” hazard potential dam owners must provide NH DES with maps of the potential inundation area if the dam were to fail. It should be noted that there are some exemptions from this requirement such as lagoons.

Past Dam Failure Events

There have not been any dam failures within the Town of Sunapee or outside the town that would have affected the town.

Table III-1 - DAMS

Dam #	Class	Dam Name	Water Body	Owner (Now or Formerly)	Status	Impoundment Area in Acres	Height of Dam (Ft)	Drainage Area in Square Miles
229.01	L	OTTER POND DAM	Otter Brook Pond	Town of Sunapee	ACTIVE	168	8	15.6
229.02		OTTER POND BROOK	Otter Brook Pond	Unknown	RUINS	0	5	12.8
229.03		COOPER SHOP DAM	OTTER POND	Holmes Brothers	RUINS	0	0	0
229.04	S	LAKE SUNAPEE DAM	SUGAR RIVER	NH Water Resources Council	ACTIVE	4090	14	44.8
229.05	L	SUNAPEE DAM	SUGAR RIVER	Town of Sunapee	ACTIVE	0.5	15	45
229.06		SUGAR R WOOLEN MILL	SUGAR RIVER	Town of Sunapee	RUINS	0	10.5	45
229.07	NM	SUGAR RIVER	SUGAR RIVER	Town of Sunapee	ACTIVE	0.23	15	0
229.08	NM	SUGAR RIVER	SUGAR RIVER	Corliss Abbott	ACTIVE	1	7	45
229.09		SUGAR RIVER MILL DAM	SUGAR RIVER	George Alexander & Sons	RUINS	0.5	3	0
229.1		Sugar R Blacksmith Shop	SUGAR RIVER	Unknown	RUINS	0	0	45
229.11		SUGAR R TROW SAWMILL	SUGAR RIVER	HA Trow	RUINS	0	6.5	47
229.12		PERKINS POND	PERKINS POND	Speros Condos	RUINS	0	0	0
229.13		SUGAR RIVER DAM	SUGAR RIVER	George E. Smith	RUINS	0	0	0
229.14		SUGAR RIVER DAM	SUGAR RIVER	George Smith	RUINS	0	0	0
229.15	L	WENDALL MARSH DAM	SUGAR RIVER	NH Fish & Game	ACTIVE	37	14	50.3
229.16	L	LEDGE POND DAM	POND BROOK	Town of Sunapee	ACTIVE	120	4	1.08
229.17	NM	WHITNEY FARM POND	NATURAL SWALE	Paul D. Whitney	ACTIVE	1	6	0
229.18	NM	UNNAMED BROOK DAM	UNNAMED BROOK	Ronald Sullivan	ACTIVE	0.1	8	0
229.19	NM	McCormack Farm	TR LAKE SUNAPEE	Thomas McCormack	ACTIVE	0.2	6.5	0
229.2	NM	TROW RICO LOWER DAM	NATURAL SWALE	Paul D. Whitney	ACTIVE	1	14	0
229.21	NM	Granliden Wildlife Pond	TR LAKE SUNAPEE	Granliden Community Assoc	ACTIVE	1	6	0
229.22	NM	Gazelle Farm Pond	TR LAKE SUNAPEE	Harry Gazelle	ACTIVE	0.2	12	0
229.23		FLANDERS FARM POND	TR SUGAR RIVER	Bardon Flanders	Exempt	0.2	2.5	0
229.24	NM	Franzen Fiire Pond Dam	UNNAMED STREAM	Eric Franzen	ACTIVE	0.2	9.5	0
229.25	NM	GOUSE FARM POND DAM	NATURAL SWALE	Carola Gouse	ACTIVE	1	6	0
229.26	NM	RECREATION POND DAM	TR SUGAR RIVER	Leon Rollins, Jr.	ACTIVE	0.33	4	0
229.27	NM	GREENWOOD POND DAM	NATURAL SWALE	Nancy Chamberlain	ACTIVE	1	5	0
229.28	NM	STOCK BASIN DAM	NATURAL SWALE	Mark & Diane Goldman	ACTIVE	2	3	0.52

Dam #	Class	Dam Name	Water Body	Owner (Now or Formerly)	Status	Impoundment Area in Acres	Height of Dam (Ft)	Drainage Area in Square Miles
229.29		Indian Caves 20 Det Pond	RUNOFF	Harbor Ridge Properties	Exempt	0.01	8.5	0
229.3		Indian Caves 21 Det Pond	RUNOFF	Harbor Ridge Properties	Exempt	0.01	8.5	0.3
229.31		Indian Caves 22 Det Pond	RUNOFF	Harbor Ridge Properties	Exempt	0.01	6.5	0.3
229.32		Indian Caves 23 Det Pond	RUNOFF	Harbor Ridge Properties	Exempt	0.02	8.5	0.43
229.33		Indian Caves 24 Det Pond	RUNOFF	Harbor Ridge Properties	Exempt	0.01	6.5	0.36
229.34		Indian Caves 25 Det Pond	RUNOFF	Harbor Ridge Properties	Exempt	0.01	8.5	0.19
229.35		Indian Caves 26 Det Pond	RUNOFF	Harbor Ridge Properties	Exempt	0.03	6.5	0.19
229.36		Indian Caves 27 Det Pond	RUNOFF	Harbor Ridge Properties	Exempt	0.03	4.5	1.8
229.37		Indian Caves 28 Det Pond	RUNOFF	Harbor Ridge Properties	Exempt	0.02	6.5	0.01
229.38		Indian Caves 29 Det Pond	RUNOFF	Harbor Ridge Properties	Exempt	0.04	6.5	1.37
229.39		Indian Caves 31 Det Pond	RUNOFF	Harbor Ridge Properties	Exempt	0.04	6.5	0.54
229.4		Detention Storm Runoff 5	RUNOFF	Environmental Specialists	Exempt	0.01	4	1.9
229.41		Detention Storm Runoff 3	RUNOFF	Environmental Specialists	Exempt	0.1	4	0.02
229.42		Detention Storm Runoff 1	RUNOFF	Environmental Specialists	Exempt	0.1	4	0
229.43		Detention Storm Runoff 6	RUNOFF	Environmental Specialists	Exempt	0.05	4	0.2
229.44		EDGEMONT DET POND	RUNOFF	Great Ledges Corp.	Exempt	0.06	7.5	0
229.45		Vill at Perkins Pond Det	RUNOFF	Mr. Burd & Mr. Clifford	Exempt	0.16	6	0.03
229.46	NM	MOUNTAIN VIEW LAKE	MNT VIEW BROOK	Mr. & Mrs. Herbert Smith	ACTIVE	116	4	1.66

Class of potential hazard: NM – non-menace; L-low; S-significant
 Material: T-timber; S-stone; E-earth; C-concrete

Source: NH DES

*The Committee believed the status to be incorrect and has changed them.

Potential Future Dam Failure Damage

Although there are 46 dams in Sunapee, there are not any “high” and one “significant” hazard dams within town. There are four “low hazard potential” dam. All active dams are shown on a map in Appendix D.

Outside the Town of Sunapee, there are not any dams that would have a direct impact on the town.

The committee determined that the Dam Failure risk in Sunapee to be low/medium.

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 Sunapee area are most likely to occur in the spring due to the increase in rainfall, snowmelt and ice flow; 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. Appendix D displays the “Special Flood Hazards Areas.”

River Ice Jams Ice forming in riverbeds and against structures presents significant hazardous conditions 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. A search on the Cold Regions Research and Environmental Laboratory (CRREL) did not reveal any historical ice jams.

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. Roads and bridges are also susceptible to erosion.

Past Flooding Events

The Committee determined there are no other flood areas in the town other than the FEMA designated flood zones. Appendix D shows the special flood hazard areas of Special Flood Hazard Areas. The town has had minor flooding in the area around lower Main Street where Route 11 crosses the Sugar River. During heavy rains this area of the river has experienced rising waters that overtopped the banks when the river constricts to pass under the bridge. The town has also had heavy rains and flooding of drainage ditches that have caused numerous road washouts, this is discussed in the erosion section of this plan. The following tables provide a list of floods in the State, County, and Sunapee. Other flooding issues are listed in the Erosion section—primarily for roads. Heavy Rains at the end of June and beginning of July 2013 cause the town to have washouts on many roads around town. Winn Hill Road, Stagecoach Road (Sugarhouse Hill), and Trow Hill Road experienced the most erosion damage from the rains causing washouts along the roads. The total amount the town was reimbursed for from FEMA was \$69,400

Table III-2: FLOODING

FLOODING				
Hazard	Date	Location	Description of Areas Impacted	Damages
Flood / Severe Storm	April 16, 1987	Cheshire, Carroll, Grafton, Hillsborough, Merrimack, Rockingham, & Sullivan Counties	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. No damage in Sunapee.
Flood	August 7-11, 1990	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack & Sullivan Counties, NH	FEMA Disaster Declaration # 876. Flooding caused by a series of storm events with moderate to heavy rains.	\$2,297,777 in damage. No damage in Sunapee.
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. No damage in Sunapee.
Flood	October 7-18, 2005	Cheshire, Grafton, Merrimack, Sullivan, and Hillsborough Counties, NH	FEMA Disaster Declaration # 1610. Severe storms and flooding; major devastation in Alstead	\$3,000,000 in damages. No significant damage in Sunapee
Flood	October-November 2005	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan counties	FEMA Disaster Declaration # DR-1144- NH	Unknown damage totals. No significant damage in Sunapee

FLOODING				
Hazard	Date	Location	Description of Areas Impacted	Damages
Flood	April 16, 2007	All counties, NH	FEMA Disaster Declaration # 1695. Severe storms and flooding; 2,005 home owners and renters applied for assistance in NH.	\$27,000,000 in damages. No significant damages in Sunapee.
Flood	July 24, 2008	Central and Southern NH; Counties Declared: Belknap, Carroll, Merrimack, Rockingham, and Strafford	FEMA DR 1782	Severe storms, tornado, and flooding. No damage in Sunapee
Flood	August 14, 2008	Central Northern NH; Counties Declared: Belknap, Carroll, Coos, and Grafton	FEMA Disaster Declaration #1787	\$3 million in public assistance; primary damage to roads. No significant damage in Sunapee.
Flood	March 14-31, 2010	Statewide	FEMA DR-1913; severe storms & flooding; Declared Counties: Hillsborough and Rockingham Counties	75% federal match; no damage in Sunapee.
Flood	May 26-30, 2011	Coos and Grafton Counties	FEMA-4006-DR Federal assistance for Coos and Grafton Counties and hazard mitigation statewide	\$1.8 million in public assistance; primary impact to roads and bridges. No Damage in Sunapee.
Flood	May 29-31, 2012	Cheshire County	FEMA DR-4065; severe storm and flood event	\$3,070,273 in public assist. No damage in Sunapee.
Flood	June 26-July 3, 2013	Grafton, Sullivan, and Cheshire Counties	FEMA DR-4139; severe storms, flooding, and landslides	\$6,252,800 in public assist. Heavy rains from this storm caused erosion on Winn Hill Road, Stage Coach Road and Trow Hill but there was not significant flooding damage. The total townwide damage was \$69,400.

Sunapee became a participating member of the National Flood Insurance Program on May 15, 1991. There are currently 33 policies in the town with \$7,134,000 of insurance: 25 single family residential, one 2-4 family residential, and five non-residential. However,

flood insurance purchase is not a reflection of the number of structures within the flood plain. Two loss claims have been paid for a total of \$6,415: one single family residence and one non-residential. There have not been any repetitive loss claims made. (Source: NH OEP office, August 2014)

Sunapee’s 100-Year Special Flood Areas are located within the A and AE Zone, with two base flood elevations determined: 1,129’ for a small area to the north and 1,095’ for Lake Sunapee. See Appendix D for a map showing all Special Flood Hazard Areas and the areas with base flood elevations. There are no non-compliant structures in the Town of Sunapee according to the NH Floodplain Insurance Program State Coordinator (July 2014).

As an NFIP participant, the Town of Sunapee has a floodplain ordinance which restricts building within the special floodplains to protect the flow of flood waters and not increase the needed land area for those waters. The Town adopted the model ordinance provided by the NH Floodplain Management Office on October 3, 2009. This ordinance is reflected in the zoning ordinance, subdivision regulations, and site plan review regulations. The town’s 2010 Master Plan includes reference to the NFIP and the management of building in the floodplain through the town’s floodplain ordinance

Potential Future Flooding Events

Future flooding is likely as noted in the above table based upon local knowledge of past flood events. There are currently 186 buildings located within the FEMA determined 100-year flood areas and dam inundation area. The total structural value of these properties is \$ 31,702,789. The value was determined by identifying the number of structures in the floodplain and using the value of their structures. The Hazard Mitigation Committee will recommend to the Planning Board that the zoning ordinance be amended to prevent further new development within the 100 year flood plain.

There are a total of 14 state and town owned bridges with the flood plain.

The Committee determined flooding is a low/medium risk in Sunapee.

Table III-3: STRUCTURE VALUES IN 100-YEAR FLOOD AREAS BY TYPE

Flood Zone	Properties	
	#	Value
Zone A and AE	186	\$31,702,789

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 Hazard Mitigation Plan*; FEMA website).

The Saffir-Simpson Hurricane Wind Scale provides categories of sustained winds by miles per hour: 1 – 74-95 mph; 2 – 96-110 mph; 3 – 111-129 mph; 4 – 130 – 156 mph; and 5 – 157 mph or higher. Categories 3 -5 are considered to be major wind events that can cause devastating to catastrophic damage.

Past Hurricane Events

There have been several hurricanes over the years which have impacted New England and New Hampshire. In recent years, the town has been spared during storms Irene and Sandy and has not experience hurricane or tropical storm damage. These are listed below.

Table III-4: 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

HURRICANES AND TROPICAL STORMS				
Hazard	Date	Location	Description of Areas Impacted	Damages
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.	No damage in Sunapee
Tropical Storm (Daisy)	October 7, 1962	Coastal NH	Heavy swell and flooding along the coast	No damage in Sunapee
Tropical Storm (Doria)	August 28, 1971	New Hampshire	Center passed over NH resulting in heavy rain and damaging winds	No damage in Sunapee
Hurricane (Belle)	August 10, 1976	Southern New England	Primarily rain with resulting flooding in New Hampshire. Category 1	No damage in Sunapee
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	No damage in Sunapee
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	No damage in Sunapee
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	No damage in Sunapee
Tropical Storm (Floyd)	September 16-18, 1999	Southern New England	FEMA DR-1305-NH. Heavy Rains	No damage in Sunapee
Hurricane (Katrina)	August 29, 2005 & continuing	East Coast of US and more	FEMA-3258-EM. Heavy rains and flooding devastating SE US	No damage in Sunapee

HURRICANES AND TROPICAL STORMS				
Hazard	Date	Location	Description of Areas Impacted	Damages
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.	No damage in Sunapee
Tropical Storm (Irene)	August 26 – September 6, 2011	East Coast of US	FEMA-4026-DR for Coos, Carroll, Grafton, Strafford, Belknap, Merrimack and Sullivan Counties; EM-3333 Hillsboro, Rockingham, and Cheshire Counties; Sunapee had \$50,000 in damage with \$25,000 on Mountain Road.	\$2 Million primarily for roads and bridges, no Damage in Sunapee
Hurricane (Sandy)	October 26 – November 8, 2012	East Coast of US	FEMA-4095-DR-NH for Belknap, Carroll, Coos, Grafton and Sullivan Counties.	\$2 Million in public assistance primarily for emergency protective services; no damage in Sunapee

Potential Future Hurricane Damage

Hurricane events will affect the entire town. It is impossible to predict into the future what damage will occur in the town. The Committee determined the hurricane risk to be medium in Sunapee.

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 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. Macrobust, 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. The storms that cause the severe wind events are not prone to striking any one area in town more than another. The storms that provide the characteristics needed to form a tornado or downburst can be located anywhere throughout town, leaving the entire town at a similar risk for tornados and downbursts.

Past Tornado & Downburst Events

The following table displays tornadoes occurring in Sullivan County between 1950 and 1995 as provided by the “Tornado Project” (www.tornadoproject.com) and the *NH Natural Hazard Mitigation Plan*. The Committee has identified areas on Tucker Hill; along Route 11 near the Wendell Marsh and Route 103 near Young Hill Road as areas that have been prone to downbursts and microburst in the past. These areas have had downed trees and wind damage during the storms, though the committee could not recall the exact dates of the storms.

