

Town of Sunapee, New Hampshire  
**Hazard Mitigation Plan**

**Town of Sunapee  
Hazard Mitigation  
Committee**



**Upper Valley Lake Sunapee  
Regional Planning  
Commission**

*Town Dam*

**2009**





U.S. Department of Homeland Security  
Region I  
99 High St. 6th Floor  
Boston, MA 02110-2320



FEMA

March 6, 2009

COPY FOR YOUR INFORMATION

Richard Leone, Chairman  
Sunapee Board of Selectmen  
23 Edgemont Road,  
Sunapee, NH 03782 -0002

Dear Mr. Leone:

Thank you for the opportunity to review the Sunapee Hazard Mitigation Plan. The Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA) Region I has evaluated the plan for compliance with the Interim Final Rule published in the Federal Register on February 26, 2002 (44 CFR Parts 201 and 206). The plan satisfactorily meets all of the mandatory requirements of the regulations except §201.6(c)(5), adoption by the local governing body.

Federal regulations require that a plan must include documentation of its formal adoption by the local governing body (e.g., Board of Selectmen). Accordingly, this letter reflects a conditional approval of the plan until we receive a copy of its signed and stamped adoption resolution. Once this adoption resolution has been received and accepted, FEMA Region I will send a formal letter of approval to you confirming the Town of Sunapee's eligibility to apply for Mitigation Grants administered by FEMA. If the plan is not adopted within one calendar year of FEMA's conditional approval, the jurisdiction must update the entire plan and resubmit it for FEMA review.

Along with a copy of the plan's adoption resolution, please also be sure to submit an electronic version of the plan. FEMA must upload complete, electronic versions of all approved plans into the National Emergency Management Information System (NEMIS) database. Acceptable electronic formats include a .doc or .pdf file and may be submitted to us on a CD.

Thank you for your continued dedication to public service demonstrated by preparing and adopting a strategy for reducing future disaster losses. Congratulations once again for achieving this milestone and ensuring a safer future for the residents of the Town of Sunapee. Should you have any questions, please do not hesitate to contact Marilyn Hilliard at (617) 956-7536.

Sincerely,

  
Kevin M. Merli, Director  
Mitigation Division

Enclosure

Cc: Richard Verville, State Hazard Mitigation Officer, NH  
Victoria Davis, Planner, UVLSRPC  
Howard Sargent, Emergency Management Director, Town of Sunapee

# LOCAL MITIGATION PLAN REVIEW CROSSWALK

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

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

### SCORING SYSTEM

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

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

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

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

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

Assessing Vulnerability: Overview				
<i>Requirement §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.</i>				
Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan include an <b>overall summary</b> description of the jurisdiction's <b>vulnerability</b> to each hazard?	Section II, pp. 4-10	The plan describes the types of assets that are located within geographically defined hazard areas as well as those that would be affected by winter storms.		
B. Does the <b>new or updated</b> plan address the <b>impact</b> of each hazard on the jurisdiction?	Section II, pp. 10-20	The plan does not address the impact of two of the five hazards addressed in the plan. <b>Required Revisions:</b> <ul style="list-style-type: none"> <li>Include a description of the impact of floods and earthquakes on the assets.</li> </ul> <b>Recommended Revisions:</b> This information can be presented in terms of dollar value or percentages of damage.		
<b>SUMMARY SCORE</b>				



**LOCAL MITIGATION PLAN REVIEW CROSSWALK**

**LOCAL MITIGATION PLAN REVIEW SUMMARY**

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

Prerequisite(s) (Check Applicable Box)  
 1. Adoption by the Local Governing Body: \$201.6(c)(5) OR \$201.6(c)(5)

		X
MET	NOT MET	

2. Multi-Jurisdictional Plan Adoption: \$201.6(c)(5)  
 AND

		n/a
		n/a

3. Multi-Jurisdictional Planning Participation: \$201.6(a)(3)

		X

Planning Process  
 4. Documentation of the Planning Process: \$201.6(b) and \$201.6(c)(1)

		S
		N

Risk Assessment  
 5. Identifying Hazards: \$201.6(c)(2)(i)  
 6. Profiling Hazards: \$201.6(c)(2)(i)  
 7. Assessing Vulnerability: Overview: \$201.6(c)(2)(ii)  
 8. Assessing Vulnerability: Addressing Repetitive Loss Properties: \$201.6(c)(2)(iii)

		X
		X
		X
		X
		X
		n/a

9. Assessing Vulnerability: Identifying Structures, Infrastructure, and Critical Facilities: \$201.6(c)(2)(ii)(B)  
 10. Assessing Vulnerability: Estimating Potential Losses: \$201.6(c)(2)(ii)(B)  
 11. Assessing Vulnerability: Analyzing Development Trends: \$201.6(c)(2)(ii)(C)  
 12. Multi-Jurisdictional Risk Assessment: \$201.6(c)(2)(iii)

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

**SCORING SYSTEM**

Please check one of the following for each requirement.

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

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

**Mitigation Strategy**

		X
		X
		X
		X
		n/a

13. Local Hazard Mitigation Goals: \$201.6(c)(3)(i)  
 14. Identification and Analysis of Mitigation Actions: \$201.6(c)(3)(iii)  
 15. Identification and Analysis of Mitigation Actions: NFIIP Compliance: \$201.6(c)(3)(iii)  
 16. Implementation of Mitigation Actions: \$201.6(c)(3)(iii)  
 17. Multi-Jurisdictional Mitigation Actions: \$201.6(c)(3)(iv)

**Plan Maintenance Process**

		S
		N

18. Monitoring, Evaluating, and Updating the Plan: \$201.6(c)(4)(iii)  
 19. Incorporation into Existing Planning Mechanisms: \$201.6(c)(4)(iii)  
 20. Continued Public Involvement: \$201.6(c)(4)(iii)

**Additional State Requirements\***

		S
		N

Insert State Requirement  
 Insert State Requirement  
 Insert State Requirement

**LOCAL MITIGATION PLAN APPROVAL STATUS**

PLAN NOT APPROVED

See Reviewer's Comments

PLAN APPROVED

# LOCAL MITIGATION PLAN REVIEW CROSSWALK

## Local Mitigation Plan Review and Approval Status

<b>Jurisdiction:</b> Town of Sunapee, NH	<b>Title of Plan:</b> Hazard Mitigation Plan	<b>Date of Plan:</b> July 23, 2008
<b>Local Point of Contact:</b> Victoria Davis	<b>Address:</b>	
<b>Title:</b> Planner	Upper Valley Lake Sunapee Regional Planning Commission	
<b>Agency:</b> Upper Valley Lake Sunapee Planning Commission	30 Bank Street Lebanon, NH 03766	
<b>Phone Number:</b> 603-448-1680	<b>E-Mail:</b> vdavis@uvlsrpc.org	

<b>State Reviewer:</b>	<b>Title:</b>	<b>Date:</b>
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<b>FEMA Reviewer:</b> Arthur E. Irwin	<b>Title:</b> Community Planner	<b>Date:</b> 12/9/08
<b>Date Received in FEMA Region 1</b>	n/a	
<b>Plan Not Approved</b>		
<b>Plan Approved</b>	**Conditionally approved pending receipt of adoption documents.	
<b>Date Approved</b>	March 6, 2009	

Jurisdiction:	DFIRM		NFIP Status*			
	In Plan	NOT in Plan	Y	N	N/A	CRS Class
1 Town of Sunapee, NH      Init FIRM identified 5/15/91			x			
2.						
3.						
4.						
5. [ATTACH PAGE(S) WITH ADDITIONAL JURISDICTIONS]						

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

**LOCAL MITIGATION PLAN REVIEW CROSSWALK**

**PREREQUISITE(S)**

**1. Adoption by the Local Governing Body**

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

SCORE		Location in the Plan (section or annex and page #)	Reviewer's Comments	Element
NOT MET	MET		NOT MET: Adoption is pending conditional approval by FEMA (page 3).	A. Has the local governing body adopted new or updated plan?
			NOT MET: An adoption resolution is included on page 57.	B. Is supporting documentation, such as a resolution, included?
	x			
	x			
SUMMARY SCORE				

**2. Multi-Jurisdictional Plan Adoption**

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

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

**3. Multi-Jurisdictional Planning Participation**

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

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

# LOCAL MITIGATION PLAN REVIEW CROSSWALK

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

## 4. Documentation of the Planning Process

**Requirement §201.6(b):** *In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:*

- (1) *An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;*
- (2) *An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and*
- (3) *Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.*

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

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the plan provide a narrative description of the process followed to prepare the <b>new or updated</b> plan?		MET: The 9 step process (recommended by NH) is expanded to 10 steps on pages 2 thru 5.		X
B. Does the <b>new or updated</b> plan indicate who was involved in the <b>current</b> planning process? (For example, who led the development at the staff level and were there any external contributors such as contractors? Who participated on the plan committee, provided information, reviewed drafts, etc.?)		MET: Committee members and their affiliations are listed on page 6.		X
C. Does the <b>new or updated</b> plan indicate how the public was involved? (Was the public provided an opportunity to comment on the plan during the drafting stage and prior to the plan approval?)		MET: Meeting postings and advertisements contained invitations for public involvement, and the Selectmen plan to hold a public hearing (pages 2 and 3).		X
D. Does the <b>new or updated</b> plan discuss the opportunity for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process?		RECOMMENDED REVISIONS: Develop a list of those to receive personal invitations to include officials of adjacent towns, representatives of other agencies, businesses, academia, non-profits, and other interested parties.		X
E. Does the planning process describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information?		MET: On page 56 it states that the HMP will be an annex to the EOP. Several of the committee members listed on page 6 are involved in developing the EOP.		X
F. Does the <b>updated</b> plan document how the planning team reviewed and analyzed each section of the plan and whether each section was revised as part of the update process?		MET: Chapter VI (pages 48 thru 50) discusses each existing strategy their improvement needs, and relative priorities.		X
<b>SUMMARY SCORE</b>				X



**LOCAL MITIGATION PLAN REVIEW CROSSWALK**

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

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

SCORE		Element	Location in the Plan (section or annex and page #)	Reviewer's Comments
N	S			
X		A. Does the new or updated plan include a description of the types of all natural hazards that affect the jurisdiction?		MET: Hazards are listed on page 2. Discussions run from pages 12 thru 35. RECOMMENDED REVISIONS: (1) Consider adding the risk of carbon monoxide poisoning to the discussions of severe winter weather, and prolonged power outages. (2) Table III-12 (page 33) dealing with Radon is difficult to understand.
<b>SUMMARY SCORE</b>				

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

SCORE		Element	Location in the Plan (section or annex and page #)	Reviewer's Comments
N	S			
X		A. Does the risk assessment identify the location (i.e., geographic area affected) of each natural hazard addressed in the new or updated plan?		MET: Areas of potential impact is covered in the discussions on pages 12 thru 35.
X		B. Does the risk assessment identify the extent (i.e., magnitude or severity) of each hazard addressed in the new or updated plan?		MET: Within the discussions on pages 12 thru 35. A risk assessment summary is presented in table form on page 39 (Table III-16). RECOMMENDED REVISION: Consider revising the method used. The risk of Severe Winter Weather seems understated at "Medium". Some of the others seem understated also.
X		C. Does the plan provide information on previous occurrences of each hazard addressed in the new or updated plan?		MET: Within the discussions on pages 12 thru 36.
X		D. Does the plan include the probability of future events (i.e., chance of occurrence) for each hazard addressed in the new or updated plan?		MET: Within the discussions on pages 12 thru 36. Both state and local assessments are presented, and an average assessment is used.
<b>SUMMARY SCORE</b>				

# LOCAL MITIGATION PLAN REVIEW CROSSWALK

## 7. Assessing Vulnerability: Overview

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

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan include an <b>overall summary</b> description of the jurisdiction's <b>vulnerability</b> to each hazard?		MET: Table III-15 and Table III-16 on page 37 and 39 present vulnerability summaries.		x
B. Does the <b>new or updated</b> plan address the <b>impact</b> of each hazard on the jurisdiction?		MET: See above.		x
<b>SUMMARY SCORE</b>				x

## 8. Assessing Vulnerability: Addressing Repetitive Loss Properties

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

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan describe vulnerability in terms of the types and numbers of <b>repetitive loss properties</b> located in the identified hazard areas?		MET: There have been no repetitive losses (page 9).		x
<b>SUMMARY SCORE</b>				x

## 9. Assessing Vulnerability: Identifying Structures

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

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan describe vulnerability in terms of the <b>types and numbers</b> of <b>existing</b> buildings, infrastructure, and critical facilities located in the identified hazard areas?		MET: Tables IV-1 thru Table IV-3 present this data in summary form. RECOMMENDED REVISION: The statement on page 41 that most bridges in Sunapee are state owned, may not be correct.		x
B. Does the <b>new or updated</b> plan describe vulnerability in terms of the <b>types and numbers</b> of <b>future</b> buildings, infrastructure, and critical facilities located in the identified hazard areas?		MET: On page 10 the plan describes most development as being residential, and involving "year-round single family homes". It also defines a need to amend land use regulations to help determine the density and location of future development.		x
<b>SUMMARY SCORE</b>				x

**LOCAL MITIGATION PLAN REVIEW CROSSWALK**

**10. Assessing Vulnerability: Estimating Potential Losses**

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

<b>SCORE</b>		<b>Element</b>	<b>Location in the Plan (section or annex and page #)</b>	<b>Reviewer's Comments</b>	<b>A. Does the new or updated plan estimate potential dollar losses to vulnerable structures?</b>	<b>B. Does the new or updated plan describe the methodology used to prepare the estimate?</b>
<b>N</b>	<b>S</b>					
	X			RECOMMENDED REVISIONS: Review the Potential Loss Estimates that are provided in Chapter V, Section C to see if rough estimates can be made in those areas now designated as "No Recorded or Estimated Cost".		
	X			MET: Estimating techniques are explained, when used.		
<b>SUMMARY SCORE</b>						
	X					