Table III-5: TORNADOES IN OR NEAR SULLIVAN COUNTY

TORNADOES & DOWNBURSTS – MEDIUM RISK			
	Date	Fujita Scale	Damages
Tornado	September 9, 1821	Most intense in NH	Killed 6 people; crossed Lake Sunapee; no damages in Sunapee
Tornado	July 14, 1963	F1	No deaths or injuries; costs unknown; no damages in Sunapee
Tornado	June 27, 1964	F0	No deaths or injuries; costs unknown; no damages in Sunapee
Tornado	August 11, 1966	F2	No deaths or injuries; costs unknown; no damages in Sunapee
Tornado	August 25, 1969	F1	No deaths or injuries; costs unknown; no damages in Sunapee
Tornado	May 31, 1972	F1	No deaths or injuries; costs unknown (Merrimack County) ; no damages in Sunapee
Tornado	July 21, 1972	F1	No deaths or injuries; costs unknown; no damages in Sunapee
Tornado	May 11, 1973	F2	No deaths or injuries; costs unknown; no damages in Sunapee
Tornado	June 11, 1973	F0	No deaths or injuries; costs unknown; no damages in Sunapee
Tornado	August 15, 1976	F1	No deaths; 5 injuries; costs unknown (Merrimack County) ; no damages in Sunapee
Tornado	August 13, 1999	F1	No deaths or injuries; costs unknown; no damages in Sunapee
Tornado	July 6, 1999	F2	No deaths or injuries; costs unknown (Merrimack County); in New London two roofs blown off structures; power outages; downed trees, utility pole, and wires; no damages in Sunapee

TORNADOES & DOWNBURSTS – MEDIUM RISK			
	Date	Fujita Scale	Damages
Tornado	Summer 2006	NA	Began in Barnet, VT and moved to Monroe, NH; no damages in Sunapee
Tornado	April 15, 2007	NA	Numerous trees were knocked down in Enfield, NH; no damages in Sunapee
Tornado	July 24, 2008	(EF 2)	DR 1799: Numerous trees and utility poles down and tearing down houses near Concord; 1 fatality and 2 injuries; no damages in Sunapee

Source: www.tornadoproject.com

Table III-6 FUJITA SCALE

Fujita Scale		
Scale	Wind Strength (MPH)	Typical Damage
EF0	65-85	Minor damage: Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
EF1	86-111	Moderate damage: Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
EF2	111-135	Considerable damage: Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	136-165	Severe damage: Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown
EF4	166-200	Extreme damage: Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated
EF5	>200	Massive damage: Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yds.); trees debarked; incredible phenomena will occur.

Source: <http://www.spc.noaa.gov>

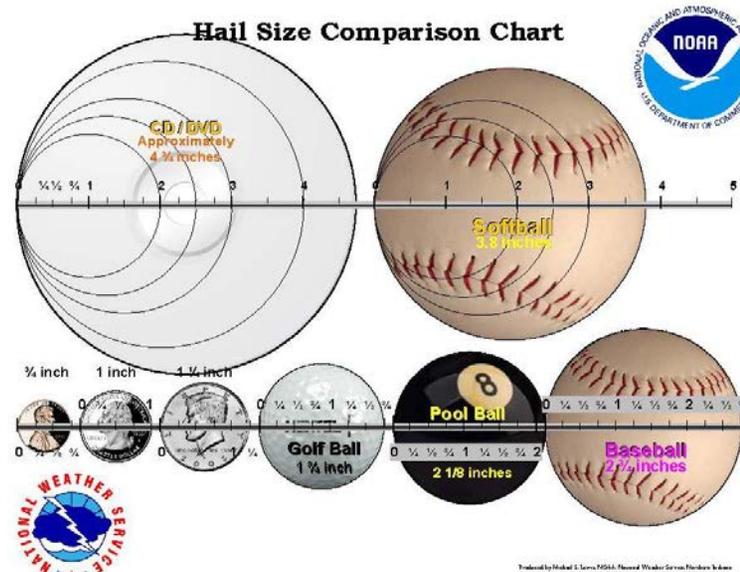
Potential Future Tornado and Downburst Damage

It is impossible to predict where a tornado or downburst will occur or what damage it will inflict. The Sunapee Committee does not recall tornadoes or downbursts in Sunapee. The FEMA website places the State of NH in the Zone II Wind Zone which provides that a community shelter should be built to a 160 mph “design wind speed.” The Committee determined there is a medium risk for tornadoes and downbursts in Sunapee.

Thunderstorms/Lightning/Hail

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), 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. Below is a comparison chart for the various sizes of hail.

Figure III-1: HAIL SIZE COMPARISON CHART



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. There have probably been lightning strikes throughout Sunapee, but there is no record of damage.

A lightning activity level has been developed by the National Weather Service and is shown below:

Table III-7: LIGHTNING ACTIVITY LEVEL

Lightning Activity Level	Description
1	No thunderstorms
2	Isolated thunderstorms: Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud to ground strikes in a five minute period.
3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a 5 minute period.
4	Scattered thunderstorms. Moderate rain is commonly produced. Lightning is frequent, 11 to 15 cloud to ground strikes in a 5 minute period.
5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 cloud to ground strikes in a 5 minute period.
6	Dry lightning (same as LAL3, but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag Warning.

Source: <http://graphical.weather.gov/definitions/defineLAL.html>

Past Thunderstorm Events

There have been lightning strikes in Sunapee. The Committee identified an area to the north and South of Ledge Pond that as been prone to lighting strikes in the past. The damage from these lightning strikes has not been significant, but the committee understands this area is more susceptible to strikes. A thunderstorm with lightning or hail could impact the entire town, although lightning is more likely in isolated areas.

Potential Future Thunderstorm Damage

It is inevitable that thunderstorms will occur in Sunapee’s future. Lightning, hail, or wind from a thunderstorm could impact anywhere in town. It is not possible to estimate potential damage. The risk for future thunderstorm damage was determined by the Committee to be low/med risk in Sunapee.

Table III-8: THUNDERSTORMS, LIGHTNING, HAIL

Thunderstorms/Lightning/Hail				
Hazard	Date	Location	Description of Areas Impacted	Damages
Hail	June 16, 2007	SW NH	A severe thunderstorm produced large hail (.75 in) in southwestern New Hampshire.	unknown; no damages in Sunapee
Hail	August 3, 2007	Sullivan County	An isolated thunderstorm produced large hail in Sullivan County.	unknown; no damages in Sunapee

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 sustained wind or frequent gusts greater than or equal to 35 miles per hour accompanied by falling and/or blowing snow, frequently reducing visibility to less than ¼ mile for three hours or more (NOAA National Weather Service). 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 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.

The National Weather Service has developed a Scaled Predictive Ice Storm Aftermath (SPIA) Index. The potential impacts are scaled from 0 to 5 and suggest potential electrical outage coverage and duration. Current ice storm warnings are based on forecast of ice accumulation only. SPIA reports on the combined effects of the predicted ice and wind. Below is a chart of the SPIA index levels.

Table III-9: SCALED PREDICTIVE ICE STORM AFTERMATH INDEX

Ice & Wind: Average Ice in Inches and Wind in Miles per hour	<15 mph	15-25 mph	25-35 mph	≥35 mph
0.10 – 0.25 inches	0	1	2	3
0.25 – 0.50 inches	1	2	3	4
0.50 – 0.75 inches	2	3	4	5
0.75 – 1.00 inches	3	4	5	5
1.00 – 1.50 inches	4	5	5	5
>1.50 inches	5	5	5	5

“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

The following table provides a list of past extreme winter weather events in New Hampshire and Sunapee. The town of Sunapee has not experience any significant damage to their infrastructure from snow storms in the past 5 years. However, in February of 2013 the Blizzard required the town to apply for reimbursement for plowing, materials and labor in the amount of \$15,000. The town did not experience any damage in the November 2014 snow storm.

Table III-10: SEVERE WINTER WEATHER

SEVERE WINTER WEATHER/ICE STORMS				
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; no damages in Sunapee
Blizzard	February 14-17, 1958	New Hampshire	20-30 inches of snow in parts of New Hampshire	Unknown; no damages in Sunapee
Snow Storm	March 18-21, 1958	New Hampshire	Up to 22 inches of snow in south central NH	Unknown; no damages in Sunapee
Snow Storm	December 10-13, 1960	New Hampshire	Up to 17 inches of snow in southern NH	Unknown; no damages in Sunapee
Snow Storm	January 18-20, 1961	New Hampshire	Up to 25 inches of snow in southern NH	Unknown; no damages in Sunapee
Snow Storm	February 2-5, 1961	New Hampshire	Up to 18 inches of snow in southern NH	Unknown; no damages in Sunapee
Snow Storm	January 11-16, 1964	New Hampshire	Up to 12 inches of snow in southern NH	Unknown; no damages in Sunapee
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; no damages in Sunapee
Snow Storm	December 26-28, 1969	New Hampshire	Up to 41 inches of snow in west central NH	Unknown; no damages in Sunapee
Snow Storm	February 18-20, 1972	New Hampshire	Up to 19 inches of snow in southern NH	Unknown; no damages in Sunapee
Snow Storm	January 19-21, 1978	New Hampshire	Up to 16 inches of snow in southern NH	Unknown; no damages in Sunapee
Blizzard	February 5-7,	New Hampshire	New England-wide. Up to 25 inches of snow in central NH	Unknown; no damages

SEVERE WINTER WEATHER/ICE STORMS				
Hazard	Date	Location	Description of Areas Impacted	Damages
	1978			in Sunapee
Snow Storm	February, 1979	New Hampshire	President’s Day storm	Unknown; no damages in Sunapee
Ice Storm	January 8-25, 1979	New Hampshire	Major disruptions to power and transportation	Unknown; no damages in Sunapee
Snow Storm	April 5-7, 1982	New Hampshire	Up to 18 inches of snow in southern NH	Unknown; no damages in Sunapee
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; no damages in Sunapee
Extreme Cold	November-December, 1988	New Hampshire	Temperature was below 0 degrees F for a month	Unknown; no damages in Sunapee
Ice Storm	March 3-6, 1991	New Hampshire	Numerous outages from ice-laden power lines in southern NH	Unknown; no damages in Sunapee
Snow Storm	1996	Regional	Two major storms with five feet of snow in a week	Unknown; no damages in Sunapee
Snow Storm	1997	New Hampshire	Power outages throughout region due to heavy snowfall	Unknown; no damages in Sunapee
Ice Storm	January 15, 1998	New Hampshire; Substantial power in NH	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; no damages in Sunapee
Snow Storm	2000	Regional	Heavy snow	Unknown; no damages in Sunapee
Snow Storm	March 5-7, 2001	New Hampshire	Heavy snow.	Unknown; no damages in Sunapee
Snow Storm	December 6-7, 2003	New Hampshire	Heavy snow. Federal Disaster Declaration FEMA-3193-NH	Unknown; no damages in Sunapee
Snow Storm	February 10-12, 2005	New Hampshire	Heavy snow. Federal Disaster Declaration FEMA-3208-NH	Unknown; no damages in Sunapee
Ice Storm	December 2008	New Hampshire	Debris removal. FEMA DR-1812; power outages in region for up to 10 days; downed trees blocked roads and damaged utility lines	\$15 Million; no damages in Sunapee

SEVERE WINTER WEATHER/ICE STORMS				
Hazard	Date	Location	Description of Areas Impacted	Damages
Wind Storm	February 23 – March 3, 2010	New Hampshire	FEMA DR-1892; Federal funding to Grafton, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan Counties; power loss	\$2 Million; no damages in Sunapee
Snow Storm	October 29-30, 2011	Statewide	EM-3344; FEMA-4049 Hillsborough & Rockingham Counties	Unknown; no damages in Sunapee
Ice Storm	January 27, 2012	Region	Isolated power outages in region; several limbs down	Unknown; no damages in Sunapee
Snow Storm	February 8-10, 2013	New Hampshire	Heavy Snow. FEMA DR-4105	Unknown; No Damage in Sunapee, however, they received \$15,000 for plowing and labor from FEMA
Snow Storm	November 26 – 27, 2014	New Hampshire/ Northern New England	Heavy Snow – heavy snow fell throughout the region.	Unknown; no damages in Sunapee
Snow Storm	January 26-28, 2015	New Hampshire	Heavy Snow and declaration declared for Hillsborough, Rockingham and Strafford counties	Unknown; no damages in Sunapee

Potential Future Severe Winter Damage:

There is the potential for severe winter damage every year. An event would affect the entire town. The Committee determined severe winter weather to be a medium risk in Sunapee.

Earthquake

Earthquakes are characterized by a sudden and rapid shaking of the ground caused by the shifting of rock beneath the ground. The damage caused by an earthquake can be severe, causing the collapse and destruction of buildings, bridges, roads and other critical infrastructure. As a result, there can be many other hazards that occur, such as gas leaks, fires, electrical outages, landslides, etc. The magnitude and intensity of an earthquake can be rated on a scale such as the Richter or Mercalli, which are both illustrated below.

The following is a list of earthquakes which have impacted New England, New Hampshire, and potentially Sunapee. Though there has been earthquake activity in the region, as seen below, the town has not experience any damage from an earthquake todote.

Table III-11: EARTHQUAKES

EARTHQUAKES			
Date	Location	Magnitude	Damage
1638	Central NH	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	6.0	Much damage: cost unknown
1800s	Statewide	83 felt earthquake in NH	Unknown; no damages in Sunapee
1900s	Statewide	200 felt earthquake in NH	Unknown; no damages in Sunapee
March 18, 1926	Manchester, NH	Felt in Hillsborough Co	Unknown; no damages in Sunapee
Dec 20, 1940	Ossipee, NH	Both earthquakes 5.5	Damage to homes, water main rupture: cost unknown ; no damages in Sunapee
December 24, 1940	Ossipee, NH	NA	Unknown; no damages in Sunapee
December 28, 1947	Dover-Foxcroft, ME	4.5	Unknown; no damages in Sunapee
June 10, 1951	Kingston, RI	4.6	Unknown; no damages in Sunapee
April 26, 1957	Portland, ME	4.7	Unknown; no damages in Sunapee
April 10, 1962	Middlebury, VT	4.2	Unknown; no damages in Sunapee
June 15, 1973	Near Quebec Border	4.8	Unknown; no damages in Sunapee
Summer 1977-1978*	Centered in Franklin	NA	U known; no damages in Sunapee
January 19, 1982	West of Laconia	4.5	Structure damage 15 miles away in Concord: cost unknown; no damages in Sunapee
October 20, 1988	Near Berlin, NH	4	Unknown; no damages in Sunapee
September 26, 2010	New Hampshire	3.4	Centered in Boscawen, NH, The Committee recalls feeling the earthquake; no damages in Sunapee
August 23, 2011	Central Virginia, East Coast	5.8	Felt in region; no damages in Sunapee
September 18, 2012	Concord, NH	1.2	Epicenter was Concord, NH and the quake was felt in the capital region of NH; no damages in Sunapee
October 16, 2012	Southern Maine	4.0	The earthquake was located southern Maine and felt throughout the area

EARTHQUAKES			
Date	Location	Magnitude	Damage
			and into southern NH; no damages in Sunapee

Source: earthquake.usgs.gov/earthquakes/states/new_hampshire/history.php for earthquakes through 1964. NH Multi-Hazard Mitigation Plan, 2010 for 1973-1982; earthquake.usgs.gov/earthquakes (12/13/11)

*Committee recollection

Table III-12 RICHTER SCALE AND MERCALLI INTENSITY

Richter Scale and Mercalli Intensity		
Richter Scale	Modified Mercalli Intensity	Average Earthquake Effects
1.0-3.0	I	I – Not felt except by a very few under especially favorable conditions.
3.0-3.9	II-III	II – Felt only by a few persons at rest, especially on upper floors of buildings. III – Felt quite noticeably by persons indoors. Standing motor cars may rock slightly.
4.0-4.9	IV-V	IV – Felt indoors by many, outdoors by few during the day. Dishes, windows, doors disturbed; walls make cracking sound. V – Felt by nearly everyone; many awakened. Some dishes, windows broken.
5.0-5.9	VI-VII	VI – Felt by all. Some heavy furniture moved; a few instances of fallen plaster. VII – Damage negligible in buildings of good design and construction, considerable damage in poorly built or badly designed structures; some chimneys broken.
6.0-6.9	VII-IX	IX – Damage considerable in specially designed structures; damage great is substantial buildings, with partial collapse.
7.0 and higher	VIII or higher	VIII and higher: damage slight in specially designed structures. Fall of chimneys, factory stacks, columns, monuments, walls. X – Some well-built wooden structures destroyed, most masonry and frame structures destroyed with foundations. XI – Few if any masonry structures remain standing. Bridges destroyed. XII – Total damage. Lines of sight and level are distorted. Objects thrown in air.

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 Sunapee. 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. The Committee determined the risk to be low in Sunapee.

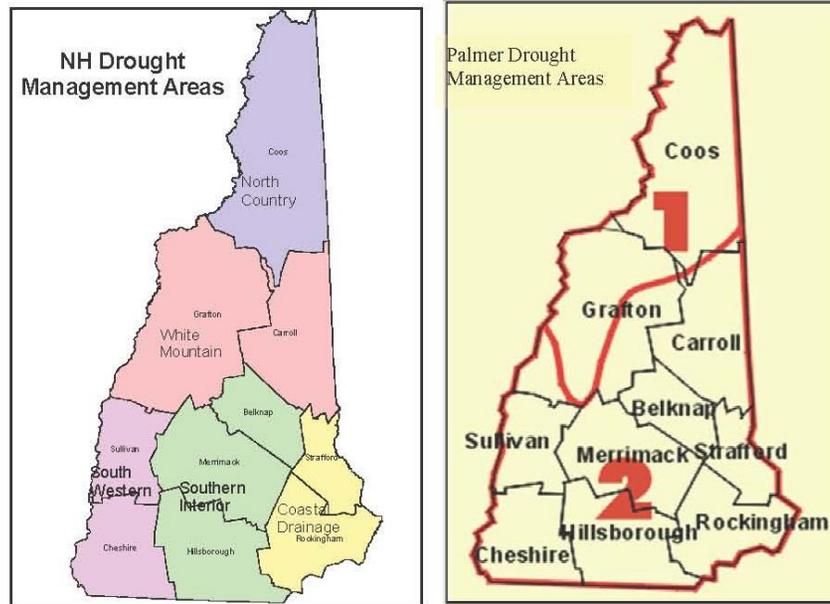
Drought

Droughts or abnormally low precipitation are generally not as damaging or disruptive as floods, but are more difficult to define. A drought is a natural hazard that evolves over months or even years and can last as long as several years or only a few months. Fortunately, droughts are rare in New Hampshire. The severity of the water deficit is gauged by the degree of moisture deficiency, its duration, and the size of the area affected. 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. Not all of these indicators will be minimal during a particular drought. For example, frequent minor rainstorms can replenish the soil moisture without raising ground water levels or increasing stream flow.

Low stream flow correlates with low ground water level because it is ground water discharge to streams and rivers that maintain stream flow during extended dry periods. Low stream flow and low ground water levels commonly cause diminished water supply.

New Hampshire breaks the State into five Drought Management Areas, with one in the north, one across the central region, and three along the southern portion of the State. The National Oceanic and Atmospheric Administration (NOAA) and the US government use the Palmer Drought Survey Index for conditions of the nation. The Palmer Drought Management areas divide the State into two areas and use the Palmer Drought Severity Index which is based on rainfall, temperature, and historic data. The Town of Sunapee is in Area 2. The NH Drought Management Team, coordinated by the NH Department of Environmental Services Dam Bureau, use these maps to help determine which areas are hardest hit.

Figure III-2: DROUGHT MAPS



Past Drought Events

Around 2001-2002, Sunapee and other nearby towns had drought issues. This occurred again in 2010. The 2010 drought did not significantly impact the town. The town has significant drinking water available with Lake Sunapee and the town did not report any specific well problems from individuals and businesses throughout town.

Table III-13: DROUGHT

Date	Location	Description	Damages
1929-1936	Statewide	Regional. Recurrence Interval 10 to > 25 years	Unknown; no damages in Sunapee
1939-1944	Statewide	Severe in southeast and moderate elsewhere. Recurrence Interval 10 to > 25 years	Unknown; no damages in Sunapee
1947-1950	Statewide	Moderate. Recurrence Interval 10 to > 25 years	Unknown; no damages in Sunapee

Date	Location	Description	Damages
1960-1969	Statewide	Regional longest recorded continuous spell of less than normal precipitation. Encompassed most of the Northeastern US. Recurrence Interval > 25 years	Unknown; no damages in Sunapee
2001-2002	Statewide	Affected residential wells and agricultural water sources; third worst drought on record, exceeded only by the drought of 1956-1966 and 1941-1942; recurrence level not determined yet	Unknown ; no damages in Sunapee
2010	Mostly southern counties	Affected dug wells and those in hillsides.	Unknown; no damages in Sunapee

Source: NH DES through 2002; Concord Monitor August 22, 2010

Potential Future Drought Damage

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. The Committee determined that drought is a low risk in Sunapee.

Extreme Heat

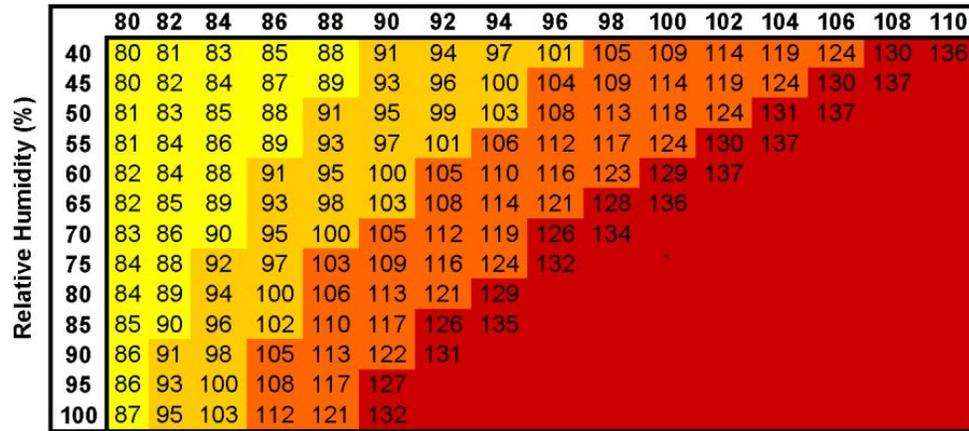
Extreme heat is characterized by abnormally high temperatures and/or longer than average time periods of high temperatures. These event conditions may impact the health of both humans and livestock. The National Weather Service developed a heat index based upon temperature and relative humidity. This is shown below.

Table III-14: HEAT INDEX

NOAA's National Weather Service

Heat Index

Temperature (°F)



Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

- Caution
- Extreme Caution
- Danger
- Extreme Danger

Past Extreme Heat Events

The following table lists the extreme heat events in the past which included the Northeast and New Hampshire. The town has not experience a heatwave that proved to cause significant damage or require significant resources.

Table III-15: EXTREME HEAT

Date	Location	Description	Damage
July, 1911	New England	11-day heat wave in New Hampshire	Unknown; no damages in Sunapee
Late June to September, 1936	North America	Temps to mid 90s in the northeast	Unknown; no damages in Sunapee
June - August, 1999	Northeast	Mean temperatures well above long-term average	Unknown; no damages in Sunapee
Early August, 2001	New Hampshire	Mid 90s and high humidity	Unknown; no damages in

Date	Location	Description	Damage
			Sunapee
August 2-4, 2006	New Hampshire	Regional heat wave and severe storms	Unknown; no damages in Sunapee
July 2010	Northeast	Regional heat wave	Unknown; no damages in Sunapee

Potential Future Extreme Heat Events

Extreme heat would impact the entire town 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 Committee determined extreme heat to be a low risk in Sunapee.

Erosion/Landslide

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. The committee felt that Erosion and Landslide were essentially the same hazard. They recognize that there can be varying causes to both erosion and landslide, but that the product of the hazard is the same, as such, they have grouped landslide with the erosion section.

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/Landslide Events

The committee acknowledged areas of erosion along Young Hill Road, Ryder Corner Road, North Road, Sargent Road and Perkins Pond Road, they also acknowledged that with the occurrence of more extreme storms, erosions and landslides may become more common. Stagecoach Road, Trow Hill, Ledge Pond Road and Winn Hill Road have experienced erosion regularly during the extreme storm events. The ditches on these roads do not have the ability to carry the capacity of the storms and the topography of the roads is steep, thus, the water moves very fast in undersized ditches and routinely causes washouts that the town must repair,. The erosion on Winn Hill Road caused the road to be down to one lane for a week before crews could repair the ditches and re-open the road in 2013. In the spring of 2015 the dirt section of Stagecoach Road was required to be closed for more than two weeks due to erosion that caused many spots to be entirely washed away along this section of road.

Potential Erosion Events

Due to the topography 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. The Committee determined there was a low/medium risk for erosion damage.

Fluvial Erosion Hazards Data

The committee's review of the FEH data did not identify any projects within the FEH data that were the town's responsibility due to the data being collected adjacent to a state road and state owned infrastructure. They did recognize the need for bank stabilization at the bridge north of Sleeper Road, which is a state owned bridge. The twin culverts of concern are at the north spur of the Route 103 and Route 11 intersection. This bridge has a tight stream that would get easily clogged with debris and cause the water and crest the road.

The Lower Main Street bridge at the confluence of Tucker Brook and the Sugar River is a reach of the river that has particular concern due to the erosion that has occurred over the past several years. The town would like to further investigate the health of the river banks in this area through a study of the river. Maps depicting the data collected through the Fluvial Erosion Hazard Zone effort can be seen in Appendix D of this document

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.

According to the National Wildfire Coordination Group, there are categories of wildfire based upon size: Class A - one-fourth acre or less; Class B - more than one-fourth acre, but less than 10 acres; Class C - 10 acres or more, but less than 100 acres; Class D - 100 acres or more, but less than 300 acres; Class E - 300 acres or more, but less than 1,000 acres; Class F - 1,000 acres or more, but less than 5,000 acres; Class G - 5,000 acres or more.

Past Wildfire Events

There have not been any significant wildfires in Sunapee to note; however, there have certainly been small brush fires on occasion.

Potential Future Wildfire Events

There are many large, contiguous forest tracts in Sunapee. Where development interfaces with the forested areas is called the “urban interface.” These are the areas where structures could be impacted by a wildfire; these areas are scattered throughout the town. The

most likely areas for wildfire are where ice storm impact downs trees and branches providing fuel for a fire. According to the State's mitigation plan, Sullivan County has substantial debris to fuel a wildfire remaining from the ice storm of 1998 and 2008 and heavy forest cover. The plan gives the county a high risk of wildfire. The Committee determined that the risk of wild and structure fire risk in Sunapee is low.

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. Following is a map of New Hampshire by the U.S. EPA to show radon zones.

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>.

There are not any areas in town that are known to be more prone to radon than another. Much of Sunapee is on granite ledge and thus providing a similar risk town wide.

Past Natural Water & Air Contaminant Events

There have been no known events related to natural water and air contamination in Sunapee. Uranium was found when constructing I-89 to the northwest of Sunapee. It is also anticipated that although no one is aware of any particular area where radon contamination exists, given that we are in the "Granite State," it is likely that some homes are affected by radon.

Table III-16: RADON – LOW/MEDIUM RISK

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

Figure III-3: MAP OF RADON ZONES

NEW HAMPSHIRE - EPA Map of Radon Zones

<http://www.epa.gov/radon/zonemap.html>

The purpose of this map is to assist National, State and local organizations to target their resources and to implement radon-resistant building codes.

This map is not intended to determine if a home in a given zone should be tested for radon. Homes with elevated levels of radon have been found in all three zones.

All homes should be tested, regardless of zone designation.



Zone 1 counties have a predicted average indoor radon screening level greater than 4 pCi/L (picocuries per liter) (red zones) **Highest Potential**

Zone 2 counties have a predicted average indoor radon screening level between 2 and 4 pCi/L (orange zones) **Moderate Potential**

Zone 3 counties have a predicted average indoor radon screening level less than 2 pCi/L (yellow zones) **Low Potential**

IMPORTANT: Consult the publication entitled "Preliminary Geologic Radon Potential Assessment of New Hampshire" (USGS Open-file Report 93-292-A) before using this map. <http://energy.cr.usgs.gov/radon/grpinfo.html> This document contains information on radon potential variations within counties. EPA also recommends that this map be supplemented with any available local data in order to further understand and predict the radon potential of a specific area.



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 Sunapee, 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.

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 low.

Hazardous Materials Spills

Hazardous materials spills or releases can cause loss of life and damage to property. Short or long-term evacuation of local residents and businesses may be required, depending on the nature and extent of the incident. The spills may occur on-site at hazardous waste generators or in transport through town.

In Sunapee, there are 35 potential hazardous waste generators listed on the NH Department of Environmental Services (DES) “one-stop” list. Only two of these are currently “active” meaning they may be handling hazardous materials now (Osborn’s Marina and Micro Precision, Inc.). The remaining generators are inactive and are primarily small businesses.

Past Hazardous Waste Spill Events

The Committee did not note any HazMat spills in the past in the town. The committee did note that there location on major state roads, discussed below, increases their risk, but that to date they have not had a hazardous material spill occur that caused significant damage or impacted the town.

Potential Future Hazardous Waste Spill Damage

Although there have not been any significant spills in Sunapee, hazardous materials spills could occur along the NH Route 11 or NH Route 103 or Interstate 89. In addition, heating fuel is delivered to homes on many of the town’s roads: spills could occur at storage tanks during the filling of the tanks. Sunapee also has a significant number of properties and marinas with fuel tanks in close proximity to the lakes, notably Lake Sunapee. There conceivably could be spills near any home in Sunapee due to home heating fuel delivery. The property owner is responsible for clean-up. The State oversees these reported spills.

The Committee determined a hazardous waste spill is a medium/high risk.

Terrorism

Terrorism has been defined in many ways. The word terrorism is derived from the Latin term “terrere” which means to frighten. Section 802 of the USA Patriot Act expanded the definition of terrorism to cover “domestic,” as opposed to international terrorism. A person engages in domestic terrorism if they do an act “dangerous to human life” that is a violation of the criminal laws of a state or the United States, if the act appears to be intended to: (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 Sunapee in the past.

Future Terrorism Events

Terrorism is not considered a major risk. The committee felt that they were not able to determine a particular area of town that was at a greater risk of terrorism. The nature of terrorism includes many unknowns and predicting a more vulnerable area can not be done. The Committee determined that the risk of terrorism is a medium/high risk in Sunapee.

C. HAZARD RISK RATINGS

The Town of Sunapee 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. These ratings were reevaluated and changed in 2014. The ratings were based on past occurrences of hazards affecting the State of New Hampshire, Sullivan County, and the Town of Sunapee. The two highest risks in Sunapee were determined to be hurricane and severe winter weather.

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:

- 1 – Low: 0 to 33% chance of occurrence in a 10 year period
- 2 – Medium: 33 to 66% chance of occurrence in a 10 year period
- 3 – High: 66 -100% chance of occurrence in a 10 year period

An n/a score was given if there was insufficient evidence to make a decision. To ensure some balance with a more scientific measurement, the plan also identifies the probability of occurrence from the State Hazard Plan as shown in Table III-10. For comparative purposes the Low rating was given a designation of “1,” the Medium rating a designation of “2,” and the High rating a designation of “3.” These figures are shown in Table III-17 and III-18.

Assessing Vulnerability

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

Table III-17: VULNERABILITY OF EXISTING DEVELOPED AREAS

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	2	2	2	2
Flooding	1	1	1	1
Hurricane	2	2	2	2
Tornado & Downburst	2	3	3	2.66
Thunderstorm/Lightning/Hail	1	1	1	1
Severe Winter/Ice Storms	2	2	2	2
Earthquake	1	1	2	1.33
Drought	1	1	1	1

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
Extreme Heat	1	1	1	1
Erosion/Landslide	1	2	1	1.33
Wildfire	1	2	2	1.66
Natural Contaminants	1	1	1	1
HazMat Spills	3	2	2	2.33
Terrorism	3	3	3	3

Assessing Risk

The averages of each vulnerability and probability were multiplied to arrive at the 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.

HIGH: There is very strong potential for a disaster of major proportions during the next 25 years; or (2) 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 against this hazard. This hazard should be a major focus of the town’s emergency management training and exercise program.

MEDIUM/HIGH: There is strong potential for a disaster of significant 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 against this hazard. This hazard should be a major focus of the town’s emergency management training and exercise program.

MEDIUM: 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 town’s emergency management training and exercise program.

MEDIUM/LOW: There is slight potential for disaster in the in the next 25 years. The modest threat warrants modest effort to prepare for, respond to, recover from, and mitigate this hazard. This hazard should be included in the town’s emergency management training and exercise program.

LOW: 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 town’s emergency management training and exercise program except as generally dealt with during hazard awareness training.