**11. Assessing Vulnerability: Analyzing Development Trends**

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

<b>SCORE</b>		<b>Element</b>	<b>Location in the Plan (section or annex and page #)</b>	<b>Reviewer's Comments</b>	<b>A. Does the new or updated plan describe land uses and development trends?</b>
<b>N</b>	<b>S</b>				
	X			MET: On page 7 the plan describes Sunapee as 40% undeveloped with a number of lakes and businesses supporting tourism.	
<b>SUMMARY SCORE</b>					
	X				

**12. Multi-Jurisdictional Risk Assessment**

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

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

## LOCAL MITIGATION PLAN REVIEW CROSSWALK

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

### 13. Local Hazard Mitigation Goals

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

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan include a description of mitigation <b>goals</b> to reduce or avoid long-term vulnerabilities to the identified hazards?		MET: The goals listed on page 50 all call for programs dealing with both the (required) natural and the (optional) human-made hazards.		X
<b>SUMMARY SCORE</b>				X

### 14. Identification and Analysis of Mitigation Actions

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

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan identify and analyze a <b>comprehensive range</b> of specific mitigation actions and projects for each hazard?		MET: Tables VI-1 and VI-2 (pages 48 & 50) provide detailed information about each existing action, including the hazard(s) they mitigate. See page 54 for potential actions.		X
B. Do the identified actions and projects address reducing the effects of hazards on <b>new</b> buildings and infrastructure?		MET: On page 10 the plan describes most development as being residential, and involving "year-round single family homes".		X
C. Do the identified actions and projects address reducing the effects of hazards on <b>existing</b> buildings and infrastructure?		MET: Tables VI-1 and VI-2 (pages 48 & 50) provide detailed information about each existing action, including the hazard(s) they mitigate. See page 54 for potential actions.		X
<b>SUMMARY SCORE</b>				X



**LOCAL MITIGATION PLAN REVIEW CROSSWALK**

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

SCORE		Element	Location in the Plan (section or annex and page #)	Reviewer's Comments
N	S			
	X	A. Does the new or updated plan describe the jurisdiction (s) participation in the NFIP?		MET: The map on page 9 identifies Flood Hazard Areas not identified on the NFIP maps.
	X	B. Does the mitigation strategy identify, analyze and prioritize actions related to continued compliance with the NFIP?		MET: See above. Also, "Planning and Zoning land use regulations" is listed on Table VI-1 (page 48) as an existing mitigation action.
<b>SUMMARY SCORE</b>				
	X			

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

SCORE		Element	Location in the Plan (section or annex and page #)	Reviewer's Comments
N	S			
	X	A. Does the new or updated mitigation strategy include how the actions are prioritized? (For example, is there a discussion of the process and criteria used?)		MET: Priorities are set using a modified STAPLEE method as explained on pages 52 and 53.
	X	B. Does the new or updated mitigation strategy address how the actions will be implemented and administered, including the responsible department, existing and potential resources and the timeframe to complete each action?		MET: See Table VIII-1 and Table VIII-2 on page 54 thru 55. RECOMMENDED REVISION: Within the list of action plans, are those that focus on response, rather than on mitigation. To include them is fine. The differences between them, however, need to be understood.
	X	C. Does the new or updated prioritization process include an emphasis on the use of a cost-benefit review to maximize benefits?		RECOMMENDED REVISION: Economic benefits are part of amounts, or estimated dollar amounts are provided.
	X	D. Does the updated plan identify the completed, deleted or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred?		MET: Ongoing actions are reviewed, and modified. None are identified as completed, or as not to be continued.
<b>SUMMARY SCORE</b>				
	X			



## LOCAL MITIGATION PLAN REVIEW CROSSWALK

### 17. Multi-Jurisdictional Mitigation Actions

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

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

### PLAN MAINTENANCE PROCESS

#### 18. Monitoring, Evaluating, and Updating the Plan

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

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan describe the method and schedule for <b>monitoring</b> the plan, including the responsible department?		MET: Chapter IX (page 56) tasks the Emergency Management Director with reviewing the plan annually, and after every hazard event. He/she		x
B. Does the <b>new or updated</b> plan describe the method and schedule for <b>evaluating</b> the plan, including how, when and by whom ( <i>i.e.</i> the responsible department)?		is to revise the plan every fifth year, and encourage wide public involvement in the process.		x
C. Does the <b>new or updated</b> plan describe the method and schedule for <b>updating</b> the plan within the five-year cycle?		See above.		x
<b>SUMMARY SCORE</b>				x

**LOCAL MITIGATION PLAN REVIEW CROSSWALK**

**19. Incorporation into Existing Planning Mechanisms**

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

SCORE		Element	Location in the Plan (section or annex and page #)	Reviewer's Comments
S	N			
X		A. Does the <b>new or updated</b> plan identify other local planning mechanisms available for incorporating the mitigation requirements of the mitigation plan?		MET: The HMP will become an annex to the EOP.
X		B. Does the <b>new or updated</b> plan include a process by which the local government will incorporate the mitigation strategy and other information contained in the plan (e.g., risk assessment) into other planning mechanisms, when appropriate?		MET: The HMP will become an annex to the EOP.
X		C. Does the <b>updated</b> plan explain how the local government incorporated the mitigation strategy and other information contained in the plan (e.g., risk assessment) into other planning mechanisms, when appropriate?		MET: The HMP will become an annex to the EOP.
SUMMARY SCORE				
X				

**Continued Public Involvement**

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

SCORE		Element	Location in the Plan (section or annex and page #)	Reviewer's Comments
S	N			
X		A. Does the <b>new or updated</b> plan explain how <b>continued public participation</b> will be obtained? (For example, will there be public notices, an on-going mitigation plan committee, or annual review meetings with stakeholders?)		RECOMMENDED REVISION: Develop a list of those to receive personal invitations to include officials of adjacent towns, representatives of other agencies, businesses, academia, non-profits, and other interested parties.
SUMMARY SCORE				
X				

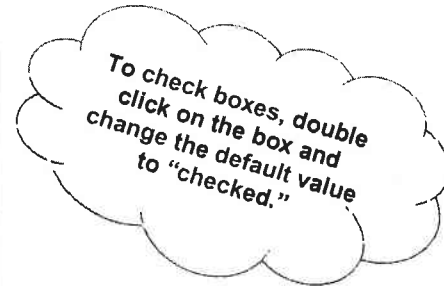
# LOCAL MITIGATION PLAN REVIEW CROSSWALK

## MATRIX A: PROFILING HAZARDS

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

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

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



Legend:

§201.6(c)(2)(i) Profiling Hazards

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

**LOCAL MITIGATION PLAN REVIEW CROSSWALK**

**MATRIX B: ASSESSING VULNERABILITY**

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

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

Hazard Type	Hazards Identified Per Requirement §201.6(c)(2)(i)		§201.6(c)(2)(iii) Assessing Vulnerability: Overview											
	Yes	No	A. Overall Summary Description of Vulnerability		B. Hazard Impact		A. Types and Number of Existing Structures in Hazard Area (Estimate)		B. Types and Number of Future Structures in Hazard Area (Estimate)		§201.6(c)(2)(ii) Assessing Vulnerability: Identifying Structures		§201.6(c)(2)(ii) Assessing Vulnerability: Estimating Potential Losses	
			N	S	N	S	N	S	N	S	N	S	N	S
Avalanche	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coastal Erosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coastal Storm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dam Failure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drought	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Earthquake	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Expansive Soils	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Levee Failure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hailstorm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hurricane	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Land Subsidence	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Landslide	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Severe Winter Storm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tornado	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tsunami	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Volcano	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wildfire	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Windstorm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Legend:

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

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

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

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

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

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

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

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

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

# LOCAL MITIGATION PLAN REVIEW CROSSWALK

## MATRIX C: IDENTIFICATION AND ANALYSIS OF MITIGATION ACTIONS

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

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

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



**Legend:**

§201.6(c)(3)(ii) Identification and Analysis of Mitigation Actions

A. Does the **new or updated** plan identify and analyze a comprehensive range of specific mitigation actions and projects for each hazard?





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## I. INTRODUCTION

### A. BACKGROUND

The New Hampshire 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 Upper Valley Lake Sunapee Regional Planning Commission (UVLSRPC), to prepare local Hazard Mitigation Plans with several of its communities. UVLSRPC began preparing a local Hazard Mitigation Plan for the Town of Sunapee in October 2007. 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 prepared the *Sunapee Hazard Mitigation Plan* with the assistance and professional services of the Upper Valley Lake Sunapee Regional Planning Commission (UVLSRPC) under contract with the New Hampshire Homeland Security and Emergency Management (HSEM) operating under the guidance of the Federal Emergency Management Agency (FEMA). After a public hearing held in the Sunapee Town Offices, the Sunapee Board of Selectmen adopted the plan on March 23, 2009.

### 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 Hazard Mitigation Grant Program (HMGP) project 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:

- |                                |                         |                             |
|--------------------------------|-------------------------|-----------------------------|
| • Dam Failure                  | • Severe Winter Weather | • Erosion                   |
| • Flooding                     | • Earthquake            | • Wildfire                  |
| • Hurricane                    | • Drought               | • Natural Contaminants      |
| • Tornado & Downburst          | • Extreme Heat          | • Hazardous Materials Spill |
| • Thunderstorm/Lightening/Hail |                         |                             |

### **E. METHODOLOGY**

Using the *Guide to Hazard Mitigation Planning for New Hampshire Communities* (2002), as developed by the Southwest Regional Planning Commission (SWRPC), the Sunapee Hazard Mitigation Committee, in conjunction with the UVLSRPC, developed the content of the *Sunapee Hazard Mitigation Plan* by tailoring the nine-step process set forth in the guidebook appropriate for the Town of Sunapee. Many FEMA resources and multiple State and Federal websites were also used as well. The Town Emergency Management Plan which is currently being updated was also reviewed. The Committee held a total of three posted meetings beginning

in May 2008 and ending in July 2008. All meetings were posted in town inviting the general public, and notices were sent to the Town Offices of neighboring towns to invite town officials. For the publicly posted meeting agendas see C: Meeting Documentation. The public will continue to be involved in future revisions as meetings will be posted publicly and advertised in local newspapers. The Sunapee Board of Selectmen adopted the Plan, contingent upon FEMA final approval, on March 23, 2009. Prior to the Town of Sunapee approving the Plan, a public hearing was held to gain additional input from the citizens of Sunapee and to raise awareness of the ongoing hazard mitigation planning process.

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

May 28, 2008

July 2, 2008

July 23, 2008

To complete this Plan, the Hazard Mitigation Committee followed the following planning steps:

**Step 1: Identify and Map the Hazards (May - June 2008)**

Committee members identified areas where damage from natural disasters had previously occurred, areas of potential damage, and human-made facilities and infrastructure that were at risk for property damage and other risk factors. A GIS-generated base map provided by the UVLSRPC was used in the process.

**Step 2: Determine Potential Damage (May - June 2008)**

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.

**Step 3: Identify Mitigation Plans/Policies Already in Place (May - June 2008)**

Using information and activities in the handbook, the Committee and UVLSRPC staff identified existing mitigation strategies which are already implemented in the Town related to relevant hazards. A summary chart and the results of this activity are presented in Chapter VI.

**Step 4: Identify the Gaps in Protection/Mitigation (May - June 2008)**

Existing strategies were then reviewed for coverage, effectiveness and implementation, as well as need for improvement. Some strategies are contained in the Emergency Action Plan and were reviewed as part of this step. The result of these activities is presented in Chapter VI.

**Step 5: Determine Actions to be Taken (July 2008)**

During an open brainstorming session, the Hazard Mitigation Committee developed a list of other possible hazard mitigation actions and strategies for the Town of Sunapee. Ideas proposed included policies, planning, and public information. A list of potential mitigation strategies can be found in Chapter VII.

**Step 6: Evaluate Feasible Options (July 2008)**

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

**Step 7: Coordinate with other Agencies/Entities (Ongoing)**

UVLSRPC staff reviewed the Sunapee Master Plan. This was done in order to determine if any conflicts existed or if there were any potential areas for cooperation. Town staff that was involved in preparing the Emergency Operations Plan participated in the hazard mitigation meetings, to avoid duplication and to share information.

**Step 8: Determine Priorities (July 2008)**

The Committee reviewed the preliminary prioritization list in order to make changes and determine a final prioritization for new hazard mitigation actions and existing protection strategy improvements identified in previous steps. UVLSRPC also presented recommendations for the Committee to review and prioritize. These are provided in Chapter VIII.

**Step 9: Develop Implementation Strategy (July 2008)**

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

**Step 10: Adopt and Monitor the Plan**

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

**F. HAZARD MITIGATION GOALS**

The Town of Sunapee Hazard Mitigation Committee reviewed the hazard mitigation goals for the State of New Hampshire, and revised them for Sunapee.

They are as follows:

1. To protect the general population, the citizens of the town and guests, from all natural and man-made hazards.
2. To reduce the potential impact of natural and man-made disasters on the town's critical support services, critical facilities, and infrastructure.
3. To reduce the potential impact of natural and man-made disasters on the town's economy.
4. To reduce the potential impact of natural and man-made disasters on the town's natural environment.
5. To reduce the potential impact of natural and man-made disasters on the town's specific historic treasures and interests as well as other tangible and intangible characteristics which add to the quality of life of the citizens and guests of the town.
6. To identify, introduce and implement cost effective hazard mitigation measures so as to accomplish the town's goals (above) and to raise the awareness and acceptance of hazard mitigation.