Table III-13: RISK ASSESSMENT

Risk Assessment					
	0-1.9 Low	2-3.9 Low/Med	4-5.9 Med	6-7.9 Med-High	8-9 High
Hazards	Probability based on Committee Review	Vulnerability based on Committee Review	Risk Rating (Probability x Vulnerability)	Risk	
Dam Failure	1	2	2	Low/ Medium	
Flooding	2	1	2	Low/Medium	
Hurricane	2	2	4	Medium	
Tornado & Downburst	2	2.66	5.33	Medium	
Thunderstorm/Lightning/Hail	2	1	2	Low/Medium	
Severe Winter/Ice Storms	2	2	4	Medium	
Earthquake	1	1.33	1.33	Low	
Drought	1	1	1	Low	
Extreme Heat	1	1	1	Low	
Erosion/Landslide	2	1.33	2.66	Low/Medium	
Wildfire	1	1.66	1.66	Low	
Natural Contaminants	1	1	1	Low	
HazMat Spills	3	2.33	6.99	Medium/High	
Terrorism	2	3	6	Medium/High	

IV. CRITICAL FACILITIES/LOCATIONS

The Critical Facilities list, identified by the Sunapee 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 Sunapee. The third category contains facilities/populations that the Committee wishes to protect in the event of a disaster. Values for all buildings in this document were obtained from town tax records for main structures plus accessory structures for 2012

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

Critical Facility	Hazard Vulnerability	Replacement Value
Safety Services Building (Emergency Operations Center)	Town-wide events & HazMat spills	\$3.4 million
Sunapee Middle-High School (Emergency Shelter)	Town-wide events	\$3.4 million
Sherburne Gym (Emergency Shelter)	Town-wide events & HazMat spills	Included in Elementary School figure
Sunapee Water & Sewer Facilities (treatment plant and pump stations)	Flooding, Dam Failure, Lightning, and Town-wide events	\$8.5 million
Roads & Bridges (evacuation and emergency access)	Town-wide events, Flooding, Dam Failure	Unknown
Sunapee Highway Garage	Town-wide events	Unknown

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

Critical Facility	Hazard Vulnerability	Replacement Value
Sunapee Town Offices	Dam failure, Flooding, Lightning, Town-wide events	\$430,000
Georges Mills United Methodist Church (potential shelter)	Town-wide events	unknown
Community United Methodist Church (potential shelter)	Town-wide events, Flooding, Dam Failure; HazMat spills	\$340,000
St. Joachim’s Catholic Church (potential shelter)	Town-wide events; HazMat spills	\$290,000
Lake Sunapee Baptist Church	Town-wide events; HazMat spills	\$110,000
Sunapee Elementary School	Town-wide events	\$1.2 million
Sunapee Hydroelectric Facility/Welcome Center	Dam Failure; Flooding; Town-wide events; HazMat spills	\$1.7 million
Sunapee Transfer Station	Town-wide Events	\$220,000
Abbott Library	Town-wide Events; HazMat spills	Unknown; new construction

Table IV-3: FACILITIES AND POPULATIONS TO PROTECT

Critical Facility	Hazard Vulnerability	Replacement Value
Sunapee Cove Assisted Living	Town-wide Events; HazMat spills	\$2.8 million
Dewey Beach & Ballfield structures	Town-wide Events	\$16,000
Old Town Hall	Flooding; Town-wide Events	\$80,000
All commercial/industrial buildings	All hazards-site specific	Unknown
All homes	All hazards-site specific	Unknown

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, dam inundation 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 except to note logical future development areas.

Table V-1: VULNERABILITY OF EXISTING DEVELOPED AREAS

Area	Hazard	Critical Facilities	Buildings (residential & non-residential)	Infrastructure	Natural Resources	Total Known Building Value
A and AE Flood Zone	Flooding	4	\$2,245,000	Unknown	Unknown	\$2,245,000

Table V-2: VULNERABILITY OF POTENTIAL DEVELOPMENT

Area	Hazard	Critical Facilities	Projected Buildings	Projected Infrastructure	Projected Value
None Known	All Hazards	None	N/A	N/A	N/A

B. IDENTIFYING VULNERABLE SPECIAL POPULATIONS

There are few centers of special populations in town including the elementary school, the town offices and the town hall during special meetings. The elderly and physically or mentally impaired residents are also residing throughout the town in their homes and facilities such as Sunapee Cove..

C. POTENTIAL LOSS ESTIMATES

This section identifies areas in 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 – \$317,027 Estimated Cost

The Committee determined the risk for Dam Failure to be low/medium. There is a single dam designated has “significant”. The cost of a dam failure is estimated at \$317,027 which is 1% of the total structure value. The impacts of the dam failure and subsequent inundation can be similar to those of flooding, road and infrastructure damage, building and home damage or destruction.

Flooding – Low/Medium Risk - \$8.9 Million Estimated Cost (not including roads, bridges)

There are approximately 186 homes located within the FEMA designated Special Flood Hazard areas. These areas are all “Zone A and AE.” The total value of the buildings (including residential and non-residential) is \$ 31,702,789. Assuming a 28 % structural damage to the buildings, the damage would total close to \$8.9 million. There are 14 town and state bridges and several sections of road in these flood areas. No value estimate has been done for these structures. No estimate for contents of buildings was done.

Hurricane – Medium Risk – \$13.2 Million Estimated Cost

Damage caused by hurricanes can be severe and expensive. Sullivan County has been impacted in the past by both wind and flooding damage as a result of hurricanes. The total assessed value of all structures within Sunapee is approximately \$574 million. It is random which structures would be impacted and how much. There is no standard loss estimation available and no record of past costs. If 10% of the buildings received 10% damage, the damage cost would be about \$5.7 million. The damage and impact of a hurricane can include buildings and structures being compromised and/or destroyed by the flood waters or high winds. The electrical

grid is also widely impacted by both the flood waters and winds, which can cause significant, long lasting, power outages. The impacts of the hurricane can effect the daily lives of residents in many ways, including the closure of stores, businesses, schools and community

Tornado & Downburst –Medium Risk – \$317,027 Estimated Cost

Tornadoes, downbursts, and microbursts are relatively uncommon natural hazards in New Hampshire, although microbursts in 2007 caused substantial 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 difficult. An estimated loss of 1% of the total structure value equates to an estimated cost of \$317,027; however, the randomness of a tornado or downburst can significantly impact the total cost and if the storms hit a more developed area, the cost could be significantly higher.

Thunderstorm/Lightning/Hail – Low/Medium 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. The cost can vary significantly due to the wide range of damage that the storms can cause, including electrical damage from wind or lightning strikes and wind damage to structures. Hail can also cause widespread damage to homes in the area.

Severe Winter Weather –Medium Risk – \$317,027 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. Due to the wide variety and varied severity of damage than can be caused by severe winter weather, a cost is difficult to determine, but 1% of the total structure value provides the estimate of \$317,027 in damage

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). U.S. average insurance claim was \$1,325 for personal property, \$1,980 for commercial property, and \$1,371 for automobiles.

Earthquake – Low Risk - \$90 million Estimated Cost if All Buildings Impacted

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 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. The total structure value in Sunapee is approximately \$574 million. If 10% of buildings in Sunapee were impacted by an earthquake, the estimated damage could be around \$57 million.

Drought – Low Risk – No Recorded or Estimated Cost

A long drought would cause damage to crops and dry up wells, which would impact not only residents personally but also commercially through the loss of local crops. There is no cost estimate for this hazard in Sunapee.

Extreme Heat – Low 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). The costs for this hazard are in terms of human suffering. It is not anticipated that there would be any structural or infrastructure costs.

Erosion/Landslide – Low/Medium Risk – No Recorded or Estimated Cost

Development on steep slopes can cause substantial erosion in the adjacent area. This can impact the adjacent roads, culverts and bridges in the area by making them more susceptible to erosion and washout. Construction itself can cause erosion if best management practices are not used to control run-off from disturbed soils, and the rooftops of buildings displace water which would have gone into the ground. This is then exacerbated by the steep slopes where the run-off moves more quickly and can cause more damage. Due to the significant variation in damage that can occur to town infrastructure, and no specific cost formula, a monetary value can not be placed on the damage. The road closures and disruption that occurs from erosion/landslides can make emergency response difficult during a severe storm event.

Wildfire – Low Risk – \$2.9 Estimated Cost

The risk of fire is difficult to predict based on location. 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 Sunapee interfaces with forest, all structures are potentially vulnerable to wildfire. The estimated value of all structures in the Town is approximately \$574 million. If 1% of the structures received 50% damage, the total estimated cost would be about \$2.9 million.

According to the Sullivan County Forester, big wildfires are uncommon in Sullivan County as the weather here is generally not favorable for a high probability of ignition and rapid spread. Additionally, there are enough roads and people in the county that fires are generally spotted and addressed before they are too large. Occasionally weather conditions are more favorable as was seen in the 1950s on Croydon Mountain.

Natural Contaminants – Low Risk – No Recorded or Estimated Cost

The cost of a natural contaminant hazard would be the health of individuals exposed to radon. Depending on the extent of the contaminant the cost can vary significantly, both financial and in a human health impact. No cost estimate is provided for this hazard.

Hazardous Material Spills –Medium/High 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 quality might be borne by the community. No cost estimate has been provided for this possible hazard.

Terrorism –Medium/High Risk – No Recorded or Estimated Cost

The cost of any terrorism event is unpredictable and not estimated in this document. Terrorism can cause significant damage to structures, human welfare and community facilities, but the extremely unpredictable nature makes defining the impacts impossible. The Committee does not feel that terrorism is a substantial threat in Sunapee.

VI. EXISTING MITIGATION ACTIONS

A. EXISTING HAZARD MITIGATION PROGRAMS

The following table provides the existing mitigation actions in Sunapee. The fourth or “Effectiveness” column ranks each program as one of the following: “high” – the existing program works as intended and meets its goals; “average” – the existing program works though there is room for improvement; and “low” – the existing program does not work as intended or falls short of its goals. The fifth column lists if there were recommendations for improvement in the previous hazard mitigation plan and if those recommendations were put into action or not and if not, why not. The final column provides either an update of the mitigation action or proposed improvements that are currently being recommended for the future. Any proposed actions or actions to be continued are shown in red and will be shown again in future tables for evaluation, prioritization, and scheduling for implementation.

Table VI-1: EXISTING MITIGATION ACTIONS

Existing Mitigation Action & Description	Hazard Type/Service Area	Responsible Local Agent	Effective-ness (Low, Average, High)	Recommendations in Previous Plan/ <i>Actions Taken to Meet Recommendations or Reasons Why Not Met</i>	Update/Future Proposed Improvements
Road Design & Road/Bridge Maintenance – Repair and upgrading of roadways, culverts, and bridges	Flood; Erosion/Town-wide	Highway Dept	High	Replace temporary Treatment Plant Road; install closed drainage systems at North Road, Perkins Pond Road, Sargent, and Ryder Corner Road; purchase excavator to make repairs / <i>COMPLETED Treatment Plant Road Bridge 2012</i>	No further action required; remove from next plan.
Emergency Back-Up Power – One permanent in Safety Services building; three portables; two on fire trucks; 16 permanent and one portable for pump stations	Multi-Hazard/Town-wide	Fire, Water & Sewer, EMD	Average	Need permanent generators in town offices building, highway garage, and high middle school / <i>DEFERRED due to lack of resources</i>	Acquire generators for the highway garage and new library
Town Master Plan - Goals/objectives to plan for	Multi-Hazard/Town-	Planning Bd	Average	Update in 2008/COMPLETED in 2010	No further action required at this time; remove from next

Existing Mitigation Action & Description	Hazard Type/Service Area	Responsible Local Agent	Effectiveness (Low, Average, High)	Recommendations in Previous Plan/ <i>Actions Taken to Meet Recommendations or Reasons Why Not Met</i>	Update/Future Proposed Improvements
growth	wide				plan.
Fire Safety Inspections - Checks oils burners, daycares, places of public assembly, etc.	Wildfire/Town-wide	Fire Chief	Average	Provide more public education / COMPLETED: Continue with public educations outreach efforts.	Continue educational outreach with inspections.
Greater Sullivan County All Health Hazard Plan - Plan to deal with emergencies; provide education by website (GSCP NH@SullivanCountyNH.gov), literature, and workshops	Multi-Hazard/Town-wide	Emergency Management Director	High	No recommendations in previous plan.	Continue to update and provide education program.
Safety Awareness Program - Fire Prevention and Safety Training	Wildfire/Town-wide	EMD/Fire Dept/EMS	High	No recommendations in previous plan.	Continue to distribute safety awareness information in schools and at fairs.
Planning and Land Use Regulations	Flooding/Erosion / Entire Town	Planning Board	Average	Amend land use regulations for Shoreland Protection and reduce maximum slope requirements / DEFERRED	Expand Steep Slopes Ordinance to include the building of residential and commercial development
Public Education & Outreach – Distribute HazMit brochure from State and HHW brochures	Multi-Hazard/Town-wide	Town Offices/ Highway	High	No recommendations in previous plan	Continue to provide education and outreach; add link to Town web site to “A Citizen’s Guide to Hazard Mitigation and Emergency Preparedness”
Tree Maintenance Program – Trimming and removal of branches along roadways.	Multi-Hazard/Town-wide	Highway Dept	Average	Purchase boom truck/ DELETE; Lack of staff resources, remove proposed improvement from plan.	Remove from plan update
Storm Drain Maintenance - Inspect and maintain culverts	Flood/Town-wide	Highway Dept	High	On-going program to convert open to closed drainage / PARTIALLY COMPLETED. Ongoing effort	Continue program to convert open to closed drainage
NFIP – Continue compliance and membership in the NFIP	Flood / Entire Town	Selectboard	High	No recommendations in previous plan.	Continue to participate in the NFIP and enforce the floodplain management

Existing Mitigation Action & Description	Hazard Type/Service Area	Responsible Local Agent	Effectiveness (Low, Average, High)	Recommendations in Previous Plan/ <i>Actions Taken to Meet Recommendations or Reasons Why Not Met</i>	Update/Future Proposed Improvements
					ordinance; add information about NFIP to education program (See Education Program below) which will be on the town website. Participate in NFIP training the State and/or FEMA (or in other training) that addresses flood hazard planning and management.
Public Education/Outreach – Educate the public on various hazards and their impacts.	All Hazards / Entire Town	EMD	Average	No recommendations in previous plan.	The town will carry out the public education and outreach program as defined below.

The Town of Sunapee will provide a public education and outreach program by using brochures and the town website to reach their citizens. There will also be one-on-one outreach as appropriate. Below is a table showing the potential topics and outreach methods. Dam failure is not included as this is performed by the State Dam bureau in their assessment of all dams in the State. Landslide is also not included as there is only one possible site in town.

Table VI-2: PUBLIC EDUCATION AND OUTREACH TOPICS

Natural Hazard	Educational Topics	Outreach Methods
Multi-Hazard	Shelters; evacuation routes; proper evacuation procedures; emergency kits and family plans	Town web site Town meeting display
Flooding	National Flood Insurance Program participation; building in a floodplain; stormwater runoff; driving on flooded roads; protecting natural systems which provide flood mitigation; securing property items such as propane tanks prior to a flood	Town web site Brochures
Wind Events (Hurricane, Tornado, Downburst)	Wind retrofits such as shutters, hurricane clips; school and town official sheltering basics; resident and business sheltering basics; window coverings	Town web site

Natural Hazard	Educational Topics	Outreach Methods
Severe Winter Weather	Installation of carbon monoxide monitor and alarms; ventilation of fuel-burning equipment; protecting water pipes	Town web site
Thunderstorms/Lightning/Hail	Taking cover; staying inside when it thunders	Town web site
Earthquake	Structural and non-structural home retrofitting; securing furnishings	Town web site
Drought	Water-saving measures; crop insurance; soil and water conservation practices by farmers	Town web site
Extreme Heat	Preparing for extreme heat; air conditioning; cooling shelters	Town web site
Erosion	High risk areas; stormwater management; bank stabilization; water body buffers	Town web site
Wildfire	Most vulnerable areas; reducing fuel for fires such as dry brush	Town web site; Fire Department and Fire Warden interactions
Natural Contaminants	Testing for contaminants in air and water	Town web site
Hazardous Materials Spills	What to do if there's a fuel delivery spill	Town web site

B. NEW MITIGATION PROGRAMS

The Committee evaluated the existing programs and proposed improvements to determine if they were addressing all the hazards they felt could impact the town. Table VII-3 summarizes this evaluation and notes where new programs could be implemented to address all hazards.

Table VI-3: COMMITTEE ASSESSMENT FOR NEW HAZARD MITIGATION ACTIONS

Hazard	Committee Ideas and Assessment
Dam Failure	The committee did not feel that they were at a significant risk for dam failure and did not feel that there were additional actions that could be reasonably taken to reduce the vulnerability.
Drought	The committee did not feel that they were at a significant risk for drought and did not feel they needed to take additional action over and above their plans and procedures for drinking water that the town already has in the event of a drought.
Earthquake	For earthquake and major wind events, the Town has adopted the State building codes which take these events into account. The Committee did not feel they could adopt more stringent requirements since earthquakes are so rare.
Hurricane	Much of the committees concerns regarding hurricanes were the flood waters that comes with the storms. To address those concerns they included to mitigation actions of erosion repair and control so that their infrastructure is better equipped to deal with the amount of water brought by a hurricane.
Tornado & Downburst	The town has adopted the State building codes and feels that due to the rare nature of tornados and downbursts, there are not additional mitigation actions that need to be taken.

Erosion	Road maintenance work; regulations for stormwater management. The committee identified several problem areas around Sunapee to be addressed as mitigation actions (see below). Additionally, they identified areas that need to be mapped and assessed for further information regarding the erosion. These erosion areas include both road and drainage erosion, as well as areas in rivers that the committee is concerned about.
Extreme Temperatures	The Fire Department does “welfare checks” during extreme temperatures and power outages at the homes of the elderly and disabled, at this point the town feels that this is sufficient for the extreme temperature events.
Flood	The town is a member of NFIP and has Floodplain Management Ordinance which does not allow new development in the floodplain. They felt the actions they could take in relation to flooded were those mention under erosion.
Thunderstorms, Lightning and Hail	Though there have been a few lightning strikes around town, the committee did not feel that they have the resources to pursue any mitigation actions in relation to lighting that this time.
Severe Winter Weather	The Town does its best to maintain the roads in winter to keep them clear of snow and debris. The Town already has adopted the State’s International Building Code and International Residential Code which are enforced by the Building Inspector. There are already checks on vulnerable populations. The Committee could not think of additional mitigation strategies appropriate for Sunapee.
Wildfire	The committee did not feel that the vulnerability to wildfire was significant enough that further action was needed at this time. The town participates in posting of the current fire danger.

Table VI-4 provides a list of proposed new mitigation actions including ones that had been proposed in the previous plan. If these actions had not been accomplished since the last plan, then there is an explanation, however, all mitigation actions are new.

Table VI-4: PROPOSED NEW MITIGATION ACTIONS

Proposed New Mitigation Action Description	Hazard Type/Service Area	Responsible Local Agent	If Recommended in Previous Plan, why was it not put into place?
Construct a fence around the George’s Mills well site	Terrorism / George’s Mills well site	Water and Sewer Supt.	
Address drainage and erosion concerns on, Ledge Pond Road, Wind Hill and Throw Hill.	Erosion / Identified Areas	Highway Director	
Remediate and mitigate the transfer of sediment into Lake Sunapee (drinking water source) through culverts into the lake.	Erosion, Flooding / Lake Sunapee	Highway Director	
Repair Bank Erosion along roads and ditches of Stagecoach Road	Erosion	Highway Director	
Bank Stabilization Above Sleeper Bridge	Erosion & Flooding/Identified Areas	Highway Director	
Map and Assess Areas Vulnerable to Erosion: Lower Main Street (Sugar River and Tucker Brook)	Erosion & Flooding/Identified Areas	Highway Director	

Proposed New Mitigation Action Description	Hazard Type/Service Area	Responsible Local Agent	If Recommended in Previous Plan, why was it not put into place?
Map and Assess Areas Vulnerable to Erosion: Perkins and Ledge Pond Water Shed	Erosion & Flooding/Identified Areas	Highway Director	

**Though the hazard type for many of the mitigation actions is erosion, the committee felt it was important, as erosion can result from flooding, hurricane and rapid melt of severe winter weather due to the large amounts of water associated with these events.

C. CRITICAL EVALUATION FOR IMPROVEMENTS TO EXISTING PROGRAMS AND NEW PROGRAMS

The Sunapee Hazard Mitigation Committee reviewed each of the proposed improvements to existing programs and proposed new programs identified for existing mitigation programs 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 Sunapee 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. These scores are re-evaluated during each update process for new and existing strategies. Table VI-6 examines the proposed improvements and new strategies 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-5: PRIORITIZING PROPOSED EXISTING PROGRAM IMPROVEMENTS & NEW MITIGATION STRATEGIES

Rank	Strategy Improvement	Reduce Damage	Community Objectives	Existing Regulations	Quickly Implemented	Socially Acceptable	Technically Feasible	Administratively Possible	Benefit - Cost	TOTAL SCORE	Mitigate Existing or New Development or Both
1	Construct a fence around the George’s Mills well site	3	3	3	3	3	3	3	3	24	NEW
2	Address drainage and erosion concerns Ledge Pond Road, Wind Hill and Throw Hill.	3	3	3	3	3	3	2	3	23	NEW
3	NFIP - Continue to participate in the NFIP and enforce the floodplain management ordinance; add information about NFIP to education program which will be on the town website. Participate in NFIP training the State and/or FEMA (or in other training) that addresses flood hazard planning and management.	2	3	3	3	2	3	2	2	20	EXISTING
3	Education and Outreach – Link to website with education and outreach materials regarding specific hazards.	1	2	3	3	3	2	3	3	20	EXISTING
4	Emergency Power – Acquire generator for critical facilities, highway garage and library	1	2	3	2	3	3	3	2	19	EXISTING
5	Remediate and mitigate the erosion which causes the transfer of sediment into Lake Sunapee (drinking water source) through culverts into the lake.	3	3	1	1	3	2	2	3	18	NEW
5	Expand Steep Slopes Ordinance to include the building of residential and commercial development	3	3	1	1	1	3	3	3	18	NEW
6	Map and Assess Areas Vulnerable to Erosion: Lower Main Street (Sugar River and Tucker Brook)	3	2	2	1	3	3	1	2	17	NEW
6	Map and Assess Areas Vulnerable to Erosion: Perkins and Ledge Pond Water Shed	3	2	2	1	3	3	1	2	17	NEW
6	Bank Stabilization at the end of North Spur of 103	2	2	1	1	3	3	1	1	17	NEW
6	Erosion Control along Bradford Road/Nutting Road (Trask	2	2	1	1	3	3	1	1	17	NEW

Rank	Strategy Improvement	Reduce Damage	Community Objectives	Existing Regulations	Quickly Implemented	Socially Acceptable	Technically Feasible	Administratively Possible	Benefit - Cost	TOTAL SCORE	Mitigate Existing or New Development or Both
	Brook)										
6	Erosion Control along Stagecoach Road	2	2	1	1	3	3	1	1	17	NEW
7	Bank Stabilization Above Sleeper Bridge	2	2	1	1	3	3	1	1	14	NEW

D. EMERGENCY PREPAREDNESS ACTIONS

Although this is a hazard mitigation plan, the Committee felt it was important to address new and proposed emergency preparedness actions. It is sometimes difficult to distinguish between hazard mitigation and emergency preparedness. Essentially, emergency preparedness is the preparation to act once a hazard has occurred. And as has been discussed previously, hazard mitigation includes actions to eliminate or reduce hazards before they happen. Table VI-7 below is a list of the emergency preparedness actions that the Committee felt should be addressed and included in this plan.

Table VI-6: EMERGENCY PREPAREDNESS ACTIONS

Existing Action	Type/Service Area	Responsible Local Agent	Effectiveness (Low, Average, High)	Recommendations in Previous Hazard Mitigation Plan/Actions Taken to Meet Recommendations or Why Not Met	Update/Future Proposed Improvements
Household Hazardous Waste Collections - Free drop off of hazardous waste to residents and by fee for commercial entities	HazMat/Town-wide	Road Agent	High	Free drop off of hazardous waste to residents and by fee for commercial entities / COMPLETE have participated annually	Continue to participate in annual HHW collections.
Town Warning System – Siren in Georges Mills Village (inactive)	Multi-hazard/ Georges Mills	Fire	Low	Look into Reverse 911 / DELETE as switched to CodeRed	N/A

Existing Action	Type/Service Area	Responsible Local Agent	Effectiveness (Low, Average, High)	Recommendations in Previous Plan/Actions Taken to Meet Recommendations or Why Not Met	Update/Future Proposed Improvements
CodeRed – Warning system for mass notification	All Hazards/Entire Town	Selectboard and EMD	High	Not addressed in previous plan	Continue use and update of service
School Evacuation Plan - Plan for evacuation/lock down/etc...	Multi-Hazard/Elementary and Middle High Schools	Police Chief, Fire Chief & EMD	High	None; continual revisions and adjustments	Continue to revise and adjust as needed.
Town Radio - Communication for Fire, Police, Highway; school buses, Water & Sewer; Town Manager	Multi-Hazard/Town-wide	Town emergency services	High	Relocate repeater on town channel / DEFERRED due to lack of resources./	Locate repeater for municipal channel
Emergency Operations Plan - Plan to deal with emergencies	Multi-Hazard/Town-wide	Emergency Management Director	High	None; Updating in process / update LEOP plan	Update LEOP 2016
HazMat Spill Program - Midwest Regional HazMat Team;	HazMat/Town-wide	Fire Dept	High	Need more equipment and more certified members / COMPLETED	Continue to recruit new members
Sewage Overflow Program – Notifications of residences around Lake Sunapee of sewage spills	HazMat/around Lake Sunapee	Water & Sewer	Low	Develop list of properties which use water from the lake for drinking / Utilize CodeRed to target properties.	No further action required
Fire Hydrant System - Fire protection in Georges Mills and Sunapee	Fire, HazMat/Town-wide	Water & Sewer	Average	Expand service area; on-going upgrades / ongoing maintenance, replace approx.. 3 hydrants per year.	Continue to replace hydrants
911 Mapping - Provide correct address for each structure	All Hazards/Entire Town	Fire Chief	High	Updating in process / Complete	No further action required

VII. PRIORITIZED IMPLEMENTATION SCHEDULE

The Sunapee Hazard Mitigation Committee created the following action plan for implementation of priority mitigation strategies. The table represents an updated view on what projects are the highest priority with both new mitigation actions and previous actions that were incomplete or modified being scored together and prioritized as one group. As it can be seen in Table VI-5, three of the tops five strategies were existing, but the top two were new strategies that show the protection of the well from contamination and addressing drainage and erosion concerns on several steep roads as the top priorities identified by the 2015 Sunapee Hazard Mitigation Committee.

The timeframe’s for project completion are defined as:

SHORT TERM: 1 years or less, or ongoing

MEDIUM TERM: 2-3 years

LONG TERM: 4-5 years

Table VII-1: PRIORITIZED IMPLEMENTATION SCHEDULE FOR NEW & EXISTING PROGRAM IMPROVEMENTS

Location: Mitigation Action	Who (Leadership)	When (Start)	How (Funding Sources)	Cost (Estimated)
Construct a fence around the George’s Mills well site to protect the pubic drinking water supply.	Water and Sewer Supt.	Short Term	EPA Grants//Taxes	\$50,000
Address drainage and erosion concerns on Ledge Pond Road, Wind Hill and Throw Hill so the drainage can accommodate large storms and eliminate the erosion threat.	Highway Director	Short Term	HMGP/PDM	\$650,000
NFIP - Continue to participate in the NFIP and enforce the floodplain management ordinance; add information about NFIP to education program which will be on the town website. Participate in NFIP training the State and/or FEMA (or in other training) that addresses flood hazard planning and management	Selectboard	Ongoing throughout life of plan	Taxes	Staff Time (\$0)
Public Education and Outreach – Maintain the links on the website with educational materials regarding hazard events.	Town Manager	Ongoing throughout life of plan	Taxes	Staff Time (\$0)

Location: Mitigation Action	Who (Leadership)	When (Start)	How (Funding Sources)	Cost (Estimated)
Emergency Power – Acquire generator for critical facilities, highway garage and library	EMD	Medium term	HMGP/PDM	\$30,000
Remediate and mitigate the transfer of sediment into Lake Sunapee (drinking water source) through culverts into the lake.	Highway Director	Medium Term	EPA Source Water Protection/Taxes	\$10,000
Expand Steep Slopes Ordinance to include the building of residential and commercial development	Planning Board	Medium Term	Taxes	Staff Time (\$0)
Map and Assess Areas Vulnerable to Erosion: Lower Main Street (Sugar River and Tucker Brook)	Selectboard/NH DES	Long Term	NH DES Grants	\$30,000
Map and Assess Areas Vulnerable to Erosion: Perkins and Ledge Pond Water Shed	Selectboard/NH DES	Long Term	NH DES Grants	\$30,000
Bank Stabilization at the end of North Spur of 103	NH DOT/Selectboard	Long Term	NH DOT / PDM Grants	\$100,000
Erosion Control along Bradford Road/Nutting Road (Trask Brook)	DPW	Medium Term	HMGP/PDM	\$30,000
Erosion Control through bank stabilization along Stagecoach Road	DPW	Medium Term	HMGP/PDM	\$100,000
Bank Stabilization Above Sleeper Road bridge	NH DOT/Selectboard	Long Term	NH DOT	\$100,000

VIII. 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 Sunapee will revisit the Hazard Mitigation Plan *annually, or with in 90 days of a hazard event*. The Sunapee 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

Many municipalities have web sites where they can share information about hazard mitigation and emergency management. The use of the web site by its citizens is often dictated by the availability of broadband service to easily access the web. The Town of Sunapee has provided a link to the Regional Planning Commission's web page, "A Citizen's Guide to Hazard Mitigation and Emergency Management."

Municipalities have documents to convey town goals and objectives that are used to guide future programs. They can be used to promote and implement hazard mitigation. A Municipal Master Plan outlines how the community wants to grow and develop. It includes overall goals and objectives of the community and recommendations for ordinances and regulations to accomplish those goals. A zoning ordinance is a common vehicle to implement goals of the master plan and regulates land use. It can be used to restrict development in flood zones, steep sloped areas, buffer zones around wetlands and water bodies, drinking water recharge areas, hillsides, and ridgelines. These areas may be "overlay districts" mapped out for protection. A zoning ordinance can also require best management practices in forestry and timber harvesting and stormwater management to prevent erosion. A floodplain management plan is part of the zoning ordinance and has typically followed a format recommended by the NH Flood Management Program. Outside of the zoning ordinance that pertains to floodplains, the town has not actively incorporated the Hazard Mitigation Plan into planning documents in the past. The town plan's to incorporate the plan into the Master Plan on it's next revision cycle, which is not due until at least 2020.

Other municipal documents include regulations such as Curb Cut Regulations, Excavation Regulations, Subdivision Regulations and Site Plan Review Regulations. Curb Cut Regulations are used to make sure the culverts at the intersection of driveways and roads are adequate to handle runoff water or stream flow. Excavation Regulations are used to restrict the removal of earth including distance to seasonal high water table and the requirements to restore the site once the excavation is completed. This is essential to make sure the area is graded and re-vegetated to reduce the chances of erosion. Subdivision Regulations determine how lots are to be laid out in a subdivision. This might include requirements for fire protection, stormwater runoff management, vegetated buffers, and reference back to the zoning ordinance. Site Plan Review Regulations are for multi-family housing and commercial development. Again, these regulations refer back to the zoning ordinance. The regulations can determine site specific development requirements such as parking, open space, vegetated buffers, and traffic flow.

Subdivision Regulations and Site Plan Review Regulations typically refer back to the Zoning Ordinance, so it may be more effective to amend the zoning ordinance to address hazard mitigation through specific restrictions though this can vary by municipality.

It should also be noted that many municipalities do not update these documents very often, and some towns do not have them at all. However, where they exist, they offer the potential to include hazard mitigation and emergency management topics.

In Sunapee, the most recent version of the Master Plan is 2010, the latest version of Subdivision Regulations is 2006, the most recent Site Plan Review Regulations is 2006, and the Zoning Ordinance is 2015. The most critical documents to reference hazard mitigation are primarily the master plan and the zoning ordinance. Since Sunapee has not updated their Master Plan in many years, this addition remains a proposal for the future. The Zoning Ordinance was amended in 2010 to include lot size averaging to provide more open space during a subdivision. The town will continue to evaluate its documents to include the hazard mitigation as the plans and ordinance go under revision.

B. CONTINUED PUBLIC INVOLVEMENT

The public will continue to be invited to participate in the hazard mitigation planning process. In future years, a public meeting will be held (separate from the adoption hearing) to inform and educate members of the public. It is hoped that a separate meeting discussing hazard mitigation and emergency management will create more interest in the process. Additionally, a press release to local newspapers will be distributed and information will be posted on the Town website and on the two bulletin boards.