## **G. ACKNOWLEDGEMENTS**

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

- David Bailey, Sunapee Water & Sewer Superintendent
- Anthony Bergeron, Sunapee Road Agent
- David Cahill, Sunapee Police Chief
- Donna Nashawaty, Sunapee Town Manager
- Daniel Ruggles, Sunapee Fire Chief
- Howard Sargent, Sunapee Deputy Fire Chief & Emergency Management Director
- Victoria Davis, Upper Valley Lake Sunapee Regional Planning Commission

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

## II. COMMUNITY PROFILE

### A. INTRODUCTION<sup>1</sup>

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.

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 40% 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.

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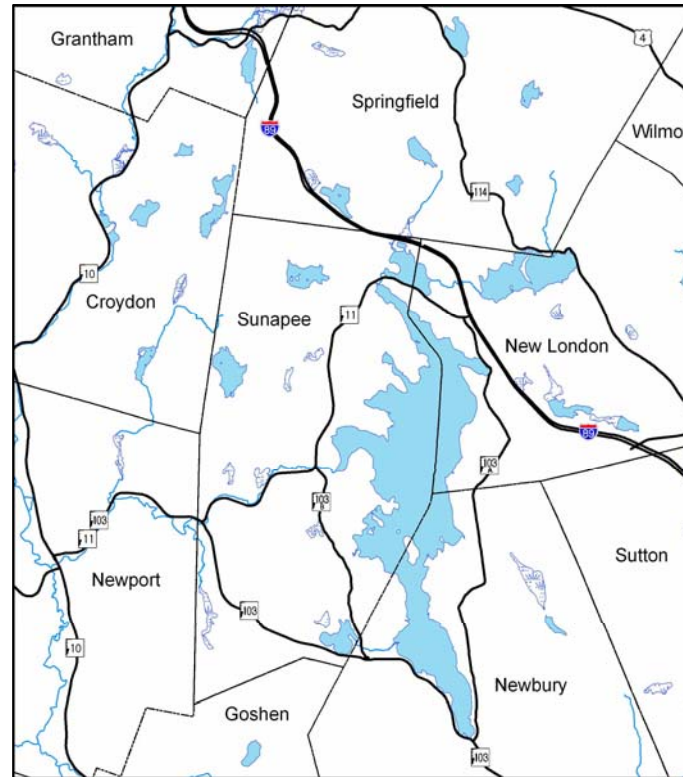
<sup>1</sup> Sunapee Master Plan (1998) and Town of Sunapee web site ([www.town.Sunapee.NH.US](http://www.town.Sunapee.NH.US))

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 there are plans for a new library sometime in the future closer to Sunapee Harbor. 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: Public Service Company of New Hampshire and New Hampshire Electric Co-op. They each have sub-stations located in Sunapee on North Road.

There are two Verizon cell towers in Sunapee: one on Stagecoach Land and the other in Georges Mills. A third is under construction off Route 11 near Trow Hill. The Town has two towers; one on the land of Bob Bell off Route 11 and Trow Hill Road and another behind the Safety Services Building. Repeaters are on the towers for emergency services communication. The Town of New London provides police and fire dispatch for Sunapee.

**Figure II-1: Locus Map of Sunapee**

Sunapee is currently a participating member of the National Flood Insurance Program. As part of the National Flood Insurance Program (NFIP), Flood Hazard Boundary Maps were prepared for the Town of Sunapee June 28, 1974. Updated maps for all towns within Sullivan County were finalized in 2006. These maps identified those areas in town which are Special Flood Hazard Areas or areas within a 100-year flood zone. There are two categories of zones within Sunapee: Zone A with base flood elevations *not* determined; and Zone AE with base flood elevations determined. There have been no repetitive flood losses in the Town of Sunapee. The Sunapee Hazard Mitigation Committee identified two additional areas which have flooded occasionally. The Special Flood Hazard Areas and the Committee identified flood areas are shown in Appendix D.

## **B. DEVELOPMENT TRENDS**

Examination of the U.S. Census Data indicates that population grew by 11% from 1980 to 1990 going from a population of 2,312 to 2,559. From 1990-2000, population increased by 19%. From 2000-2010, the population is estimated to increase by 18%.

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); along Tucker Hill (about 300 acres); along Timothy Road (12-14 lots); near Trow Hill (12-14 lots); and near Prospect Hill (11-12 lots). These properties are not located in any specific hazard area, although the Ledge Pond area seems to be more susceptible to lightning.

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.

The following tables provide the current population and number of housing units in Sunapee as well as projections. The average number of persons per occupied housing unit was 2.4 in 2000. In 2000, there were 849 vacant units—this includes 783 seasonal units, primarily vacation homes on the lakes. These were assumed to be included in the U.S. Census total housing units as single-family units. It is important to consider these vacant units in hazard mitigation as they are often located near water bodies. These units may also be occupied during certain seasons of the year prone to natural hazard, e.g. vacation lake home occupants could be impacted by a flood and should be included in any educational campaign for disaster preparedness.

**Table II-1: AREA POPULATION TRENDS**

Area	1970	1980	Avg. Annual Growth 70-80	1990	Avg. Annual Growth 80-90	2000	Avg. Annual Growth 90-00	30 Yr. Avg. Annual Rate
Sunapee	1,384	2,312	5.27%	2,559	1.02%	3,055	1.79%	2.67%
Croydon	396	457	1.44%	627	3.21%	661	0.53%	1.72%
Goshen	395	549	3.35%	742	3.06%	741	-0.01%	2.12%
New London	2236	2935	2.76%	3180	0.80%	4116	2.61%	2.05%
Newbury	509	961	6.56%	1347	3.43%	1702	2.37%	4.11%
Newport	5899	6229	0.55%	6110	-0.19%	6269	0.26%	0.20%
Springfield	310	532	5.55%	788	4.01%	945	1.83%	3.79%
<i>Sullivan County</i>	<i>30,949</i>	<i>36,063</i>	<i>1.54%</i>	<i>38,592</i>	<i>0.68%</i>	<i>40,458</i>	<i>0.47%</i>	<i>0.90%</i>
<i>New Hampshire</i>	<i>737,681</i>	<i>920,610</i>	<i>2.24%</i>	<i>1,109,252</i>	<i>1.88%</i>	<i>1,235,786</i>	<i>1.09%</i>	<i>1.73%</i>

Source: US Census

**Table II-2: POPULATION PROJECTIONS FOR SUNAPEE**

	1970	1980	1990	2000	2010	2020	2030
Population	1384	2312	2559	3055	3590	4040	4370
Decade Change in Population		.67	.11	.19	.18	.13	.08

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

**Table II-3 : OCCUPIED HOUSING UNIT PROJECTIONS BY TYPE FOR SUNAPEE**

	2000	2010	2020	2030
Single-Family Units (.72)	934	1077	1212	1311
Multi-Family Units (.22)	287	329	370	401
Mobile Home Units (.06)	73	90	101	109
<b>TOTAL OCCUPIED UNITS</b>	<b>1294</b>	<b>1496</b>	<b>1683</b>	<b>1821</b>

Source: US Census PHC 2-31 Table 18 for unit type proportions in 2000; assumed all vacant units are single-family; projected totals based on persons/occupied unit (2.4)

**Table II-4: TOTAL HOUSING UNIT PROJECTIONS BY OCCUPANCY FOR SUNAPEE**

	2000	2010	2020	2030
Seasonal or Vacation Vacant (.37)	783	922	1038	1123
Other Vacant Units (.03)	66	75	84	91
Occupied Units (.60)	1294	1496	1683	1821
<b>TOTAL ALL UNITS</b>	<b>2143</b>	<b>2493</b>	<b>2805</b>	<b>3035</b>

Source: US Census PHC-1-31 Table 12 for 2000; total units projected as percentage of occupied units; other units projected in proportion of total in 2000.

### 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 historical knowledge of long time residents and town officials and documented disasters. The hazards affecting the Town of Sunapee are dam failure, flooding, hurricane, tornado, thunderstorm (including lightening and hail), severe wind, extreme winter weather (including extreme cold and ice storms), earthquake, erosion, drought, extreme heat, wildfire, natural contaminants, and hazardous materials spills. 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. Eliminated hazards include Land Subsidence, Expansive Soils, Landslides, and Snow Avalanches due to topography, soil types, and knowledge of past hazard events.

#### 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/Lightening/Hail
- Severe Winter Weather
- Earthquake
- Drought
- Extreme Heat
- Erosion
- Wildfire
- Natural Contaminants
- Hazardous Materials Spill



**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. Appendices G and H provide maps with the location of dams in Sunapee.

*Past Dam Failure Events*

There have been no dam failures in Sunapee or any surrounding towns which impacted Sunapee. There are 46 dams in the Town of Sunapee. The State ranks them according to hazard risk. Most of the dams are classified as ruins as they are no longer holding back water. Fourteen dams were designated as “non-menace” which means because of its location and size, a dam failure would not result in probable loss of life or loss to property. Four dams were designated by the State as “low hazard potential” which means because of its location and size, a dam failure would result in no possible loss of life, low economic loss to structures or property; possible structural damage to public roads; the release of liquid industrial, agricultural, or commercial wastes under certain conditions; and reversible losses to environmentally-sensitive areas. The Lake Sunapee Dam is designated as “significant.” By State definition this means the dam has a significant hazard potential because it is in a location and of a size that failure or inappropriate operation of the dam would result in any of the following: no probable loss of lives; major economic loss to structures or property; structural damage to a Class I or Class II road that could render the road impassable or otherwise interrupt public safety services; and at least one major environmental or public health loss such as damage to a public water system, as defined by RSA 485:1-a, XV, which will take longer than 48 hours to repair; the release of liquid industrial, agricultural, or commercial wastes, septage, sewage, or contaminated sediments if the storage capacity is 2 acre-feet or more; or damage to an environmentally-sensitive site that does not meet the definition of reversible environmental losses.

**Table III-1: DAMS – LOW RISK**

<b>DAMS (DAM FAILURE – LOW RISK)</b>									
<b>Dam #</b>	<b>Class</b>	<b>Dam Name</b>	<b>Water Body</b>	<b>Owner</b>	<b>Status</b>	<b>Type</b>	<b>Impoundment (Acres)</b>	<b>Height of Dam (Ft)</b>	<b>Drainage (Acres)</b>
229.01	L	Otter Pond Dam	Otter Pond Brook	Town of Sunapee	Active	E	168	8	15.60
229.02	-	Otter Pond Brook Dam	Otter Pond Brook	Unknown	Ruins	T	0	5	12.80
229.03	-	Cooper Shop Dam	Otter Pond	Holmes Brothers	Ruins	S/E	0	0	0.00
229.04	S	Lake Sunapee Dam	Sugar River	NH Water Res Council	Active	C	4,090	14	44.80
229.05	L	Sugar River Dam	Sugar River	Town of Sunapee	Active	C	0.50	15	45.00
229.06	-	Sugar R Woolen Mill	Sugar River	Town of Sunapee	Ruins	C/T	0	10.50	45.00

<b>DAMS (DAM FAILURE – LOW RISK)</b>									
<b>Dam #</b>	<b>Class</b>	<b>Dam Name</b>	<b>Water Body</b>	<b>Owner</b>	<b>Status</b>	<b>Type</b>	<b>Impoundment (Acres)</b>	<b>Height of Dam (Ft)</b>	<b>Drainage (Acres)</b>
229.07	NM	Sugar River	Sugar River	Town of Sunapee	Active	S/E	0.230	15.00	0.00
229.08	NM	Sugar River	Sugar River	Corliss G Abbott	Active	T/S	1.000	7.00	45.00
229.09	-	Sugar River Mill Dam	Sugar River	GE Alexander & Sons	Ruins	T	0.500	3.00	0.00
229.10	-	Sugar R Blacksmith Shop	Sugar River	Unknown	Ruins	T	0.000	0.00	45.00
229.11	-	Sugar R Trow Sawmill	Sugar River	H A Trow	Ruins	T	0.000	6.50	47.00
229.12	-	Perkins Pond	Perkins Pond	Speros Condos	Ruins	-	0.000	0.00	0.00
229.13	-	Sugar River Dam	Sugar River	George E Smith	Ruins	-	0.000	0.00	0.00
229.14	-	Sugar River Dam	Sugar River	George Smith	Ruins	-	0.000	0.00	0.00
229.15	L	Wendall Marsh Dam	Sugar River	NH Fish & Game	Active	C	37.000	14.00	50.30
229.16	L	Ledge Pond Dam	Pond Brook	Town Of Sunapee	Active	C	120.000	4.00	1.08
229.17	NM	Whitney Farm Pond Dam	Natural Swale	Paul D Whitney	Active	C	1.000	6.00	0.00
229.18	NM	Unnamed Brook Dam	Unnamed Brook	Ronald Sullivan	Active	C	0.100	8.00	0.00
229.19	NM	McCormack Farm Pond	Tr Lake Sunapee	Thomas McCormack	Active	E	0.200	6.50	0.00
229.20	NM	Trow Rico Lower Dam	Natural Swale	Paul D Whitney	Active	E	1.000	14.00	0.00
229.21	NM	Granliden Wildlife Pond	Tr Lake Sunapee	Granliden Comm Assoc	Active	C	1.000	6.00	0.00
229.22	NM	Gazalle Farm Pond Dam	Tr Lake Sunapee	Harry Gazelle	Active	E	0.200	12.00	0.00
229.23	-	Flanders Farm Pond Dam	Tr Sugar River	Bardon Flanders	Exempt	C	0.200	2.50	0.00
229.24	NM	Franzen Fire Pond Dam	Unnamed Stream	Eric Franzen	Active	E	0.200	9.50	0.00
229.25	NM	Gouse Farm Pond Dam	Natural Swale	Carola E Gouse	Active	E	1.000	6.00	0.00
229.26	NM	Recreation Pond Dam	Tr Sugar River	Leon Rollins Jr.	Active	E	0.330	4.00	0.00
229.27	NM	Greenwood Pond Dam	Natural Swale	Nancy Chamberlain	Active	E	1.000	5.00	0.00
229.28	NM	Stock Basin Dam	Natural Swale	M&D Goldman	Active	C	2.000	3.00	0.52
229.29	-	Indian Caves Structure 20	Runoff	Harbor Ridge Prop	Exempt	E	0.010	8.50	0.00
229.30	-	Indian Caves Structure 21	Runoff	Harbor Ridge Prop	Exempt	E	0.010	8.50	0.30
229.31	-	Indian Caves Structure 22	Runoff	Harbor Ridge Prop	Exempt	E	0.010	6.50	0.30
229.32	-	Indian Caves Structure 23	Runoff	Harbor Ridge Prop	Exempt	E	0.020	8.50	0.43
229.33	-	Indian Caves Structure 24	Runoff	Harbor Ridge Prop	Exempt	E	0.010	6.50	0.36
229.34	-	Indian Caves Structure 25	Runoff	Harbor Ridge Prop	Exempt	E	0.010	8.50	0.19
229.35	-	Indian Caves Structure 26	Runoff	Harbor Ridge Prop	Exempt	E	0.030	6.50	0.19
229.36	-	Indian Caves Structure 27	Runoff	Harbor Ridge Prop	Exempt	E	0.030	4.50	1.80
229.37	-	Indian Caves Structure 28	Runoff	Harbor Ridge Prop	Exempt	E	0.020	6.50	0.01

<b>DAMS (DAM FAILURE – LOW RISK)</b>									
<b>Dam #</b>	<b>Class</b>	<b>Dam Name</b>	<b>Water Body</b>	<b>Owner</b>	<b>Status</b>	<b>Type</b>	<b>Impoundment (Acres)</b>	<b>Height of Dam (Ft)</b>	<b>Drainage (Acres)</b>
229.38	-	Indian Caves Structure 29	Runoff	Harbor Ridge Prop	Exempt	E	0.040	6.50	1.37
229.39	-	Indian Caves Structure 31	Runoff	Harbor Ridge Prop	Exempt	E	0.040	6.50	0.54
229.40	-	Det Storm Runoff Site 5	Runoff	Env Specialists Inc	Exempt	E	0.010	4.00	1.90
229.41	-	Det Storm Runoff Site 3	Runoff	Env Specialists Inc	Exempt	E	0.100	4.00	0.02
229.42	-	Det Storm Runoff Site 1	Runoff	Env Specialists Inc	Exempt	E	0.100	4.00	0.00
229.43	-	Det Storm Runoff Site 6	Runoff	Env Specialists Inc	Exempt	E	0.050	4.00	0.20
229.44	-	Edgemont Detention Pond	Runoff	Great Ledges Corp	Exempt	E	0.060	7.50	0.00
229.45	-	Village At Perkins Pond	Runoff	R Burd & D Clifford	Exempt	E	0.160	6.00	0.03
229.46	NM	Mountain View Lake	Mountain View Br	M&M Herbert Smith	Active	S/E	116.000	4.00	1.66

*Source: Dam information provided by the NH Dam Bureau in 2007; Significant & High Hazard dams must have an emergency action plan.*

*The State of New Hampshire classifies dams into the following four categories: Blank- Non-Active; NM – Non-menace; L – Low hazard; S – Significant hazard; H – High Hazard Type: S=stone; C=concrete; E=earth; T=timber*

### *Potential Future Dam Failure Damage*

Because the Lake Sunapee Dam on the Sugar River is considered to have a “significant” hazard potential, an emergency action plan was developed to delineate inundation areas in the event of a dam failure. Appendix D shows the inundation area of the Lake Sunapee Dam as shown in the emergency action plan. Review of the emergency action plan indicates that both the Lake Sunapee Dam and the Town Dam would have to fail in order to achieve the inundation area shown on the map.

Within the inundation area are 11 single family homes; three multi-family homes; a church; two factories; the town offices; the town hydro plant; the town welcome center; a store and shop; and an auto repair business. The Committee determined that the risk of dam failure is low.

### **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 and snowmelt; however, floods can occur at any time of the year. A sudden winter thaw or a major summer downpour can cause flooding. Floodplains indicate areas potentially affected by flooding. There are several types of flooding.

100-Year Floods The term “100-year flood” does not mean that flooding will occur once every 100 years, but is a statement of probability to describe how one flood compares to others that are likely to occur. What it actually means is that there is a one percent chance of a flood in any given year. These areas were mapped for all towns in New Hampshire by FEMA. 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) and discussion with the Sunapee Committee revealed that there is no history of ice jam related events in the Town.

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*

Appendix D is a map which shows the locally identified flood area. This area is surrounded by the waters of Otter Pond. It is locally know that the basement of one of these homes has been pumped out in the past. Appendix D also shows Flood Insurance Rate Map of

Special Flood Hazard Areas. The following tables provide a list of floods in the State, County, and Sunapee.

**Table III-2: FLOODING – FEMA DISASTER DECLARATIONS**

<b>FLOODING – FEMA DISASTER DECLARATIONS</b>				
<b>Hazard</b>	<b>Date</b>	<b>Location</b>	<b>Description of Areas Impacted</b>	<b>Damages</b>
Flood	March 11-21, 1936	NH State	Damage to Road Network. Flooding caused by simultaneous heavy snowfall totals, heavy rains and warm weather. Run-off from melting snow with rain overflowed the rivers	Unknown
Flood / Severe Storm	April 16, 1987	Cheshire, Carroll, Grafton, Hillsborough, Merrimack, Rockingham, & Sullivan Counties, NH	FEMA Disaster Declaration # 789- DR (Presidentially Declared Disaster). Flooding of low-lying areas along river caused by snowmelt and intense rain.	\$4,888,889 in damage.
Flood	August 7-11, 1990	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack & Sullivan Counties, NH	FEMA Disaster Declaration # 876. Flooding caused by a series of storm events with moderate to heavy rains.	\$2,297,777 in damage.
Flood	October 29, 1996	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan Counties, NH	FEMA Disaster Declaration # 1144- DR. Flooding caused by heavy rains.	\$2,341,273 in damage.
Flood	October 7-18, 2005	Cheshire, Grafton, Merrimack, Sullivan, and Hillsborough Counties, NH	FEMA Disaster Declaration # 1610. Severe storms and flooding.	\$3,000,000 in damages.
Flood	October-November 2005	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan counties	FEMA Disaster Declaration # DR-1144- NH	Unknown
Flood	April 16, 2007	All counties, NH	FEMA Disaster Declaration # 1695. Severe storms and flooding.	\$27,000,000 in damages; 2,005 home owners and renters applied for assistance in NH.

**Table III-3: FEMA FLOOD INSURANCE RATE MAP SPECIAL FLOOD HAZARD AREAS**

Location of Special Flood Hazard Area	Number of Structures in Area	Comments
Trask Brook along Newport town line	One single family home; Trask Brook Road bridge (#069/069)	This home has been seen to be surrounded by water; bridge floods about once a year; Bradford Road bridge (#071/052) occasionally floods after Trask Brook Road bridge floods.
Sugar River from Newport town line to Sunapee Harbor including an area going north along Tucker Brook	11 single family homes; three multi-family homes; Methodist Church; two factories; town offices; town hydro plant; town welcome center; store/shop; auto repair business, industrial building; temporary Town bridge #083/088	This flood area runs through the heart of Sunapee; bridge to Treatment Facility on Treatment Plant Road to be replaced during 2008
Lake Sunapee shores	None	Most of the shoreline is out of the flood area due to higher elevations
Otter Pond shores	None	Most of the shoreline is out of the flood area due to higher elevations
14 small uninhabited, remote areas	None	These areas are generally inaccessible

**Table III-4: LOCALLY DEFINED FLOODING – LOW/MEDIUM RISK**

LOCALLY DEFINED FLOODING – LOW/MEDIUM RISK			
Date	Location	Description of Areas Impacted	Damages
Once every 25 years	Causeway to Oak Ridge Road surrounded by waters of Otter Pond	Causeway to developed area; four seasonal homes on causeway and outer perimeter of road	To date only flooding of causeway and water in basement of one home—other homes do not have basements
Once every two years	State bridge #112/074 on Route 103B	No buildings are impacted; road closed though passage often still possible through low water	Usually floods in spring when snow and ice constrict the drainage

*Potential Future Flooding Events*

Future flooding is likely as noted in the above table based upon local knowledge of past flood events. The total structures in potential flood areas are 20 homes (including units in multi-family homes), the Sunapee Methodist Church, two factories, a store/shop, an auto repair business, an industrial building, the town offices, the town hydro plant, and the town welcome center. According to the State’s Mitigation Plan, Sullivan County has a high hazard risk for flooding. The Committee determined flooding is a low/medium risk in Sunapee.

**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).

*Past Hurricane Events*

There have been several hurricanes over the years which have impacted New England and New Hampshire. These are listed below. The 1938 hurricane directly impacted Sunapee according to the Committee member recollections.

**Table III-5: HURRICANES & TROPICAL STORMS – LOW/MEDIUM RISK**

<b>HURRICANES AND TROPICAL STORMS – LOW/MEDIUM RISK</b>				
<b>Hazard</b>	<b>Date</b>	<b>Location</b>	<b>Description of Areas Impacted</b>	<b>Damages</b>
Hurricane	August, 1635	n/a		Unknown
Hurricane	October 18-19, 1778	n/a	Winds 40-75 mph	Unknown
Hurricane	October 9, 1804	n/a		Unknown
Gale	September 23, 1815	n/a	Winds > 50mph	Unknown
Hurricane	September 8, 1869	n/a		Unknown
Hurricane	September 21, 1938	Southern New England	Flooding caused damage to road network and structures. 13 deaths, 494 injured throughout NH. Disruption of electric and telephone services for weeks. 2 Billion feet of marketable lumber blown down. Total storm losses of \$12,337,643 (1938 dollars). 186 mph maximum winds.	Unknown
Hurricane (Carol)	August 31, 1954	Southern New England	Category 3, winds 111-130 mph. Extensive tree and crop damage in NH, localized flooding	Unknown

<b>HURRICANES AND TROPICAL STORMS – LOW/MEDIUM RISK</b>				
<b>Hazard</b>	<b>Date</b>	<b>Location</b>	<b>Description of Areas Impacted</b>	<b>Damages</b>
Hurricane (Edna)	September 11, 1954	Southern New England	Category 3 in Massachusetts. This Hurricane moved off shore but still cost 21 lives and \$40.5 million in damages throughout New England. Following so close to Carol it made recovery difficult for some areas. Heavy rain in NH	Unknown
Hurricane (Donna)	September 12, 1960	Southern and Central NH	Category 3 (Category 1 in NH). Heavy flooding in some parts of the State.	Unknown
Tropical Storm (Daisy)	October 7, 1962	Coastal NH	Heavy swell and flooding along the coast	Unknown
Tropical Storm (Doria)	August 28, 1971	New Hampshire	Center passed over NH resulting in heavy rain and damaging winds	Unknown
Hurricane (Belle)	August 10, 1976	Southern New England	Primarily rain with resulting flooding in New Hampshire. Category 1	Unknown
Hurricane (Gloria)	September, 1985	Southern New England	Category 2, winds 96-110 mph. Electric structures damaged; tree damages. This Hurricane fell apart upon striking Long Island with heavy rains, localized flooding, and minor wind damage in NH	Unknown
Hurricane (Bob)	August 19, 1991	Southern New England; caused flooding in Sunapee	Structural and electrical damage in region from fallen trees. 3 persons were killed and \$2.5 million in damages were suffered along coastal New Hampshire. Federal Disaster FEMA-917-DR	Unknown
Hurricane (Edouard)	September 1, 1996	Southern New England	Winds in NH up to 38 mph and 1 inch of rain along the coast. Roads and electrical lines damaged	Unknown
Tropical Storm (Floyd)	September 16-18, 1999	Southern New England	FEMA DR-1305-NH. Heavy Rains	Unknown
Hurricane (Katrina)	August 29, 2005 & continuing	East Coast of US and more	FEMA-3258-EM. Heavy rains and flooding devastating SE US	Unknown
Tropical Storm (Tammy)	October 5-13, 2005	East Coast of US	Remnants of Tammy contributed to the October 2005 floods which dropped 20 inches of rain in some places in NH.	Unknown



### *Potential Future Hurricane Damage*

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

### *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](http://www.tornadoproject.com)) and the *NH Natural Hazard Mitigation Plan*. In the mid 1990s, a severe microburst knocked down stands of trees and some utility lines in Sunapee. The wind came from the west across Tucker Hill and near the Lower Village toward Lake Sunapee. Also in the mid 1990s, a downburst blew west along the Sugar River and Route 11 again knocking down several trees and some utility lines but not damaging buildings.