Copies of the Hazard Mitigation Plan have been or will be shared with the following parties for reference:

- Select Board Offices in neighboring towns

- NH Homeland Security & Emergency Management
- Sunapee Select Board, Conservation Commission, and Planning Board
- Upper Valley Lake Sunapee Regional Planning Commission

RESOURCES USED IN THE PREPARATION OF THIS PLAN

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

Town of Sunapee Emergency Operations Plan, 2008

Town of Sunapee Master Plan, 2010

NH HSEM's *State of New Hampshire Multi-Hazard Mitigation Plan Update 2013*

www.fema.gov/news/disasters.fema: Website for FEMA's Disaster List

www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms: Website for National Oceanic & Atmospheric Administration Disaster List

www.tornadoproject.com: Website for The Tornado Project

www.crrel.usace.army.mil/: Website for Cold Regions Research and Engineering Laboratory Website (CRREL)

www.nesec.org: Website for Northeast States Emergency Consortium

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

APPENDICES

- Appendix A: Technical Resources**
- Appendix B: Hazard Mitigation Assistance Grants**
- Appendix C: Meeting Documentation**
- Appendix D: Map of Hazard Areas and Critical Facilities**
- Appendix E: Town Adoption & FEMA Approvals of Hazard Mitigation Plan**

APPENDIX A:
Technical Resources

APPENDIX A: TECHNICAL RESOURCES

1) Agencies

New Hampshire Homeland Security and Emergency Management
 Hazard Mitigation Section 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 and Emergency Management
406 Public Assistance and Hazard Mitigation	NH Homeland Security and Emergency Management
Community Development Block Grant (CDBG).....	NH HSEM, NH OEP, also refer to RPC
Dam Safety Program	NH Department of Environmental Services
Disaster Preparedness Improvement Grant (DPIG)	NH Homeland Security and Emergency Management
Emergency Generators Program by NESEC‡	NH Homeland Security and Emergency Management
Emergency Watershed Protection (EWP) Program	USDA, Natural Resources Conservation Service
Flood Mitigation Assistance Program (FMAP)	NH Homeland Security and Emergency Management
Flood Plain Management Services (FPMS)	US Army Corps of Engineers
Mitigation Assistance Planning (MAP)	NH Homeland Security and 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 and Emergency Management
Project Impact.....	NH Homeland Security and 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
Florida State University Atlantic Hurricane Site	http://www.met.fsu.edu/explores/tropical.html	Tracking and NWS warnings for Atlantic Hurricanes and other links

Sponsor	Internet Address	Summary of Contents
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.tornadoject.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.iaa.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

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.

All subapplicants for Flood Mitigation Assistance Program (FMA) must currently be participating in the National Flood Insurance Program (NFIP) to be eligible to apply for this grant. Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation (PDM) mitigation project subapplications for projects sited within a special flood hazard area are eligible only if the jurisdiction in which the project is located is participating in the NFIP. There is no NFIP participation requirement for HMGP and PDM project subapplications located outside the special flood hazard area. Properties included in a project subapplication for FMA funding must be NFIP-insured at the time of the application submittal. Flood insurance must be maintained at least through completion of the mitigation activity.

The HMA grant assistance includes three programs:

1. *Hazard Mitigation Grant Program (HMGP)*: This program assists in the implementation of long-term hazard mitigation measures following a major disaster.
2. *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.
3. *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.

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

HMGP - <http://www.fema.gov/hazard-mitigation-grant-program>

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

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

Mitigation Project:	HMGP	PDM	FMA
1. Mitigation Projects	X	X	X
Property Acquisition and Structure Demolition	X	X	X
Property Acquisition and Structure Relocation	X	X	X
Structure Elevation	X	X	X
Mitigation Reconstruction	X	X	X
Dry Floodproofing of Historic Residential Structures	X	X	X
Dry Floodproofing of Non-residential Structures	X	X	X
Generators	X	X	
Localized Flood Reduction Projects	X	X	X
Non-Localized Flood Reduction Projects	X	X	
Structural Retrofitting of Existing Buildings	X	X	X
Non-structural Retrofitting of Existing Buildings and Facilities	X	X	X
Safe Room Construction	X	X	
Wind Retrofit for One- and Two-Family Residences	X	X	
Infrastructure Retrofit	X	X	X
Soil Stabilization	X	X	X
Wildfire Mitigation	X	X	
Post-Disaster Code Enforcement	X		
Advance Assistance	X		
5% Initiative Projects	X		
Misc. Other	X	X	X
2. Hazard Mitigation Planning	X	X	X
Planning Related Activities	X		
3. Technical Assistance			X
4. Management Costs	X	X	X

OTHER HAZARD MITIGATION ASSISTANCE FUNDING

Environmental Protection Agency

The EPA makes available funds for water management and wetlands protection programs that help mitigate against future costs associated with hazard damage.

Mitigation Funding Sources Program	Details	Notes
Clean Water Act Section 319 Grants	Grants for water source management programs including technical assistance, financial assistance, education, training, technology transfer, demonstration projects, and regulation. http://www.epa.gov/OWOW/NPS/cwact.html	Funds are provided only to designated state and tribal agencies
Clean Water State Revolving Funds	State grants to capitalize loan funds. States make loans to communities, individuals, and others for high-priority water-quality activities. http://www.epa.gov/owow/wetlands/initiative/srf.html	States and Puerto Rico
Wetland Program Development Grants	Funds for projects that promote research, investigations, experiments, training, demonstrations, surveys, and studies relating to the causes, effects, extent, prevention, reduction, and elimination of water pollution. http://www.epa.gov/owow/wetlands/initiative/#financial	See website

National Oceanic and Atmosphere Administration (NOAA)

NOAA is the major source for mitigation funding related to coastal zone management and other coastal protection projects.

Mitigation Funding Sources Program	Details	Notes
Coastal Services Center Cooperative Agreements	Funds for coastal wetlands management and protection, natural hazards management, public access improvement, reduction of marine debris, special area management planning, and ocean resource planning. http://www.csc.noaa.gov/funding/	May only be used to implement and enhance the states' approved Coastal Zone Management programs
Coastal Services Center Grant Opportunities	Formula and program enhancement grants for implementing and enhancing Coastal Zone Management programs that have been approved by the Secretary of Commerce. http://www.csc.noaa.gov/funding/	Formula grants require non-federal match
Coastal Zone Management Program	The Office of Ocean and Coastal Resource Management (OCRM) provides federal funding and technical assistance to better manage our coastal resources. http://coastalmanagement.noaa.gov/funding/welcome.html	Funding is reserved for the nation's 34 state and territory Coastal Zone Management Programs
Marine and Coastal Habitat Restoration	Funding for habitat restoration, including wetland restoration and dam removal. http://www.nmfs.noaa.gov/habitat/recovery/	Funding available for state, local and tribal governments and for- and non-profit organizations.

Floodplain, Wetland and Watershed Protection Programs

USACE and the U.S. Fish and Wildlife Service offer funding and technical support for programs designed to protect floodplains, wetlands, and watersheds.

Funding and Technical Assistance for Wetlands and Floodplains Program	Details	Notes
USACE Planning Assistance to States (PAS)	Fund plans for the development and conservation of water resources, dam safety, flood damage reduction and floodplain management. http://www.lre.usace.army.mil/planning/assist.html	50 percent non-federal match
USACE Flood Plain Management Services (FPMS)	Technical support for effective floodplain management. http://www.lrl.usace.army.mil/p3md-o/article.asp?id=9&MyCategory=126	See website
USACE Environmental Laboratory	Guidance for implementing environmental programs such as ecosystem restoration and reuse of dredged materials. http://el.erdc.usace.army.mil/index.cfm	See website
U.S. Fish & Wildlife Service Coastal Wetlands Conservation Grant Program	Matching grants to states for acquisition, restoration, management or enhancement of coastal wetlands. http://ecos.fws.gov/coastal_grants/viewContent.do?viewPage=home	States only. 50 percent federal share
U.S. Fish & Wildlife Service Partners for Fish and Wildlife Program	Program that provides financial and technical assistance to private landowners interested in restoring degraded wildlife habitat. http://ecos.fws.gov/partners/viewContent.do?viewPage=home	Funding for volunteer-based programs

Housing and Urban Development

The Community Development Block Grants (CDBG) administered by HUD can be used to fund hazard mitigation projects.

Mitigation Funding Sources Program	Details	Notes
Community Development Block Grants (CDBG)	Grants to develop viable communities, principally for low and moderate income persons. CDBG funds available through Disaster Recovery Initiative. http://www.hud.gov/offices/cpd/communitydevelopment/programs/	Disaster funds contingent upon Presidential disaster declaration
Disaster Recovery Assistance	Disaster relief and recovery assistance in the form of special mortgage financing for rehabilitation of impacted homes. http://www.hud.gov/offices/cpd/communitydevelopment/programs/dri/assistance.cfm	Individuals
Neighborhood Stabilization Program	Funding for the purchase and rehabilitation of foreclosed and vacant property in order to renew neighborhoods devastated by the economic crisis. http://www.hud.gov/offices/cpd/communitydevelopment/programs/neighborhoodspg/	State and local governments and non-profits

Bureau of Land Management

The Bureau of Land Management (BLM) has two technical assistance programs focused on fire mitigation strategies at the community level.

Mitigation Funding Sources Program	Details	Notes
Community Assistance and Protection Program	Focuses on mitigation/prevention, education, and outreach. National Fire Prevention and Education teams are sent to areas across the country at-risk for wildland fire to work with local residents. http://www.blm.gov/nifc/st/en/prog/fire/community_assistance.html	See website
Firewise Communities Program	Effort to involve homeowners, community leaders, planners, developers, and others in the effort to protect people, property, and natural resources from the risk of wildland fire before a fire starts. http://www.firewise.org/	See website

U.S. Department of Agriculture

There are multiple mitigation funding and technical assistance opportunities available from the USDA and its various sub-agencies: the Farm Service Agency, Forest Service, and Natural Resources Conservation Service.

Mitigation Funding Sources Agency Program	Details	Notes
USDA Smith-Lever Special Needs Funding	Grants to State Extension Services at 1862 Land-Grant Institutions to support education-based approaches to addressing emergency preparedness and disasters. http://www.csrees.usda.gov/funding/rfas/smith_lever.html	Population under 20,000
USDA Community Facilities Guaranteed Loan Program	This program provides an incentive for commercial lending that will develop essential community facilities, such as fire stations, police stations, and other public buildings. http://www.rurdev.usda.gov/rhs/cf/cp.htm	Population under 20,000
USDA Community Facilities Direct Loans	Loans for essential community facilities. http://www.rurdev.usda.gov/rhs/cf/cp.htm	Population of less than 20,000
USDA Community Facilities Direct Grants	Grants to develop essential community facilities. http://www.rurdev.usda.gov/rhs/cf/cp.htm	Population of less than 20,000
USDA Farm Service Agency Disaster Assistance Programs	Emergency funding and technical assistance for farmers and ranchers to rehabilitate farmland and livestock damaged by natural disasters. http://www.fsa.usda.gov/	Farmers and ranchers
USDA Forest Service National Fire Plan	Funding for organizing, training, and equipping fire districts through Volunteer, State and Rural Fire Assistance programs. Technical assistance for fire related mitigation. http://www.forestsandrangelands.gov/	See website
USDA Forest Service Economic Action Program	Funds for preparation of Fire Safe plans to reduce fire hazards and utilize byproducts of fuels management activities in a value-added fashion. http://www.fs.fed.us/spf/coop/programs/eap/	80% of total cost of project may be covered
USDA Natural Resources Conservation Service Emergency Watershed Protection Support	Funds for implementing emergency measures in watersheds in order to relieve imminent hazards to life and property created by a natural disaster. http://www.nrcs.usda.gov/programs/ewp/	See website

Mitigation Funding Sources Agency Program	Details	Notes
Services		
USDA Natural Resources Conservation Service Watershed Protection and Flood Prevention	Funds for soil conservation; flood prevention; conservation, development, utilization and disposal of water; and conservation and proper utilization of land. http://www.nrcs.usda.gov/programs/watershed/index.html	See website

Health and Economic Agencies

Alternative mitigation programs can be found through health and economic agencies that provide loans and grants aimed primarily at disaster relief.

Federal Loans and Grants for Disaster Relief Agency Program	Details	Notes
Department of Health & Human Services Disaster Assistance for State Units on Aging (SUAs)	Provide disaster relief funds to those SUAs and tribal organizations who are currently receiving a grant under Title VI of the Older Americans Act. http://www.aoa.gov/doingbus/fundopp/fundopp.asp	Areas designated in a Disaster Declaration issued by the President
Economic Development Administration (EDA) Economic Development Administration Investment Programs	Grants that support public works, economic adjustment assistance, and planning. Certain funds allocated for locations recently hit by major disasters. http://www.eda.gov/AboutEDA/Programs.xml	The maximum investment rate shall not exceed 50 percent of the project cost
U.S. Small Business Administration Small Business Administration Loan Program	Low-interest, fixed rate loans to small businesses for the purpose of implementing mitigation measures. Also available for disaster damaged property. http://www.sba.gov/services/financialassistance/index.html	Must meet SBA approved credit rating

Research Agencies

The United States Geological Survey (USGS) and the National Science Foundation (NSF) provide grant money for hazard mitigation-related research efforts.

Hazard Mitigation Research Grants Agency Program	Details	Notes
National Science Foundation (NSF) Decision, Risk, and Management Sciences Program (DRMS)	Grants for small-scale, exploratory, high-risk research having a severe urgency with regard to natural or anthropogenic disasters and similar unanticipated events. http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5423&org=SES	See website
U.S. Geological Survey (USGS) National Earthquake Hazards Reduction Program	The purpose of NEHRP is to provide products for earthquake loss reduction to the public and private sectors by carrying out research on earthquake occurrence and effects. http://www.usgs.gov/contracts/nehrrp/	Community with a population under 20,000

Appendix C: Meeting Documentation

Meeting #1: Thursday, February 6, 2014 8:00 – 10:00 PM (2 hours)

- General discussion of requirements and in-kind match process
- Review goals of hazard mitigation plan and revise (hand out)
- Review hazards (see poster – Add hazards? Remove hazards?)
- Identify and map past/potential hazards (update map & lists in Chapter 2)
- Flooding – Are there any non-FEMA flood areas?
- Specific past and potential events of hazards not in 2008 plan (recent events)
- Potential development areas in town (compare with list in 2008 plan)
- Identify critical facilities (update map and list)
- Determine Vulnerability to Hazards for Town
- Determine Probability of Hazards for Town
- Review Critical Facilities & hazard vulnerability
- Discuss future meetings, public notice, stakeholders to be notified, notices to abutting towns

Meeting #2 Thursday, February 20, 2014 8:00 – 10:00 (2 hours)

- Review previously determined potential mitigation efforts (were they implemented? If not, why not and are they still on the table to be implemented?)
- Brainstorm improvements to existing mitigation efforts
- Brainstorm potential new mitigation efforts

Meeting #3 Wednesday, February 26, 2014 8:00 – 10:00 (2 hours)

- Evaluate the past and potential mitigation efforts
- Develop a prioritized implementation schedule and discuss the adoption and monitoring of the plan

Meeting #4 Thursday, March 20, 2014 8:00 – 9:00 (1 hour)

- Review and revise draft plan

Meeting #4 Thursday, May 28, 2015 8:00 – 10:00 (2 hour)

- Review Fluvial Erosion Hazard data to incorporate into plan
- Review and revise draft plan

Adam Ricker

From: Adam Ricker
Thursday, May 21, 2015 3:02 PM
Sent: Janet Roberts (admin@springfieldnh.org); TOWN OF NEWPORT
(manager@newportnh.net); 'townadm@nl-nh.com'; 'croydon@myfairpoint.net'; Dennis
Pavicek (townadmin@newburynh.org); 'townofgoshen@goshennh.org'
To: Sunapee Hazard Mitigation
Subject: Sunapee Hazard Mitigation

Good Afternoon,

The Sunapee Hazard Mitigation Committee will be meeting on Thursday, May 28, 2015 at 8:00 AM at the Sunapee Town Office to review the Fluvial Erosion Hazards Data and work on their Hazard Mitigation Plan. The meeting is open to the public and we invite anyone that is interested from neighboring communities to attend.

Best,
Adam Ricker

*Adam Ricker, Assistant Planner
Upper Valley Lake Sunapee Regional Planning Commission
10 Water Street, Suite 225, Lebanon, NH 03786
Phone: 603-448-1680*

Legal/Public Notices

TOWN OF SUNAPEE

The Sunapee Hazard Mitigation Committee will hold the final working meeting of the Hazard Mitigation Plan Update and review the Fluvial Erosion Hazards Zone data collected in areas of the Sugar River Watershed. The meeting will be held at the Sunapee Town Meeting Room on Thursday, May 28 at 8 a.m.