**Table III-6: TORNADOES IN SULLIVAN COUNTY – LOW/MEDIUM RISK**

<b>TORNADOS – LOW/MEDIUM RISK Sullivan County</b>		
<b>Date</b>	<b>Fujita Scale</b>	<b>Damages</b>
October 24, 1955	F0	No deaths or injuries; costs unknown
July 9, 1962	F0	No deaths or injuries; costs unknown
July 9, 1962	F1	No deaths or injuries; costs unknown
July 18, 1963	F1	No deaths or injuries; costs unknown

*Potential Future Tornado Damage*

It is impossible to predict where a tornado or other winds will occur or what damage it will inflict. The Sunapee Committee does not recall tornadoes 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.” According to the State’s mitigation plan, Sullivan County has a medium risk for tornadoes. The Committee determined there is a low/medium risk for tornadoes and downbursts in Sunapee.

**Thunderstorms**

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

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

Lightning is a giant spark of electricity that occurs within the atmosphere or between the atmosphere and the ground. As lightning passes through the air, it heats the air to a temperature of about 50,000 degrees Fahrenheit, considerably hotter than the surface of the

sun. Fires are a likely result of lightning strikes, and lightning strikes can cause death, injury, and property damage. “Lightning kills an average of 87 people per year in the United States, and New Hampshire has the 16th highest casualty rate in the nation.”<sup>2</sup>

*Past Thunderstorm Events*

A thunderstorm with lightening or hail could impact the entire town. There have been no recalled severe hailstorms in Sunapee. However, lightning events have occurred as noted in the table below.

**Table III-7: LIGHTNING EVENTS IN SULLIVAN COUNTY**

<b>Date</b>	<b>Location</b>	<b>Description of Areas Impacted</b>	<b>Cost</b>
July 21, 1994	Sullivan County	1 person injured	--
May 31, 2002	Town of Sunapee	Storage barns struck & destroyed	\$20,000
June 5, 2002	Town of Washington	Tower of Town Hall struck; damage to tower and equipment	\$11,000
August 18, 2002	Town of Sunapee	Three people injured	--
July 8, 2004	Town of Sunapee	Computer and radio equipment damaged at Town Office	\$3,000

*Potential Future Thunderstorm Damage*

In Sullivan County, five lightning strikes have been reported from 1950 and 2007 to the National Climatic Data Center, including two lightning strikes that damaged equipment in town-owned buildings (see table above).

The Committee has determined there are two areas most susceptible to lightning due to elevation and past events. One of these areas includes several high points beginning to the east of Perkins Pond and north to above Ledge Pond. There have been a few structure fires caused by lightning in this area over the last several years. The other area is Burkehaven Hill south of Sunapee Harbor. Lightning has caused damage to the water filtration plant electrical system on several occasions including a storm which caused substantial damage to office equipment. Fuses were installed to prevent future damage, and the fuses must be changed five to six times a year due to lightning. In addition, the nearby town offices received damage to their computer and radio equipment as noted in the above table.

It is inevitable that thunderstorms will occur in Sunapee’s future, although it is impossible to predict exactly where damage will occur.

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<sup>2</sup> State of NH Hazard Mitigation Plan, page 63

Lightening, hail, or wind from a thunderstorm could impact the entire town. According to the State's mitigation plan, Sullivan County has a medium risk of a lightening hazard. The risk for future thunderstorm damage was determined by the Committee to be low/medium risk 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 winter storm characterized by high winds, low temperatures, and driving snow- according to the official definition given in 1958 by the U.S. Weather Bureau, the winds must exceed 35 miles per hour and the temperatures must drop to 20°F (-7°C) or lower. Therefore, intense Nor'easters, which occur in the winter months, are often referred to as blizzards. The definition includes the conditions under which dry snow, which has previously fallen, is whipped into the air and diminishes visual range. Such conditions, when extreme enough, are called "white outs."

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

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

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

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

*Past Extreme Winter Weather Events*

The following table provides a list of past extreme winter weather events in New Hampshire and Sunapee.

**Table III-8: SEVERE WINTER WEATHER – LOW/MEDIUM RISK**

<b>SEVERE WINTER WEATHER/ICE STORMS – LOW/MEDIUM RISK</b>				
<b>Hazard</b>	<b>Date</b>	<b>Location</b>	<b>Description of Areas Impacted</b>	<b>Damages</b>
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
Blizzard	February 14-17, 1958	New Hampshire	20-30 inches of snow in parts of New Hampshire	Unknown
Snow Storm	March 18-21, 1958	New Hampshire	Up to 22 inches of snow in south central NH	Unknown
Snow Storm	December 10-13, 1960	New Hampshire	Up to 17 inches of snow in southern NH	Unknown
Snow Storm	January 18-20, 1961	New Hampshire	Up to 25 inches of snow in southern NH	Unknown
Snow Storm	February 2-5, 1961	New Hampshire	Up to 18 inches of snow in southern NH	Unknown
Snow Storm	January 11-16, 1964	New Hampshire	Up to 12 inches of snow in southern NH	Unknown
Blizzard	January 29-31, 1966	New Hampshire	Third and most severe storm of 3 that occurred over a 10-day period. Up to 10 inches of snow across central NH	Unknown
Snow Storm	December 26-28, 1969	New Hampshire	Up to 41 inches of snow in west central NH	Unknown

<b>SEVERE WINTER WEATHER/ICE STORMS – LOW/MEDIUM RISK</b>				
<b>Hazard</b>	<b>Date</b>	<b>Location</b>	<b>Description of Areas Impacted</b>	<b>Damages</b>
Snow Storm	February 18-20, 1972	New Hampshire	Up to 19 inches of snow in southern NH	Unknown
Snow Storm	January 19-21, 1978	New Hampshire	Up to 16 inches of snow in southern NH	Unknown
Blizzard	February 5-7, 1978	New Hampshire	New England-wide. Up to 25 inches of snow in central NH	Unknown
Snow Storm	February, 1979	New Hampshire	President's Day storm	Unknown
Ice Storm	January 8-25, 1979	New Hampshire	Major disruptions to power and transportation	Unknown
Snow Storm	April 5-7, 1982	New Hampshire	Up to 18 inches of snow in southern NH	Unknown
Ice Storm	February 14, 1986	New Hampshire	Fiercest ice storm in 30 yrs in the higher elevations in the Monadnock region. It covered a swath about 10 miles wide from the MA border to New London NH	Unknown
Extreme Cold	November-December, 1988	New Hampshire	Temperature was below 0 degrees F for a month	Unknown
Ice Storm	March 3-6, 1991	New Hampshire	Numerous outages from ice-laden power lines in southern NH	Unknown
Blizzard, Snow, High Winds	March 1993	New Hampshire	Record snowfall; Sunapee town meeting recessed for storm	Unknown
Snow Storm	1997	New Hampshire	Power outages throughout Sunapee due to heavy snowfall	Unknown
Ice Storm	January 15, 1998	New Hampshire; Substantial power outages in Sunapee for a week	Federal disaster declaration DR-1199-NH, 20 major road closures, 67,586 without electricity, 2,310 without phone service, \$17+ million in damages to Public Service of NH alone	Unknown
Snow Storm	2000	Regional; entire town of Sunapee	Heavy snow	Unknown

<b>SEVERE WINTER WEATHER/ICE STORMS – LOW/MEDIUM RISK</b>				
<b>Hazard</b>	<b>Date</b>	<b>Location</b>	<b>Description of Areas Impacted</b>	<b>Damages</b>
Ice/Snow Storm	2004	Regional	Ice storm resulted in many trees down and loss of power.	Unknown
Snow Storms	2005	Regional	Regional	FEMA paid Sullivan County for storms in January, February, and March

*Potential Future Severe Winter Damage:*

There is the potential for severe winter and ice storm damage every year. The event would likely affect the entire town. According to the State’s mitigation plan, Sullivan County has a high risk for severe winter weather. The Committee determined severe winter weather to be a low/medium risk in Sunapee.

**Earthquake**

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

*Past Earthquake Events:*

**Table III-9: EARTHQUAKES – LOW/MEDIUM RISK**

<b>EARTHQUAKES – LOW/MEDIUM</b>			
<b>Date</b>	<b>Location</b>	<b>Magnitude</b>	<b>Damage</b>
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	Unknown

<b>EARTHQUAKES – LOW/MEDIUM</b>			
<b>Date</b>	<b>Location</b>	<b>Magnitude</b>	<b>Damage</b>
1900s	Statewide	200	Unknown
March 18, 1926	Manchester, NH	Felt in Hillsborough Co	Unknown
Dec 20, 1940	Ossipee, NH	Both earthquakes 5.5	Damage to homes, water main rupture: cost unknown.
December 24, 1940	Ossipee, NH	NA	Unknown
December 28, 1947	Dover-Foxcroft, ME	4.5	Unknown
June 10, 1951	Kingston, RI	4.6	Unknown
April 26, 1957	Portland, ME	4.7	Unknown
April 10, 1962	Middlebury, VT	4.2	Unknown
June 15, 1973	Near Quebec Border	4.8	Unknown
January 19, 1982	West of Laconia	4.5	Structure damage 15 miles away in Concord: cost unknown
October 20, 1988	Near Berlin, NH	4	Unknown
April 2002	Entire town		Fault under Mount Kearsarge; No structural damage though felt

*Potential Future Earthquake Damage:*

A United States Geographic Survey mapping tool on the web ([geohazards.cr.usgs.gov/projects](http://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. According to the State’s mitigation plan, Grafton County has a medium risk for earthquakes. The Committee determined the risk to be low/medium in Sunapee.



**Drought**

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

*Past Drought Events*

Sunapee has not experienced a drought to the Committee’s knowledge.

**Table III-10: DROUGHT – LOW/MEDIUM RISK**

<b>Date</b>	<b>Location</b>	<b>Description</b>	<b>Damages</b>
1929-1936	Statewide	Regional. Recurrence Interval 10 to > 25 years	Unknown
1939-1944	Statewide	Severe in southeast and moderate elsewhere. Recurrence Interval 10 to > 25 years	Unknown
1947-1950	Statewide	Moderate. Recurrence Interval 10 to > 25 years	Unknown
1960-1969	Statewide	Regional longest recorded continuous spell of less than normal precipitation. Encompassed most of the Northeastern US. Recurrence Interval > 25 years	Unknown
2001-2002	Statewide	Affected residential wells and agricultural water sources	Unknown

*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. According to the State’s mitigation plan, Sullivan County has a medium risk for drought. The Committee determined that drought is a low/medium risk for 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.

*Past Extreme Heat Events*

The following table lists the extreme heat events in the past which included the Northeast and New Hampshire.

**Table III-11: EXTREME HEAT – LOW RISK**

<b>Date</b>	<b>Location</b>	<b>Description</b>	<b>Damage</b>
July, 1911	New England	11-day heat wave in New Hampshire	Unknown
Late June to September, 1936	North America	Temps to mid 90s in the northeast	Unknown
Late July, 1999	Northeast	13+ days of 90+ degree heat	Unknown
Early August, 2001	New Hampshire	Mid 90s and high humidity	Unknown
August 2-4, 2006	New Hampshire	Regional heat wave and severe storms	Unknown

*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 State did not develop a county risk factor for extreme heat in its *NH Hazard Mitigation Plan*. The Committee determined extreme heat to be a low risk in Sunapee.

**Erosion**

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

Soil becomes vulnerable to erosion when construction activity removes or disturbs the vegetative cover. Vegetative cover and its root system play an extremely important role in preventing erosion by: (1) Shielding the soil surface from the impact of falling rain drops; (2) Reducing the velocity of runoff; (3) Maintaining the soil's capacity to absorb water, and (4) Holding soil particles in place. Because of the vegetation's ability to minimize erosion, limiting its removal can significantly reduce soil erosion. In addition, decreasing the area and duration of exposure of disturbed soils is also effective in limiting soil erosion. The designer must give special consideration to the phasing of a project so that only those areas actively under construction have exposed soils. Other factors

influencing soil erosion are: (1) Soil types, (2) Land slope, (3) Amount of water flowing onto the site from up-slope, and (4) Time of year of disturbance.

#### *Past Erosion Events*

Due to the rolling topography of the Town of Sunapee, there has been substantial erosion causing damage to roads. Rain washes down the steeper areas toward the water bodies. A past problem area was the Stagecoach Road and Hells Corner Road. FEMA monies helped pay for drainage work which seems to have mitigated future erosion problems there. The western Young Hill Road section and the Perkins Pond Road eroded so badly, FEMA provided monies for mitigation and later about \$70,000 from the Town was spent in 2006. A 10 acre clear cut above Young Hill Road probably contributed to the problem there. The area is growing up, but the soil is relatively shallow over ledge so it cannot absorb a lot of water from a rain. There are also erosion problems on North Road north of the intersection with Trow Hill Road. Other critical road erosion areas include Sargent Road between Avery Road and North Road, and Ryder Corner Road.

#### *Potential Future Erosion Events*

It is anticipated that erosion will continue to be a problem in Sunapee, especially in the following areas: North Road above the intersection with Trow Hill Road, Perkins Pond Road, Sargent Road, and Ryder Corner Road. However drainage work along some roads has provided mitigation of erosion. The Committee determined erosion is a low/medium risk.

### **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](http://www.nesec.org)). The majority of wildfires usually occur in April and May, when home owners are cleaning up from the winter months, and when the majority of vegetation is void of any appreciable moisture making them highly flammable.

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

#### *Past Wildfire Events*

There have been a few small fires in Sunapee in the last several years. They have been contained and originated from carelessness such as a campfire or discarded burning cigarette. Another fire about 25 years ago was assumed to be the result of an ember landing in Sunapee from a fire in a neighboring town.

#### *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. Appendix E provides a map which displays the areas where housing and forest interface or are intermixed. The Committee considers all structures within Sunapee to be in an urban interface, and wildfire could affect the entire town in structural and timber loss. According to the State’s mitigation plan, Sullivan County has substantial debris to fuel a wildfire remaining from the ice storm of 1998 and heavy forest cover. The plan gives the county a high risk of wildfire. The Committee determined that the risk of wildfire in Sunapee is low/medium.

### **Natural Water & Air Contaminants**

Radium, radon and uranium are grouped together because they are radionuclides, unstable elements that emit ionizing radiation. These three particular substances are a health risk only if taken into the body by ingestion or inhalation. They occur naturally in the environment, uranium and radium as solids in rock while radon exists as a gas. Radionuclides are undetectable by taste, odor, or

color, so only analytical testing can determine if they are present in water. Because they are associated with rock, wells drilled into bedrock are more likely to contain elevated levels of radionuclides than shallow or dug wells.

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

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

#### *Past Natural Water & Air Contaminant Events*

There have been no known events related to natural water and air contamination in Sunapee although uranium is a known water contaminant in neighboring towns. Concentrated amounts of uranium were also found during the construction of I-89.

**Table III-12: RADON – LOW RISK**

<b>RADON - LOW RISK</b>					
<b>Summary Table of Short-term Indoor Radon Test Results in NH's Radon Database 11/04/2003)</b>					
<b>County</b>	<b># Tests</b>	<b>G. Mean</b>	<b>Maximum</b>	<b>% &gt; 4.0 pCi/l</b>	<b>% &gt; 12.0 pCi/l</b>
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
<b>Sullivan</b>	<b>466</b>	<b>1.4</b>	<b>29.4</b>	<b>15.7</b>	<b>2.1</b>
<b>STATEWIDE</b>	<b>15860</b>	<b>2.4 pCi/L</b>	<b>478.9 pCi/L</b>	<b>32.4</b>	<b>8.6</b>

*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, Sullivan County radon levels are below average for the State. According to the State's mitigation plan, Sullivan County has a medium probability of a radon related hazard.

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

*Past Hazardous Waste Spill Events*

No known significant spills have occurred in Sunapee though they are possible in transportation as there is substantial through traffic on Routes 11, 103, and 103B as well as I-89. In addition, heating fuel is delivered to homes on many of the town's roads. Below is a list of active hazardous waste generators where potential on-site spills could occur. This list is from the NH Department of Environmental Services (DES). Other generators are known to exist in town though they may not be required to register with DES. There are two automotive service stations and two marinas in town which provide fuel to the public. The State Highway Garage and numerous facilities also have underground tanks which could potentially leak into the groundwater.

Another type of hazardous materials spill is from the sewage treatment facilities in and around Sunapee. The neighboring town of New London has had pump failures and broken pipes resulting in sewage dumping into Lake Sunapee. The Town of Sunapee obtains drinking water from the lake. Fortunately, the intake for the drinking water was a few miles from the spill. Since these spills, the Town of New London is upgrading their facility. Sunapee's system is occasionally overtaxed in the spring when there is excessive runoff. The Wastewater Department has made efforts to install adequate alarm systems to alert staff of a possible problem, and a protocol is put in place to lessen the output into the Sugar River.

**Table III-13: HAZARDOUS WASTE GENERATORS**

<b>HAZARDOUS WASTE GENERATORS &amp; ABOVE-GROUND STORAGE TANKS (Active)</b>			
<b>Name</b>	<b>Location</b>	<b>Hazardous Waste</b>	<b>Above Ground Storage Tanks</b>
Micro Precision, Inc.	6 Main Street	Small Quantity Generator	None
Dead River Co.	Route 11	NA	2 – 1,000 gallon steel: diesel
PSNH Substation	North Road	NA	2 – 1,620 gallon oil-filled electrical equip.
Sunapee Hwy Garage	621 Route 11	NA	4,000 gallon steel: diesel
<i>Source: NH Department of Environmental Services One-Stop Website</i>			

*Potential Future Hazardous Waste Spill Damage*

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. Larger spills are possible from non-residential fuel tanks and generation as shown above in Sunapee. The greater risk appears to be a potential for hazardous materials spills on all roads, especially the highly traveled NH Routes 11, 103, and 103B from hazardous waste haulers passing through Sunapee. The cost for clean-up would be assigned to the transporter. However, there should be an emergency plan to immediately respond to the site to minimize water and ground contamination. The State did not determine county risk for hazardous waste spills in the *NH Hazard Mitigation Plan*. The Committee determined a hazardous waste spill is a medium risk.

Until the Town has a sewage treatment facility which can take the extra water during high rainfall in the spring, they will have to manage the overflow into the river.

**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. The ratings were based on past occurrences of

hazards affecting the State of New Hampshire, Sullivan County, and the Town of Sunapee. Hazardous waste spills were ranked at a medium risk in Sunapee. This was the highest ranking. Flooding, hurricane, tornado & downburst, thunderstorm/lightning/hail, severe winter, earthquake, drought, erosion, wildfire, and natural contaminants were all ranked as a low/medium risk. Dam failure and extreme heat were ranked as a low risk.

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

An n/a score was given if there was insufficient evidence to make a decision. 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.” Finally, the Committee determined probability and the State determined probability were averaged for the final probability ranking. These figures are shown in Table III-11 and III-12.

**Table III-14: PROBABILITY OF HAZARD**

Probability of Hazard Occurring in Sullivan County from State Plan											
Flood	Dam Failure	Drought	Wildfire	Earthquake	Land-slide	Radon	Tornado	Hurricane	Lightning	Severe Winter	Avalanche
H	L	M	H	M	M	M	M	M	M	H	L

**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.

The Committee determined vulnerabilities were then averaged with the “low” vulnerability determined for Sullivan County in the *NH Natural Hazard Mitigation Plan*.



**Table III-15: VULNERABILITY OF EXISTING DEVELOPED AREAS**

<b>Committee Assessment of Vulnerability</b>	<b>Human Impact</b>	<b>Property Impact</b>	<b>Economic Impact</b>	<b>Vulnerability</b>
	<b>Probability of death or injury</b>	<b>Physical losses and damages</b>	<b>Cottage businesses &amp; agriculture</b>	<b>Avg. of human/ property/ business impact</b>
Dam Failure	1	3	3	2.3
Flooding	1	1	1	1.0
Hurricane	1	3	3	2.3
Tornado & Downburst	1	2	2	1.7
Thunderstorm/Lightening/Hail	1	1	1	1.0
Severe Winter/Ice Storms	1	1	1	1.0
Earthquake	1	1	1	1.0
Drought	2	1	2	1.7
Extreme Heat	2	1	2	1.7
Erosion	1	2	1	1.3
Wildfire	1	2	1	1.3
Natural Contaminants	1	1	1	1.0
HazMat Spills	2	2	2	2.0

## 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. Table III-12 provides the result of this evaluation.

**HIGH:** (1) There is 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:** 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.

**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-16: RISK ASSESSMENT**

<b>Risk Assessment</b>								
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	Probability based on State Hazard Plan	Average of Probabilities	Vulnerability based on Committee Review	Vulnerability based on State Hazard Plan	Average of Vulnerabilities	Risk Rating (Probability x Vulnerability)	Risk
Dam Failure	1	1	1.0	2.3	1	1.7	1.7	L
Flooding	3	3	3.0	1.0	1	1.0	3.0	L/M
Hurricane	2	2	2.0	2.3	1	1.7	3.4	L/M
Tornado & Downburst	2	2	2.0	1.7	1	1.4	2.8	L/M
Thunderstorm/Lightening/Hail	3	2	2.5	1.0	1	1.0	2.5	L/M
Severe Winter	3	3	3.0	1.0	1	1.0	3.0	L/M
Earthquake	2	2	2.0	1.0	1	1.0	2.0	L/M
Drought	3	2	2.5	1.7	1	1.4	3.5	L/M
Extreme Heat	1	n/a	1.0	1.7	1	1.4	1.4	L
Erosion	3	n/a	3.0	1.3	1	1.2	3.6	L/M
Wildfire	3	3	3.0	1.3	1	1.2	3.6	L/M
Natural Contaminants	3	2	2.5	1.0	1	1.0	2.5	L/M
HazMat	3	n/a	3.0	2.0	1	1.5	4.5	M

#### 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 were obtained from town tax records for 2007 adjusted to a 100% equalization value and rounded to the nearest 1000. It does not include content values. Town-wide events cannot be predicted for a specific area of town. These events include hurricanes, tornado & downbursts, thunderstorms/lightning/hail (though note there are some structures which are more susceptible to lightning as shown below), severe winter, earthquakes, wildfire, and natural contaminants. Hazardous material spills will most likely impact facilities along major roads.

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

<b>Critical Facility</b>	<b>Hazard Vulnerability</b>	<b>Replacement Value</b>
Safety Services Building (Emergency Operations Center)	Town-wide events & HazMat spills	\$3,289,000
Sunapee Middle-High School (Emergency Shelter)	Town-wide events	5,053,000
Sherburne Gym (Emergency Shelter)	Town-wide events & HazMat spills	966,000
Sunapee Water & Sewer Facilities (treatment plant and pump stations)	Flooding, Dam Failure, Lightning, and Town-wide events	4,446,000
Roads & Bridges (evacuation and emergency access)	Town-wide events, Flooding, Dam Failure	unknown

**Table IV-2: NON-EMERGENCY RESPONSE FACILITIES & STRUCTURES**

<b>Critical Facility</b>	<b>Hazard Vulnerability</b>	<b>Replacement Value</b>
Sunapee Town Offices	Dam failure, Flooding, Lightning, Town-wide events	\$270,000
Sunapee Highway Garage	Town-wide events	1,070,000
Georges Mills United Methodist Church (potential shelter)	Town-wide events	132,000
Community United Methodist Church (potential shelter)	Town-wide events, Flooding, Dam Failure; HazMat spills	479,000
St. Joachim's Catholic Church (potential shelter)	Town-wide events; HazMat spills	435,000

<b>Critical Facility</b>	<b>Hazard Vulnerability</b>	<b>Replacement Value</b>
Lake Sunapee Baptist Church	Town-wide events; HazMat spills	145,000
Sunapee Elementary School	Town-wide events	2,918,000
Sunapee Hydroelectric Facility/Welcome Center	Dam Failure; Flooding; Town-wide events; HazMat spills	2,120,000
Sunapee Transfer Station	Town-wide Events	235,000

**Table IV-3: FACILITIES & POPULATIONS TO PROTECT**

<b>Critical Facility</b>	<b>Hazard Vulnerability</b>	<b>Replacement Value</b>
Sunapee Cove Assisted Living	Town-wide Events; HazMat spills	\$4,286,000
Dewey Beach & Ballfield structures	Town-wide Events	22,000
Abbott Library	Town-wide Events; HazMat spills	270,000
Old Town Hall	Flooding; Town-wide Events	296,000
All commercial/industrial buildings	All hazards-site specific	30,129,000
All homes	All hazards-site specific	631,269,000

The following table is a list of all bridges in the Town of Sunapee. Bridges are important to the Town’s infrastructure. They need to be maintained or replaced when necessary to avoid potential damage to property or life due to bridge failure. Bridges are often located along emergency routes, and bridge failures could be devastating during a hazard or other event requiring evacuation or emergency access. Sunapee has three red-listed bridges on town roads. This is from a State Bridge Condition Category which means “priority for repair.” All three bridges are located in a special flood hazard area. The Treatment Road bridge is being replaced this year so it will no longer be “red-listed.” Most of the bridges in Sunapee are State-owned and are considered adequate.

**Table IV-4: BRIDGES**

<b>Bridge #</b>	<b>Owner</b>	<b>Road</b>	<b>Feature</b>	<b>Location</b>	<b>Year Built/ Reconstructed</b>	<b>Recommended Posting</b>	<b>Bridge Condition</b>
094/100	Town	Lower Main Street	Sugar River	0.3 mile from NH Route 11	1900/NA	06	Red
083/088	Town	Treatment Road	Sugar River	0.1 mile N of NH Route 11	1983/1972	BRC	Red
071/052	Town	Bradford Road	Wendell (Trask) Brook	0.15 mile from Newport T/L	1950/1985	15	Red
122/168	State	Springfield Road	Otter Pond Outlet	85' from jct inv Route 44	1968/NA	E2	Pink
112/074	State	NH Route 103B	Sucker Brook	1.54 miles N Newbury T/L	1935/1975	E2	Pink
122/163	Town	Cooper Street	Otter Pond Outlet	255' from NH Route 11	1920/2006	03P	Green
108/099	Town	High Street	Sugar River	0.3 mile from Route 103B	1920/2006	156	Green
097/101	Town	Lower Main Street	brook	0.4 mile from NH Route 11	1985/NA	E2	Green
069/069	Town	Trask Brook Road	Wendell (Trask) Brook	0.15 mile Newport T/L	1983/NA	NPR	Green
067/078	State	NH Route 103	Sugar River	0.2 mile W Newport T/L	1957/1979	NPR	Green
069/079	State	NH Route 11 ramp	Sugar River	0.1 mile from Newport T/L	1923/1979	NPR	Green
071/087	State	NH Route 11	Sugar River	6.1 miles from New London	1957/NA	NPR	Green
097/100	Town	North Road	Sugar River	2.1 miles from Croydon T/L	1910/2004	NPR	Green
103/100	State	NH Route 11	Sugar River	4 miles from New London T/L	1957/NA	NPR	Green
100/100	Town	Mill Street	Sugar River	200' from Main Street	1920/NA	BRC	Green
111/099	Town	Main Street	Sugar River	115' from Garnett Street	1920/1992	NPR	Green
121/166	Town	Old NH Route 11	Otter Pond Outlet	0.57 mile from Springfield	1927/NA	E2	Green
121/165	State	NH Route 11	Otter Pond Outlet	0.5 mile from New London	1954/NA	NPR	Green
124/178	State	I-89 South bound	Georges Mills Rd	0.5 mile from New London	1968/NA	NPR	Green
124/179	State	I-89 North bound	Georges Mills Rd	0.5 from New London	1967/NA	NPR	Green

*State Bridge Condition Category: Red – Red List priority for repair; Pink – Close to priority list; Yellow – Needs repair, non-priority; Green – No repair; The E-2 designation excludes all combination and single unit certified (weights per NH RSA 216-18-b) vehicles from crossing; NPR = No Posting Required*

## V. DETERMINING HOW MUCH WILL BE AFFECTED

### A. IDENTIFYING VULNERABLE FACILITIES

It is important to determine which critical facilities and other structures are the most vulnerable and to estimate potential losses. The first step is to identify the facilities most likely to be damaged in a hazard event. To do this, the locations of critical facilities were compared to the location of past and potential hazard events. Facilities and structures located in federally and locally determined flood areas, wildfire prone areas, etc. were identified and included in the analysis. There is neither large land areas slated for potential development nor large development projects in the works, so vulnerability of undeveloped land was not analyzed. The building value provided for hurricane and earthquake include the full assessed value for all buildings in town.