Sunapee Hazard Mitigation Meeting - May 28, 2015	
Name	Position
Donna Washawaty	Town MANAGER
Scott Hazen	Highway Director
Dan Bailey	Water/sewer SUPERINTENDENT
David Cahill	Police Chief
Howard Sargent	EMD / FIRE

APPENDIX D:
Map of Hazard Areas and Critical Facilities
&
Map of Fluvial Geomorphology Data

Hazard Areas and Critical Facilities Map
Sunapee Hazard Mitigation Plan

Legend

- Town Boundaries
- Electric Transmission Line
- Roads**
- State
- Local
- Not Maintained
- Private
- Bridge

Water Features

- Lake or Pond
- Stream or River
- 100-Year Floodplain, FEMA
- Inundation Area if Sunapee Dam Fails, in the case of a 100-year breach

Critical Facilities

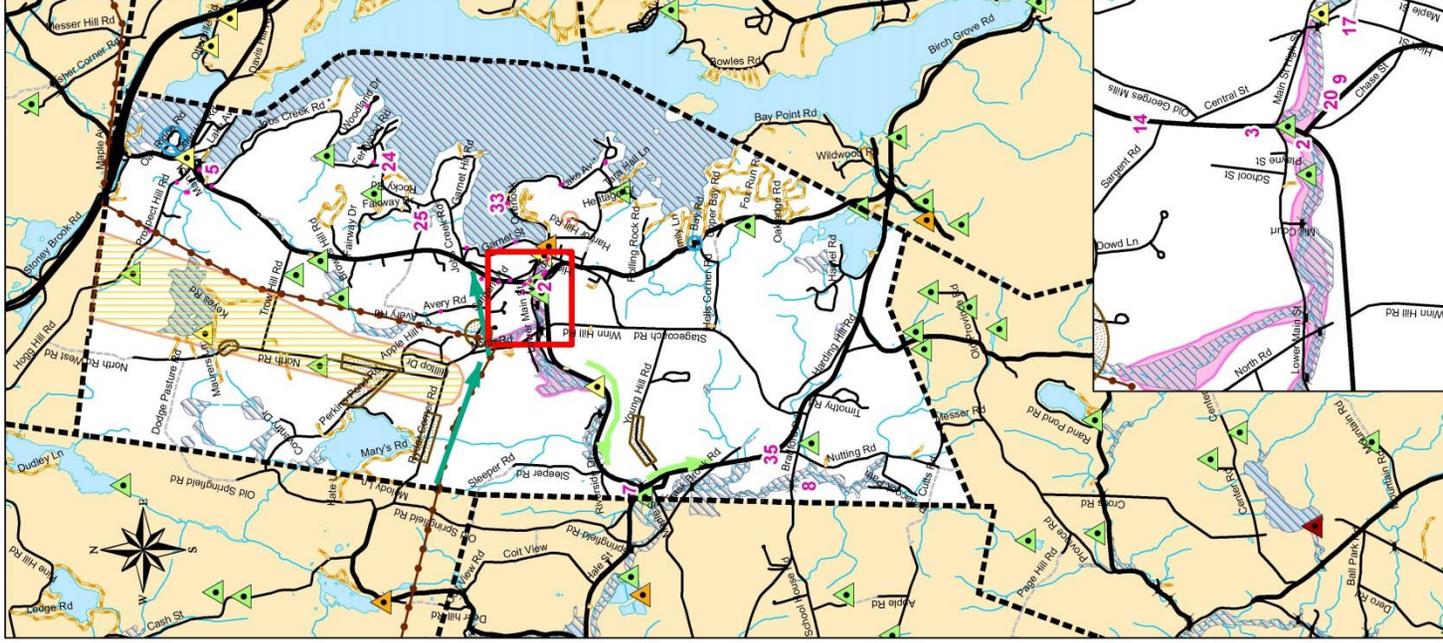
- 1 Listed by number above

Dams by Hazard Class

- High hazard potential
- Significant hazard potential
- Low hazard potential
- Non Menace
- Ruins, removed, breached, not built, or exempt

Hazard Areas

- Downburst
- Microburst
- Erosion
- Local Flooding
- Lightning



Listing of Critical Facilities in Sunapee, NH

ID #	Critical Facility	HAZ	Critical Facility
1	LITTLE FALLS DAM	25	Water Storage Tank
2	WATER STORAGE TANK	25	Water Storage Tank
3	WATER STORAGE TANK	25	Water Storage Tank
4	WATER STORAGE TANK	25	Water Storage Tank
5	WATER STORAGE TANK	25	Water Storage Tank
6	WATER STORAGE TANK	25	Water Storage Tank
7	WATER STORAGE TANK	25	Water Storage Tank
8	WATER STORAGE TANK	25	Water Storage Tank
9	WATER STORAGE TANK	25	Water Storage Tank
10	WATER STORAGE TANK	25	Water Storage Tank
11	WATER STORAGE TANK	25	Water Storage Tank
12	WATER STORAGE TANK	25	Water Storage Tank
13	WATER STORAGE TANK	25	Water Storage Tank
14	WATER STORAGE TANK	25	Water Storage Tank
15	WATER STORAGE TANK	25	Water Storage Tank
16	WATER STORAGE TANK	25	Water Storage Tank
17	WATER STORAGE TANK	25	Water Storage Tank

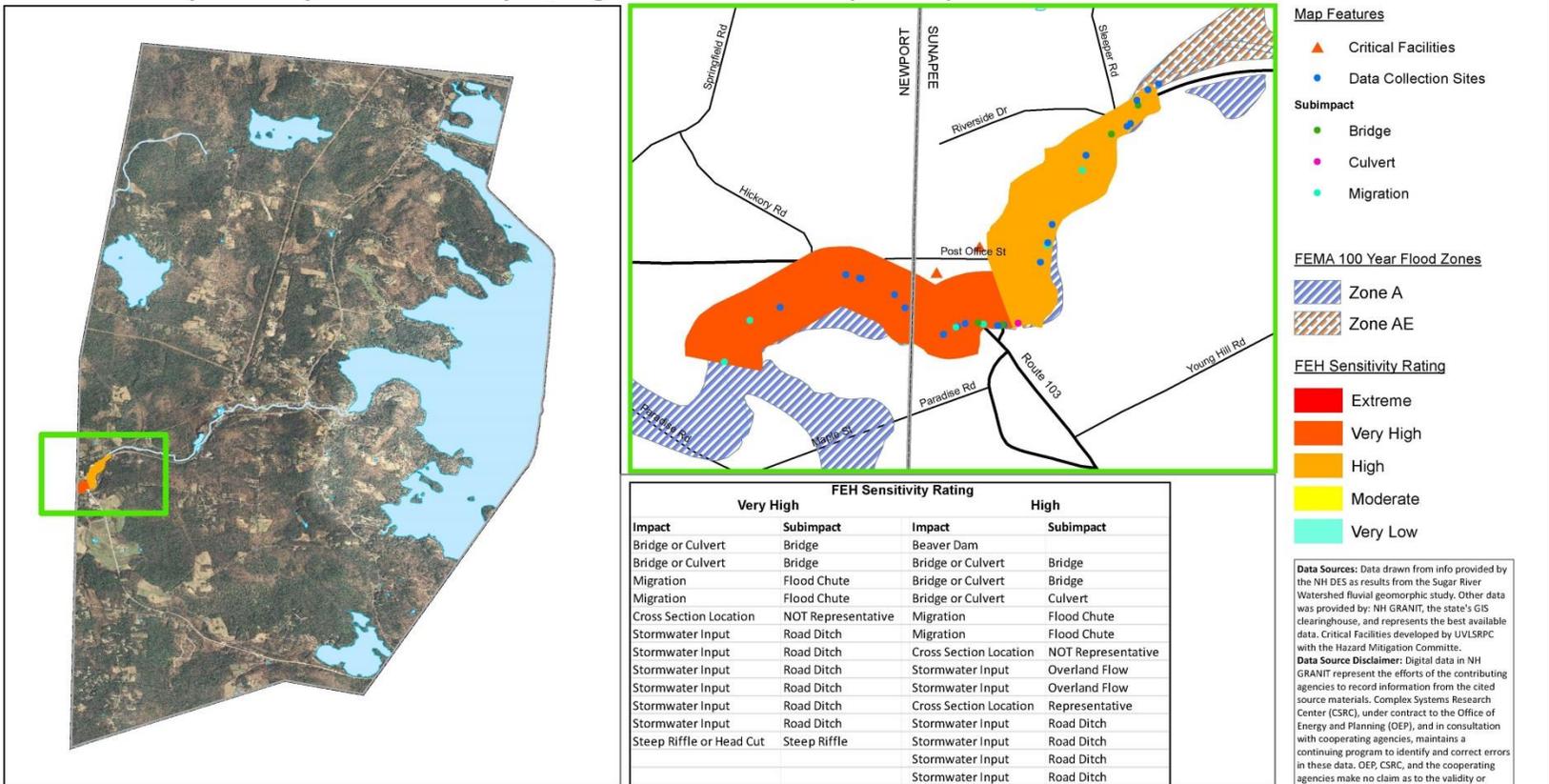
Data drawn from NH GRANIT, the state's GIS system, and the state's Dam Inventory data. Dam data from NH DES Dam Bureau. Bridge data from NH DOT. Local hazard areas and critical facilities identified by the Sunapee Hazard Mitigation Committee.

Data Source Disclaimer: Digital data in NH GRANIT represent the efforts of the contributing agencies to record information from the cited source. The data are provided as a courtesy by the Office of Energy and Planning (OEP), under contract to the Office of Energy and Planning (OEP), and in consultation with cooperating agencies, maintains a continuing program to identify and correct errors in these data. OEP, CSKC, and

MAP PREPARED BY UVA/SRRC
FOR SUNAPEE HAZ MIT COMMITTEE
FEBRUARY 2014



Fluvial Geomorphic Study - Town of Sunapee, Sugar River Watershed (HUC 10)



Fluvial Erosion Hazard Zone Sensitivity Rating
 This information is based on data collected for the Sugar River Watershed Area by the NH Geological Survey & the NH Department of Environmental Services. The Fluvial Erosion Hazard Zone (FEH), or meander belt, is provided for river reaches that have been assessed for this study. Sensitivity ratings are based on 6 categories of condition, ranging from Very Low to Extreme. Sensitivity is defined as the potential of a river to respond to flood events, through bank erosion and lateral migration (across the floodplain) processes.

Culvert Compatibility
 This data was rated and scored based on how the culvert will influence specific features that impact the compatibility of a culvert with river/stream geomorphic processes, in general, the information provides guidance on what each rank tells us about the long-term compatibility of a culvert with flow and sediment transport processes. The tables on each map indicate culvert data for the points in the selected area.

Data Sources: Data drawn from info provided by the NH DES as results from the Sugar River Watershed fluvial geomorphic study. Other data was provided by: NH GRANIT, the state's GIS clearinghouse, and represents the best available data. Critical Facilities developed by UVLSRPC with the Hazard Mitigation Committee.
Data Source Disclaimer: Digital data in NH GRANIT represent the efforts of the contributing agencies to record information from the cited source materials. Complex Systems Research Center (CSRC), under contract to the Office of Energy and Planning (OEP), and in consultation with cooperating agencies, maintains a continuing program to identify and correct errors in these data. OEP, CSRC, and the cooperating agencies make no claim as to the validity or reliability or to any implied uses of these data.



Map created by UVLSRPC January 2015.

APPENDIX E:
FEMA Approvals and Town Adoption of Hazard Mitigation Plan

**Town of Sunapee, New Hampshire
Board of Selectmen
A Resolution Adopting the Sunapee Hazard
Mitigation Plan Update 2016**

WHEREAS, the Town of Sunapee 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 updated plan; and

WHEREAS, several planning meetings to develop the hazard mitigation plan update were held in February through May 2015 and then presented to the Board of Selectmen for review and discussion on December 28, 2015; and

WHEREAS, the Sunapee Hazard Mitigation Plan Update 2016 contains several potential future projects to mitigate the hazard damage in the Town of Sunapee; and

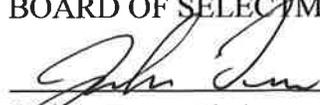
WHEREAS, the Board of Selectmen held a public meeting on December 28, 2015 to formally approve and adopt the Sunapee Hazard Mitigation Plan Update 2016.

NOW, THEREFORE BE IT RESOLVED that the Sunapee Board of Selectmen adopted the Sunapee Hazard Mitigation Plan Update 2016.

- The Plan is hereby adopted as an official plan of the Town of Sunapee;
- The respective officials identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;
- Future revisions and Plan maintenance required by 44 CFR 201.6 and FEMA are hereby adopted as a part of this resolution for a period of five (5) years from the date of this resolution;
- An annual report on the progress of the implementation elements of the Plan shall be presented to the Board of Selectmen by the Emergency Management Director

Adopted this day, the 28th of December, 2015.

TOWN OF SUNAPEE
BOARD OF SELECTMEN

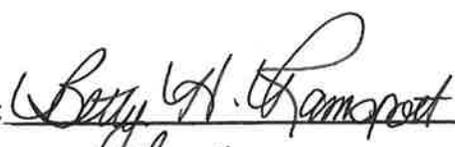


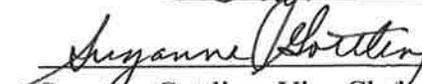
Joshua Trow, Chair

Frederick C. Gallup

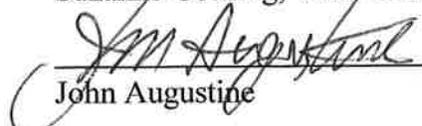
Emma M. Smith

(seal)

ATTEST: 



Suzanne Gottling, Vice Chair



John Augustine

BETTY H. RAMSPOTT
Notary Public, State of New Hampshire
My Commission Expires June 22, 2016



FEMA

FEB 09 2016

Joshua Trow, Chairman
Board of Selectmen
Town of Sunapee
23 Edgemont Road
Sunapee, NH 03782

Dear Mr. Trow:

Thank you for the opportunity to review the Town of Sunapee, New Hampshire Hazard Mitigation Plan Update 2016. The Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA) Region I has evaluated the plan for compliance with 44 C.F.R. Pt. 201. The plan satisfactorily meets all of the mandatory requirements set forth by the regulations.

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

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

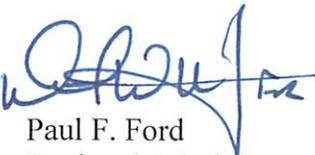
The Town of Sunapee, New Hampshire Hazard Mitigation Plan Update 2016 must be reviewed, revised as appropriate, and resubmitted to FEMA for approval within **five years of the plan approval date of January 22, 2016** in order to maintain eligibility for mitigation grant funding. We encourage the Town to continually update the plan's assessment of vulnerability, adhere to its maintenance schedule, and implement, when possible, the mitigation actions proposed in the plan.

Joshua Trow
Page 2

FEB 09 2016

Once again, thank you for your continued dedication to public service demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please do not hesitate to contact Marilyn Hilliard at (617) 956-7536.

Sincerely,



Paul F. Ford
Regional Administrator

PFF: mh

cc: Beth Peck, New Hampshire State Hazard Mitigation Officer
Jennifer Gilbert, Asst. New Hampshire State NFIP Coordinator
Parker Moore, State Hazard Mitigation Planner
Donna Nashawaty, Town Manager, Sunapee
Victoria Davis, Planner, UVLSRPC
Adam Ricker, Assistant Planner, UVLSRPC

Enclosure

LOCAL MITIGATION PLAN REVIEW TOOL

Town of Sunapee, NH

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to the community.

- The Regulation Checklist provides a summary of FEMA’s evaluation of whether the Plan has addressed all requirements.
- The Plan Assessment identifies the plan’s strengths as well as documents areas for future improvement.
- The Multi-jurisdiction Summary Sheet is an optional worksheet that can be used to document how each jurisdiction met the requirements of the each Element of the Plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

The FEMA Mitigation Planner must reference this *Local Mitigation Plan Review Guide* when completing the *Local Mitigation Plan Review Tool*.

Jurisdiction: Sunapee, NH	Title of Plan: Town of Sunapee, New Hampshire Hazard Mitigation Plan Update 2016	Date of Plan: 2016
Single or Multi-jurisdiction plan? Single		New Plan or Plan Update? Update
Regional Point of Contact: Victoria Davis / Adam Ricker Planner / Assistant Planner Upper Valley Lake Sunapee Regional Planning Commission 10 Water Street, Suite 225 Lebanon, NH 03766 603-448-1680; vdavis@uvlsrpc.org & aricker@uvlsrpc.org		Local Point of Contact: Joshua Trow Chairman, Board of Selectmen Town of Sunapee, NH 23 Edgemont Road Sunapee, NH 03782 603-863-6021; joshua.trow@gmail.com Donna Nashawaty, Town Manager donna@town.sunapee.nh.us

State Reviewer: Parker Moore	Title: State Hazard Mitigation Planner parker.moore@dos.nh.gov	Date: 7/1/2015; 7/21/2015; 8/24/2015; 9/1/2015
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FEMA Reviewer: Jay Neiderbach	Title: Community Planner	Date: 11/16/2015; 1/22/2016
Date Received in FEMA Region I	9/1/2015	
Plan Not Approved		
Plan Approvable Pending Adoption	11/19/2015	
Plan Adopted	12/28/2015	
Plan Approved	1/22/2016	

**SECTION 1:
REGULATION CHECKLIST**

INSTRUCTIONS: The Regulation Checklist must be completed by FEMA. The purpose of the Checklist is to identify the location of relevant or applicable content in the Plan by Element/sub-element and to determine if each requirement has been ‘Met’ or ‘Not Met.’ The ‘Required Revisions’ summary at the bottom of each Element must be completed by FEMA to provide a clear explanation of the revisions that are required for plan approval. Required revisions must be explained for each plan sub-element that is ‘Not Met.’ Sub-elements should be referenced in each summary by using the appropriate numbers (A1, B3, etc.), where applicable. Requirements for each Element and sub-element are described in detail in this *Plan Review Guide* in Section 4, Regulation Checklist.