**Table V-1: VULNERABILITY OF EXISTING DEVELOPED AREAS**

Hazard	Area	Critical Facilities	Other Buildings	Infrastructure	Natural Resources	Total Known Building Value
Dam Failure	See Map in Appendices	Town Offices; Hydro Plant	11 single family homes; 3 multi-family buildings; church; 2 factories; store & shop; welcome center; auto repair shop	5 dams; 6 bridges; road sections	Sugar River, Wendall Marsh; wildlife habitat, vegetation, forest	\$6,687,000
Flooding	See Map in Appendices	Town Offices; Hydro Plant	Same as above plus: home on Bradford Road; commercial property in Wendell; 4 seasonal homes	5 dams; 13 bridges; road sections	Wildlife habitat; vegetation; forest; Sugar River; Wendall Marsh; other streams	7,673,000
Hurricane	Town-wide	All	All	All	All	691,000,000
Tornado & Downburst	Town-wide	All	All	All	All	Unknown
Thunderstorm/Light ening/Hail	Town-wide	All	All	All	All	Unknown
Severe Winter/Ice Storms	Town-wide	All	All	All	All	Unknown
Earthquake	Town-wide	All	All	All	All	691,000,000
Drought	Town-wide	All	All	Individual wells; lake water quality for municipal system	Wildlife habitat; vegetation; forest; crops	Unknown
Extreme Heat	Town-wide	All	NA	NA	Wildlife habitat;	Unknown

Hazard	Area	Critical Facilities	Other Buildings	Infrastructure	Natural Resources	Total Known Building Value
					vegetation; forest; crops	
Erosion	See Map in Appendices	None	None	Road sections	Streams, wildlife habitat, vegetation	Unknown
Wildfire	Town-wide	All	All	All	Wildlife habitat; vegetation; forest; crops	Unknown
Natural Contaminants	Site Specific	NA	NA	NA	NA	Unknown
HazMat Spills	Site Specific	NA	NA	NA	NA	Unknown

**B. IDENTIFYING VULNERABLE SPECIAL POPULATIONS**

The Sunapee Cove Independent and Assisted Senior Living located in Georges Mills on Route 11 is the only centralized special population in Sunapee. They have 30 1-person units and five 2-person units. There are other special populations of elderly and physically or mentally impaired residents located within the community, but scattered throughout the town in their homes. Town-wide programs will have to take this into account. Town officials having knowledge of its residents will assist in protection of those with special needs.

**C. POTENTIAL LOSS ESTIMATES**

This section identifies areas in 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 Risk - \$1.9 Million Estimated Cost**

There are 11 single family homes; three multi-family buildings; a church; two factories; a store & shop; the welcome center, the Town Offices building, the Town’s hydro plant, and an auto repair shop within the dam failure inundation area. The total value of these



buildings is \$6,687,000. Assuming a four-foot inundation with a 28% structural damage, the damage is estimated at \$1.9 million. The damage cost to the dams, bridges, and road sections is unknown.

#### **Flooding – Low/Medium Risk - \$2.2 Million Estimated Cost**

There are 12 single family homes; three multi-family buildings; a church; two factories; a store & shop; the welcome center; the Town Offices building; the Town's hydro plant; an auto repair shop; and a commercial property located within the FEMA designated Special Flood Hazard areas and four seasonal homes in the area on Otter Pond determined by the Committee to be a flood area. The total value of all structures in all of these areas is \$7,673,000. The FEMA areas are all "Zone AE" meaning they have base flood elevation. Assuming a four-foot flood for all of these structures with a 28 % structural damage to the houses (there are no mobile homes), the damage is estimated at \$2.2 million. The flood areas cross several roads including Route 11. There are five dams and thirteen bridges within the flood areas. The cost of repair for these structures is unknown.

#### **Hurricane – Low/Medium Risk – No Recorded or Estimated Cost**

Damage caused by hurricanes can be severe and expensive. Sunapee has been impacted in the past by both wind and flooding damage as a result of hurricanes. The total assessed value of all buildings within Sunapee is approximately \$691 million and utilities is assessed at \$9.3 million (2005 value). It is random which structures would be impacted and how much. There is no standard loss estimation available and no record of past costs.

#### **Tornado & Downburst – Low/Medium Risk – No Recorded or 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 not possible. There is no standard loss estimation model available for tornadoes due to their random nature.

#### **Thunderstorm/Lightening/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. Sunapee has experienced lightning losses ranging from \$20,000 for barns burned in 2002 and \$3,000 for equipment loss in the town offices in

2004. Substantial loss to the computer system at the Water and Sewer Department happened a few years ago. Fuses have been installed to prevent this from happening in the future.

#### **Severe Winter Weather – Low/Medium Risk – No Recorded or Estimated Cost**

Ice storms often cause widespread power outages by downing power lines, and these storms can also cause severe damage to trees. New England usually experiences at least one or two severe snowstorms, with varying degrees of severity, each year. All of these impacts are a risk to the community and put all residents, especially the elderly, at risk.

According to a study done for the Institute for Catastrophic Loss Reduction (Canada) and the Institute for Business and Home Safety (U.S.), the 1998 Ice Storm inflicted \$1.2 billion (U.S.) worth of damage in the U.S. and Canada. In New Hampshire alone, over 67,000 people were without power ([http://www.meteo.mcgill.ca/extreme/Research\\_Paper\\_No\\_1.pdf](http://www.meteo.mcgill.ca/extreme/Research_Paper_No_1.pdf)). The U.S. average insurance claim was \$1,325 for personal property, \$1,980 for commercial property, and \$1,371 for automobiles.

#### **Earthquake – Low/Medium Risk - \$6.9 Million Estimated Cost**

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

FEMA's *Understanding Your Risks: Identifying Hazards and Estimating Costs*, August 2001 provides that an earthquake with a 5% peak ground acceleration (as determined by the US Geologic Survey for the area) could cause damage to single family residences by around 10% of the structural value. If all buildings in Sunapee were impacted by an earthquake, the estimated damage could be around \$6.9 million.

#### **Drought – Low/Medium Risk – No Recorded or Estimated Cost**

A long drought would cause damage to crops and dry up wells. There is no cost estimate for this hazard in 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 – Low/Medium Risk – \$100,000 Annual Estimated Cost**

Erosion during a major rain can wash out roads, undermine bridge supports, and even damage buildings. Soil-laden run-off pollutes water bodies and potential drinking water sources. Sunapee has experienced erosion damage over the years, especially on its roads, most recently in 2005, 2006, and 2007. In 2005 and 2006, the damage cost was about \$100,000 each year. The damage cost was substantially less in 2007.

**Wildfire – Low/Medium Risk – No Recorded or 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 buildings is approximately \$691 million.

According to the Grafton County Forester, there are no reliable figures for the value of timber in New Hampshire; and excluding the last big fires of the early 1940s, the acres and timber values affected by fires would not be supportive of major investment in fire prevention in this region (v. fire-prone western regions). (The Sullivan County Forester was not available at the time of inquiry.)

**Natural Contaminants - Low Risk – No Recorded or Estimated Cost**

The cost of a natural contaminant hazard would be the health of individuals exposed to contaminated air or water. No cost estimate is provided for this hazard.

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

The cost of a hazardous material spill would depend upon the extent of the spill, the location of the spill in relation to population, structures, infrastructure, and natural resources, as well as the type of hazardous material. The cost of any clean-up would be imposed upon the owner of the material. However, other less tangible costs such as loss of water quality might be borne by the community. No cost estimate has been provided for this possible hazard. There are no significant hazardous waste generators in Sunapee, so any spills would most likely be from heating fuel delivery or transport of materials through the town on the State routes 11, 103, and 103B.

## VI. EXISTING MITIGATION ACTIONS

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

**Table VI-1: EXISTING MITIGATION ACTIONS**

Existing Mitigation Action	Description	Hazard Type/Service Area	Responsible Local Agent	Effectiveness (Low, Average, High)	Proposed Improvements
Road Design & Road/Bridge Maintenance	State and Local Control of Roads 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 Road, and Ryder Corner Road; purchase excavator to make repairs
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
Town Warning System	Siren in Georges Mills village (inactive)	Multi-Hazard	Fire	Low	Look into Reverse 911
Planning and Zoning land use regulations	Conservation District Overlays and restrictions: no building on slopes of 20% or greater; access way restricted to 10% grade for emergency vehicle access	Flood & Erosion/Town-wide	Planning Board	Average	Amend land use regulations for Shoreland Protection and reduce maximum slope requirements
Town Master Plan	Goals/objectives to plan for growth	Multi-Hazard/Town-wide	Planning Bd	Average	Update in 2008
School Evacuation Plan	Plan for evacuation/lock down/etc...	Multi-Hazard/Elementary and Middle High Schools	Police Chief, Fire Chief & EMD	High	None; continual adjustments
Fire Safety Inspections	Checks oils burners, daycares, places of public assembly, etc.	Wildfire/Town-wide	Fire Chief	Average	Provide more public education
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

Existing Mitigation Action	Description	Hazard Type/Service Area	Responsible Local Agent	Effectiveness (Low, Average, High)	Proposed Improvements
Emergency Operations Plan	Plan to deal with emergencies	Multi-Hazard/Town-wide	Emergency Management Director	High	None; Updating in process
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	None; Updating education program now
Safety Awareness Program	Fire Prevention and Safety Training	Wildfire/Town-wide	EMD/Fire Dept/EMS	High	None; distributing information in schools and fairs
Household Hazardous Waste Collections	Free drop off of hazardous waste to residents and by fee for commercial entities	HazMat/Town-wide	Road Agent	High	None
Public Education	Distribute HazMit brochure from State and HHW brochures	Multi-Hazard/Town-wide	Town Offices/Highway	High	None
Tree Maintenance Program	Performed by State and Town	Multi-Hazard/Town-wide	Highway Dept	Average	Purchase boom truck; contracting out now
Storm Drain Maintenance	Inspect and maintain culverts	Flood/Town-wide	Highway Dept	High	None; on-going program to convert open to closed drainage
HazMat Spill Program	Midwest Regional HazMat Team	HazMat/Town-wide	Fire Dept	High	Need more equipment and more certified members
	Notification 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
Fire Hydrant System	Fire protection in Georges Mills and Sunapee	Fire, HazMat/Town-wide	Water & Sewer	Average	Expand service area; on-going upgrades
911 Mapping	Provide correct address for each structure	All	Fire Chief	High	Updating in process

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

**Table VI-2: PRIORITIZING EXISTING MITIGATION STRATEGY IMPROVEMENTS**

Rank	Strategy Improvement	Reduce Damage	Community Objectives	Existing Regulations	Quickly Implemented	Socially Acceptable	Technically Feasible	Administration Possible	Benefit - Cost	TOTAL SCORE	Mitigate Existing or New Development
1	Roads & Bridges - Replace temporary bridge on Treatment Plant Road	3	3	3	3	3	3	3	3	24	Existing
1	Fire Safety - More public education	3	3	3	3	3	3	3	3	24	Both
1	Tree Maintenance Program - Boom truck for tree maintenance	3	3	3	3	3	3	3	3	24	Both
2	Roads & Bridges - Install closed drainage systems at North Road, Perkins Pond Road, Sargent Road, and Ryder Corner Road	3	3	3	2	3	3	3	3	23	Both
2	Roads & Bridges – Purchase excavator for road repairs	3	3	3	3	3	3	2	3	23	Both
2	Town Warning System - Reverse 911 implementation	3	3	3	3	3	3	2	3	23	New
2	Town Radio - Locate repeater for town channel	3	3	3	3	2	3	3	3	23	Both
2	HazMat – More equipment and more certified members; Lake Sunapee residential drinking water contact list	3	3	3	2	3	3	3	3	23	Both
3	Emergency Backup - Permanent generators for Highway Garage, Town Offices, and High School	1	3	3	3	2	3	3	3	21	Both
4	Land Use Regulations - Amend/recommend amending town regulations for reducing maximum slope development & driveway grade	3	3	1	2	2	3	3	3	20	Both
4	Fire Hydrant System –Upgrade & expand	3	3	3	1	3	2	2	3	20	Both

## **VII. GOALS AND NEWLY IDENTIFIED MITIGATION ACTIONS**

### **A. GOALS & OBJECTIVES**

The Sunapee Hazard Mitigation Committee reviewed its goals and developed objectives to meet these goals.