1. REGULATION CHECKLIST	Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)			
ELEMENT A. PLANNING PROCESS			
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	pp. 2-6, Appendix C	X	
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))	pp. 2-3, 6, Appendix C	X	
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	pp. 2-3, 6	X	
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	pp. 65-66	X	
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	p. 66	X	
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	p. 65	X	
<u>ELEMENT A: REQUIRED REVISIONS</u>			
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT			
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	Section III: pp. 12-40	X	

1. REGULATION CHECKLIST		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)				
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	Section III: pp. 10-44	X		
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	Section III: p. 10-45	X		
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	Section III: pp. 18-19	X		
<u>ELEMENT B: REQUIRED REVISIONS</u>				
ELEMENT C. MITIGATION STRATEGY				
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	Section VIII: pp. 65-66	X		
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	Section III: pp. 18-19; Section VI p. 57	X		
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	Section I: p. 5	X		
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	Section VI: pp. 51-59	X		
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	Section VI: p. 60-61 Section VII pp 63-64	X		
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	Section VIII: p. 65-66	X		
<u>ELEMENT C: REQUIRED REVISIONS</u>				

1. REGULATION CHECKLIST		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)				
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)				
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	Section II: pp. 9-11	X		
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	Section VI: pp. 55-56	X		
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	Section VI: p. 60-61	X		
<u>ELEMENT D: REQUIRED REVISIONS</u>				
ELEMENT E. PLAN ADOPTION				
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))	Sect. I.A p. 1; App. E	X		
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	N/A			
<u>ELEMENT E: REQUIRED REVISIONS</u>				
ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)				
F1.				
F2.				
<u>ELEMENT F: REQUIRED REVISIONS</u>				

SECTION 2: PLAN ASSESSMENT

A. Plan Strengths and Opportunities for Improvement

This section provides a discussion of the strengths of the plan document and identifies areas where these could be improved beyond minimum requirements.

Element A: Planning Process

Plan Strengths:

- The plan provides documentation of the planning process by including sign-in sheets for each committee meeting, the public notice in the InterTown Record about the last working meeting, and a copy of the e-mail that was sent to neighboring communities about the last working meeting.
- The town incorporated existing reports and data into the plan, including the CRREL Ice Jam Database, information on federally declared disasters, information from the NH Office of Energy and Planning, the fluvial geomorphic study for the Sugar River watershed, and local land use restrictions.

Opportunities for Improvement:

- There are several inconsistencies in the description of the public and stakeholder outreach process, which make it difficult to understand exactly who was involved, what comments were received, and how many hazard mitigation committee meetings were held. Consider revising the plan to address the following: (1) On page 3, the plan states that a Planning Board member and Selectboard member represented municipal organizations with general and land use planning authority. However, there is no indication in the meeting sign-in sheets or list of hazard mitigation committee members on page 7 that there was participation by these two representatives. (2) On page 2, the plan states that the hazard mitigation committee held a total of four posted meetings in 2013. However, the four planning meetings occurred in 2014. (3) Page 7 states that “no comments were submitted to be incorporated into the plan,” but also that “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.” Clarify as to whether there was public input received.
- Page 8 of the plan references the 2003 version of the Sunapee Master Plan. On page 72, it is stated that the plan was last updated in 2010. Revise the footnote on page 8 to reference the most recent version of the Master Plan.
- Provide additional documentation of the planning process, such as individual meeting agendas, meeting minutes, and copies of the public notices that were posted at the town office, town hall, general store, and town website.
- Consider ways in which participation could be increased for future updates and the continued public outreach process. A survey could be made available on the town website and at common public places asking residents for their input on the town’s vulnerabilities and mitigation options. As part of public notices, consider including a brief summary of the

plan's purpose and providing context about the planning process. Many residents and stakeholders who may be interested in participating may not be completely familiar with hazard mitigation and may require some background knowledge to better understand how it relates to them. Consider presenting about the plan at meetings of other local boards and committees at which there is generally public attendance. Consider posting notice for all hazard mitigation committee meetings, rather than only three meetings, to promote greater potential participation. For more outreach ideas, see page 3-5 of FEMA's *Local Mitigation Planning Handbook*.

- Consider inviting a representative from the town's Conservation Commission and Planning Board to join the hazard mitigation committee. Because the Conservation Commission and Planning Board play critical roles in mitigation efforts, representatives from these entities would be able to evaluate the effectiveness of current actions and suggest potential improvements.
- As part of sharing copies of the plan for reference with the town's Selectboard, Conservation Commission, Planning Board, and neighboring communities, consider also specifically requesting comments from each of these entities to be incorporated into future updates. This will make it clear to them that comments are encouraged and foster greater participation and input from a wide variety of stakeholders.
- FEMA's *Local Mitigation Planning Handbook* includes worksheets on pages A-35 and A-37 that can be used to assist in monitoring progress of mitigation actions and evaluating the plan. As part of future plan updates, review these worksheets and consider incorporating their content into the plan. Consider listing specific criteria that will be used to evaluate the plan during the maintenance process. Some areas to evaluate are the effectiveness of public outreach, tracking procedures, and the reassessment of mitigation actions.

Element B: Hazard Identification and Risk Assessment

Plan Strengths:

- The plan includes a map of the fluvial geomorphic study completed for the Sugar River watershed, identifying areas that are at greatest risk from erosion.
- The plan analyzes the location, extent, impact, previous occurrences, and future probability of hazards that were determined to affect the community. For many hazards, the community estimated potential financial damages. The analysis incorporates information from the State of New Hampshire Multi-Hazard Mitigation Plan.
- The plan describes the vulnerability of current development to flooding, with information about the number of structures in the 1% floodplain, their assessed value, the number and type of NFIP policies, and the total claims that have been paid.
- Critical facilities and resources are identified in the plan, along with their estimated value and the key hazards to which they are vulnerable.

Opportunities for Improvement:

- Include more information on the extent of previous hazard events. On page 43, the plan states, "there have not been any significant wildfires in Sunapee to note." Define what is meant by a "significant" wildfire, and consider including more information about the

location or number of small brush fires. Describe the extent of all previous hurricanes using the Saffir-Simpson Scale. Describe water depth during previous flooding events. Estimate snow fall totals during all previous severe winter events.

- The estimates for potential financial damages have significant errors that should be corrected. The errors are: (1) For earthquakes, the heading states an estimated damage based on all buildings being impacted, whereas the estimate in the text is for 10% of structures receiving 10% of damage. Additionally, if 10% of structures received 10% of damage, based on the total structure value in Sunapee of \$574 million, the resulting estimate should be \$5.7 million, rather than the \$57 million figure that is stated in the text. (2) Because of the nature of tornadoes, downbursts, and severe winter weather being hazards that can affect the entire town, consider using the total structure value of \$574 million to estimate damages from these hazards, rather than only the value of property in the floodplain. (3) The damage stated for hurricanes is different in the heading (\$13.2 million) than in the text below it (\$5.7 million).
- Consider estimating financial damages for all hazards. If the community would prefer to not describe specific costs from previous events due to the potential range of severity of future events, consider including a range of potential costs, taking into consideration different magnitude of events (Tropical Storms versus Category 1 hurricane, different wind and ice combinations on the Scaled Predictive Ice Storm Aftermath Index, etc.). Consider also adding the estimated financial impacts to land, utilities, roads, bridges, and critical facilities.
- On page 62, it is stated that there is only one possible site in town for landslides in the community. This is inconsistent with the location analysis of landslides found on page 41. Revise the plan so that these two sections are in agreement.
- On page 48, it is stated that “The two highest risks in Sunapee were determined to be hurricane and severe winter weather.” However, on page 51, it appears that tornado/downburst scored the highest in the risk assessment, above both hurricane and severe winter weather. Given these scores, consider providing an explanation for why tornado/downburst was determined to not be as high of a risk as these other two hazards.
- Consider adding more information about the extent of extreme heat, drought, and hurricanes. For extreme heat, consider defining events based on a certain number of days above or below a specific temperature. Provide more information on the severity of drought for different categories of the Palmer Drought Severity Index. Consider adding a description of the different damages associated with different hurricane categories on the Saffir-Simpson Hurricane Wind Scale.
- As part of the hazard analysis, describe the impact that climate change will have on the magnitude of future hazard events, and how this will affect the town’s overall vulnerability.

Element C: Mitigation Strategy

Plan Strengths:

- The plan states whether proposed mitigation actions will address existing development, new development, or both.
- The hazard mitigation committee developed a detailed public outreach plan for educating the public about the community's vulnerabilities. The outreach plan addresses specific mitigation actions that will make both new and existing development more resilient.

Opportunities for Improvement:

- Specify more information about potential funding sources for the actions listed in the prioritized implementation schedule. For items labeled as "taxes," specify the type of tax or town department budget from which the funding will be derived. Including more detailed information will make it easier for stakeholders and the community's decision makers to understand how potential projects may be funded.
- Consider providing additional information on the town's existing capabilities. For example, include the town's existing staffing resources, and describe potential staffing limitations and budget concerns that may affect the ability to implement the actions in the prioritized implementation schedule. A list of potential capabilities to consider for inclusion can be found in FEMA's *Local Mitigation Planning Handbook*, pages 4-1 to 4-5.
- Many of the future local mitigation efforts of the Town of Sunapee will be affected by regional development and mitigation efforts in nearby towns. Because the region is currently experiencing significant development, consider addressing mitigation needs through cooperation with nearby towns or on a regional level. As part of the prioritized implementation schedule, consider adding an action that the Town of Sunapee will work with other communities to determine potential areas of collaboration for future mitigation efforts.
- Provide additional information about how each of the mitigation strategies in the prioritized implementation schedule will be implemented. For items in which the action will be led by the town's Selectboard in partnership with the NH DOT or NH DES, discuss the specific actions the Selectboard will be taking. For projects labeled "erosion control," describe more specifics about the method(s) of erosion control that will be utilized. For the mitigation action addressing drainage and erosion concerns on Ledge Pond Road, Wind Hill and Throw Hill, describe specifically what "addressing" these concerns will entail (GIS mapping, culvert upgrades, etc.).
- Because no representative of the Planning Board was involved in the planning process, describe more specifically how the Planning Board will be engaged in modifying the Steep Slopes Ordinance and integrating the hazard mitigation plan into development regulations. Consider having the Emergency Management Director request that the Planning Board review the plan annually, or whenever the Master Plan, Subdivision Regulations, Site Plan Review Regulations, or Zoning Ordinance are updated in the future.
- The discussion on pages 71 and 72 identifies the types of programs that municipalities generally have that address hazard mitigation. It is stated that, "many municipalities do not

update these documents very often, and some towns do not have them at all.” Specify which of the general programs described exist in Sunapee, to make it clearer the ways in which hazard mitigation could be integrated into the town’s existing policies and programs.

Element D: Plan Update, Evaluation, and Implementation (*Plan Updates Only*)

Plan Strengths:

- The plan describes whether mitigation actions identified in the previous plan have been completed, deleted from the current plan, or deferred and incorporated into the new prioritized implementation schedule.
- The plan includes information about residential and commercial building permits that have been issued every year since 2009, population growth during the 1970s through 2010s, and population projections every five years until 2040.
- The plan includes the locations and size of potential future developments, and indicates that future development is not expected in areas that are particularly vulnerable to hazards.

Opportunities for Improvement:

- Consider summarizing any overall trends in the way priorities have changed, in order to make these changes easier to understand. Potential ways in which priorities may have changed include: placing more emphasis on mitigation rather than preparedness, focusing on flooding or erosion vulnerabilities, adjusting the scoring criteria for individual categories of the STAPLEE analysis, or emphasizing mitigation actions of a certain type (public information and involvement, planning and implementation, etc.).

B. Resources for Implementing Your Approved Plan

- The State of New Hampshire Multi-Hazard Mitigation Plan Update 2013, Section VI and Appendix B identify a number of potential funding sources for various mitigation activities. More information about applying for grants, available publications and training opportunities can be obtained from Beth Peck, New Hampshire’s State Hazard Mitigation Officer at Elizabeth.Peck@dos.nh.gov and Parker Moore, Hazard Mitigation Program Planner at Parker.Moore@dos.nh.gov.
- The town is encouraged to do everything possible to maximize use of every 406 hazard mitigation opportunity when available during federally declared disasters. A better alignment and increasing the effectiveness of 406 and 404 mitigation funds, greatly benefit the community in the long run.
- Consider what actions can be funded by various governmental agencies (federal and state), especially when meeting multiple community goals. Federal agencies may support integrated planning efforts such as rural development, sustainable communities and smart growth, wildfire mitigation, conservation, etc.
- Seek out other non-governmental or non-emergency management funding sources such as from private organizations and businesses, federal initiatives (Smart Growth, Sustainable Communities), Federal Highways pilot projects, and historic preservation programs.

Publications:

Hazard Mitigation Planning Online Webliography, FEMA Region I

This compilation of government and private online sites is a useful source of information for developing and implementing hazard mitigation programs and plans in New England.

<http://www.fema.gov/about-region-i/about-region-i/hazard-mitigation-planning-webliography>

FEMA 2015 Hazard Mitigation Assistance Guidance

Information on FEMA requirements regarding HMGP, PDM, and FMA grants.

http://www.fema.gov/media-library-data/1424983165449-38f5dfc69c0bd4ea8a161e8bb7b79553/HMA_Guidance_022715_508.pdf

Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards

<http://www.fema.gov/media-library/assets/documents/30627?id=6938>

FEMA B-797, Hazard Mitigation Field Book – Roadways

<http://www.fema.gov/library/viewRecord.do?fromSearch=fromsearch&id=4271>

Flood Hazard Mitigation Handbook for Public Facilities

<http://www.fema.gov/library/viewRecord.do?fromSearch=fromsearch&id=3724>

FEMA 386-6, Mitigation Planning How To #6: Integrating Historic Property & Cultural Resource Considerations into Hazard Mitigation Planning

<http://www.fema.gov/library/viewRecord.do?fromSearch=fromsearch&id=1892>

FEMA P-787 Catalog of FEMA Wind, Flood & Wildfire Publications, Training Courses & Workshops (2012)

<http://www.fema.gov/library/viewRecord.do?fromSearch=fromsearch&id=3184>

No Adverse Impact

The intent of this document is to expand on the knowledge base within the original No Adverse Impact Toolkit and to provide specific tools for incorporating NAI floodplain management into local regulations, ordinances, requirements, design, standards and practices.

<http://www.floods.org/index.asp?menuID=460>

Integrating Hazard Mitigation into Local Planning

This publication highlights case studies and tools for community officials providing practical guidance on how to incorporate risk reduction strategies into existing local plans, policies, codes, and programs that guide community development or redevelopment patterns. It includes recommended steps and tools to assist with local integration efforts, along with ideas for overcoming possible impediments, and presents a series of case studies to demonstrate successful integration in practice. The document also includes several pull-out fact sheets to provide succinct guidance on specific integration topics. <http://www.fema.gov/media-library/assets/documents/31372?id=7130>

Integrating Local Mitigation Plan into a Community's Comprehensive Plan

FEMA developed this guidebook to explain and demonstrate how to integrate natural hazard mitigation concepts into local comprehensive plans. The guidebook describes the benefits of integration, provides examples of how it can be accomplished, reviews existing state authorities and regulations, and highlights successful best practices in FEMA Region X communities.

http://www.fema.gov/media-library-data/20130726-1908-25045-0016/integrating_hazmit.pdf

Beyond the Basics: Best Practices in Local Mitigation Planning

DHS Coastal Hazards Center of Excellence developed this guide, the purpose of which is to help communities develop and improve their local hazard mitigation plan. The site, which was created by the DHS Science and Technology Coastal Hazard Center of Excellence and the of North Carolina at Chapel Hill, also contains a self-assessment tool, sample community plans and place to share experiences and lessons learned. <http://mitigationguide.org/>

U.S. Climate Resilience Toolkit

Scientific tools, information, and expertise are provided to help people manage their climate-related risks and opportunities, and improve their resilience to extreme events. This aid assists planning through links to a wide-variety of web-tools covering topics including coastal flood risk, ecosystem vulnerability, and water resources among others. Experts can be located in the NOAA, USDA, and Dept. of Interior, as well as state climatologists. Case studies in resilience are presented, including six within New England states. The site is designed to serve interested citizens, communities, businesses, resource managers, planners, and policy leaders at all levels of government. <https://toolkit.climate.gov>