#### **Goals**

1. To protect the general population, the citizens of the town and guests, from all natural and human-made hazards.
2. To reduce the potential impact of natural and human-made disasters on the town's critical support services, critical facilities, and infrastructure.
3. To reduce the potential impact of natural and human-made disasters on the town's economy.
4. To reduce the potential impact of natural and human-made disasters on the town's natural environment.
5. To reduce the potential impact of natural and human-made disasters on the town's specific historic treasures and interests as well as other tangible and intangible characteristics which add to the quality of life of the citizens and guests of the town.
6. To identify, introduce, and implement cost effective hazard mitigation measures to accomplish the town's goals (above) and to raise awareness and acceptance of hazard mitigation.

#### **Objectives**

- Protect structures and roads in known flood areas.
- Prohibit new development in areas where hazards will occur.
- Amend the master plan to address natural and human-made hazards.
- Protect houses in the wildland – urban interface from wildfire.
- Educate the public to prepare for hazard emergencies.

## **B. POTENTIAL MITIGATION ACTIONS**

The Sunapee Hazard Mitigation Committee brainstormed potential mitigation actions at a meeting on July 23, 2008. This is in addition to the many existing programs and proposed improvements to those programs delineated in the previous chapter.

### **Multiple Hazards**

- Acquire hazard message board for road closures in the event of a hazard that would affect safe travel, evacuation, or access to critical facilities and to announce storm warnings and the need to prepare.
- Purchase rescue boat to serve the five inhabited islands within the Town.
- Inventory access ways into the forest for emergency rescue and wildfire fighting access: this would include mapping snowmobile trails, logging roads, and Class VI roads.

### **Hazardous Materials Spills**

- Utilize existing drainage map for the neighborhood off Routes 11, 103, and 103B and Interstate 89 to prepare for hazardous materials incidents. This map was originally developed many years ago for road drainage.
- Develop a list of needs for responding to spill containment, and pursue state and federal funding to purchase needed equipment and materials.

## **C. SUMMARY OF CRITICAL EVALUATION**

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

- Does it reduce disaster damage?
- Does it contribute to community objectives?
- Does it meet existing regulations?
- Can it be quickly implemented?
- Is it socially acceptable?
- Is it technically feasible?
- Is it administratively possible?
- Does the action offer reasonable benefits compared to cost of implementation?

Each mitigation strategy was evaluated and assigned a score (High – 3; Average – 2; and Low – 1) based on the criteria.



**Table VII-1: PRIORITIZING PROPOSED MITIGATION STRATEGIES**

Rank	Strategy	Reduce Damage	Community Objectives	Existing Regulations	Quickly Implemented	Socially Acceptable	Technically Feasible	Administration. Possible	Benefit - Cost	TOTAL SCORE	Mitigate Existing or New Development or Both
1	Inventory access ways into the forest for emergency rescue and wildfire fighting access: this would include mapping snowmobile trails, logging roads, and Class VI roads.	3	3	3	3	3	3	3	3	24	Both
1	Utilize existing drainage map for the neighborhood off Routes 11, 103, and 103B and Interstate 89 to prepare for hazardous materials incidents.	3	3	3	3	3	3	3	3	24	Both
1	Develop a list of needs for responding to spill containment, and pursue state and federal funding to purchase needed equipment and materials.	3	3	3	3	3	3	3	3	24	Both
2	Acquire hazard message board for road closures in the event of a hazard that would affect safe travel, evacuation, or access to critical facilities and to announce storm warnings and the need to prepare.	2	3	3	3	3	3	3	3	23	Both
3	Purchase rescue boat to serve the five inhabited islands within the Town.	1	3	3	3	3	3	2	2	20	Both

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.

## VIII. PRIORITIZED IMPLEMENTATION SCHEDULE

**Table VIII-1: PRIORITIZED IMPLEMENTATION SCHEDULE OF EXISTING PROGRAM IMPROVEMENTS**

Location: Mitigation Action	Who (Leadership)	When (Start)	How (Funding Sources)	Cost (Estimated)
Roads & Bridges - Replace temporary bridge on Treatment Plant Road	Road Agent	2008	Bridge Aid & Taxes	\$612,000
Roads & Bridges - Install closed drainage systems at North Road, Perkins Pond Road, Sargent Road, and Ryder Corner Road	Road Agent	2013	Grants & Taxes	North Road - \$150,000 Perkins Pond Road - \$200,000 Sargent Road - \$100,000 Ryder Corner Road - \$125,000
Roads & Bridges – Purchase excavator for road repairs	Road Agent	2010	Grants & Taxes	\$125,000
Emergency Backup - Permanent generators for Highway Garage, Town Offices, and High School	Town Manager & EMD	2008	Grants & Taxes	\$\$150,000
Town Warning System - Reverse 911 – look into it or do it?	Town Manager	2008	Grants & Taxes	\$1,500
Land Use Regulations - Amend/recommend amending town regulations for steep slope dev & drive grade	Planning Board & Town Manager	2007 (in discussion stages last year)	NA	\$0
Fire Safety - More public education	Fire Chief	2008	Grants & Taxes	\$10,000
Town Radio - Locate repeater for town channel	Police Chief	2009	Grants & Taxes	\$30,000
Tree Maintenance Program - Boom truck for tree maintenance	Road Agent	2012	Grants & Taxes	\$20-100,000 (used v. new)
HazMat – More equipment and more certified members	Fire Chief	2008	Grants & Taxes	None – included in annual fee
HazMat - Lake Sunapee residential drinking water contact list	Water & Sewer Commission	2008 - 2009	NA	\$0
Fire Hydrant System – upgrade & expand	Water & Sewer Commission; Fire Chief	2008 (plan completed)	Grants, Taxes, and User Fees	To be determined

**Table VIII-2: PRIORITIZED IMPLEMENTATION SCHEDULE OF PROPOSED ACTIONS**

Location: Mitigation Action	Who (Leadership)	When (Start)	How (Funding Sources)	Cost (Estimated)
Inventory access ways into the forest for emergency rescue and wildfire fighting access: this would include mapping snowmobile trails, logging roads, and Class VI roads.	Fire Chief	2008	NA	\$0
Utilize drainage map for the neighborhood off Routes 11, 103, and 103B and Interstate 89 to prepare for hazardous materials incidents.	Fire Chief	2008	NA	\$0
Develop a list of needs for responding to spill containment, and pursue state and federal funding to purchase needed equipment and materials.	Fire Chief	2008	Grants	To be determined
Acquire hazard message board for road closures in the event of a hazard that would affect safe travel, evacuation, or access to critical facilities and to announce storm warnings and the need to prepare.	Road Agent	2008	Grants	\$50,000
Purchase rescue boat to serve the five inhabited islands within the Town.	Police Chief	2009	Grants & Taxes	\$10,000

## **IX. ADOPTION & IMPLEMENTATION OF THE PLAN**

A good plan needs to provide for periodic monitoring and evaluation of its successes and challenges, and to allow for updates of the Plan where necessary. In order to track progress and update the Mitigation Strategies identified in the Plan, the Town of Sunapee will revisit the Hazard Mitigation Plan *annually, or after 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**

The Plan will be adopted locally as an Annex to the recently updated Emergency Operations Plan (EOP), and it will be updated annually along with the EOP. In addition, the Board of Selectmen, during the Capital Improvement Process, will review and include any proposed structural projects outlined in this plan.

### **B. CONTINUED PUBLIC INVOLVEMENT**

The public will continue to be involved in the hazard mitigation planning process. In future years, a public meeting will be held (separate from the adoption hearing) to inform and educate members of the public. Additionally, a press release will be distributed, and information will be posted on the Town website.

Copies of the Hazard Mitigation Plan have been or will be sent to the following parties for review and comment:

- Selectmen's Offices in neighboring towns
- Jeremy LaPlante, Field Representative, NH Homeland Security & Emergency Management
- Richard Verville, NH Homeland Security & Emergency Management
- Board of Selectmen, Sunapee
- Upper Valley Lake Sunapee Regional Planning Commission

## **RESOURCES USED IN THE PREPARATION OF THIS PLAN**

*Guide to Hazard Mitigation Planning for New Hampshire Communities*, prepared for NH HSEM by the Southwest Regional Planning Commission (October 2002)

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

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

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

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

*Ice Storm '98* by Eugene L. Lecomte et al for the Institute for Catastrophic Loss Reduction (Canada) and the Institute for Business & Home Safety (U.S.) (December 1998) [www.meteo.mcgill.ca/extreme/Related\\_Info.htm#disname](http://www.meteo.mcgill.ca/extreme/Related_Info.htm#disname)

*Town of Sunapee Emergency Operations Plan*, Update in process 2008

*Town of Sunapee Master Plan*, 1998

NH HSEM's *State of New Hampshire Natural Hazard Mitigation Plan* (2004)

[www.fema.gov/news/disasters.fema](http://www.fema.gov/news/disasters.fema): Website for FEMA's Disaster List

[www4.ncdc.noaa.gov/cgi-win/wwwcgi.dll?wwevent~storms](http://www4.ncdc.noaa.gov/cgi-win/wwwcgi.dll?wwevent~storms): Website for National Oceanic & Atmospheric Administration Disaster List

[www.tornadoproject.com](http://www.tornadoproject.com): Website for The Tornado Project

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

[www.nesec.org](http://www.nesec.org): Website for Northeast States Emergency Consortium

[http://earthquake.usgs.gov/research/hazmaps/products\\_data/2002/ceus2002.php](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: Hazard Areas and Critical Facilities Map**
- Appendix E: Map of Wildland – Urban Interface for Wildfire Hazard Areas**

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

Sponsor	Internet Address	Summary of Contents
		regarding lightning safety.
NASA Optical Transient Detector	<a href="http://www.ghcc.msfc.nasa.gov/otd.html">http://www.ghcc.msfc.nasa.gov/otd.html</a>	Space-based sensor of lightning strikes
LLNL Geologic & Atmospheric Hazards	<a href="http://wwwep.es.llnl.gov/wwwep/ghp.html">http://wwwep.es.llnl.gov/wwwep/ghp.html</a>	General hazard information developed for the Dept. of Energy.
The Tornado Project Online	<a href="http://www.tornadoobject.com/">http://www.tornadoobject.com/</a>	Information on tornadoes, including details of recent impacts.
National Severe Storms Laboratory	<a href="http://www.nssl.uoknor.edu/">http://www.nssl.uoknor.edu/</a>	Information about and tracking of severe storms.
Independent Insurance Agents of America IIAA Natural Disaster Risk Map	<a href="http://www.iaa.iix.com/ndcmap.htm">http://www.iaa.iix.com/ndcmap.htm</a>	A multi-disaster risk map.
Earth Satellite Corporation	<a href="http://www.earthsat.com/">http://www.earthsat.com/</a>	Flood risk maps searchable by state.
USDA Forest Service Web	<a href="http://www.fs.fed.us/land">http://www.fs.fed.us/land</a>	Information on forest fires and land management.

## **APPENDIX B: HAZARD MITIGATION ASSISTANCE GRANTS**

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

The HMA grant assistance includes four programs:

1. *The Pre-Disaster Mitigation (PDM) program:* This provides funds for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. Funding these plans and projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations. PDM grants are awarded on a competitive basis.
2. *The Flood Mitigation Assistance (FMA) program:* This provides funds so that cost-effective measures can be taken to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insured under the NFIP. The long-term goal of FMA is to reduce or eliminate claims under the NFIP through mitigation activities.
3. *The Repetitive Flood Claims (RFC) program:* This program provides funding to reduce or eliminate the long-term risk of flood damage to structures insured by NFIP that have had one or more claim payments for flood damages. The long-term goal of the RFC program is to reduce or eliminate claims under the NFIP through mitigation activities that are in the best interest of the NFIP.
4. *The Severe Repetitive Loss (SRL) program:* This program provides funding to reduce or eliminate the long-term risk of flood damage to severe repetitive loss residential structures insured under the NFIP.

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

PDM – [www.fema.gov/government/grant/pdm/](http://www.fema.gov/government/grant/pdm/)

FMA – [www.fema.gov/government/grant/fma](http://www.fema.gov/government/grant/fma/)

RFC – [www.fema.gov/government/grant/rfc](http://www.fema.gov/government/grant/rfc/)

SRL – [www.fema.gov/government/grant/srl](http://www.fema.gov/government/grant/srl/)

Mitigation Project:	PDM	FMA	RFC	SRL
<b>1. Property Acquisition and Demolition or Relocation Project</b>				
Property Elevation	X	X	X	X
<b>2. Construction Type Projects</b>				
Property Elevation	X	X	X	X
Mitigation Reconstruction <sup>1</sup>				X
Localized Minor Flood Reduction Projects	X	X	X	X
Dry Floodproofing of Residential Property <sup>2</sup>		X		X
Dry Floodproofing of Non-residential Structures		X	X	
Stormwater Management	X	X		
Infrastructure Protection Measure	X			
Vegetative Management/Soil Stabilization	X			
Retrofitting Existing Buildings and Facilities (Wind/Earthquake)	X			
Safe room construction	X			
<b>3. Non-construction Type Projects</b>				
All Hazard/Flood Mitigation Planning	X	X		
1. The SLR Program allows Mitigation Reconstruction projects located outside the regulatory floodway or Zone V as identified on the effective Flood Insurance Rate Map (FIRM), or the mapped limit of the 1.5-foot breaking wave zone. Mitigation Reconstruction is only permitted if traditional elevation cannot be implemented.				
2. The residential structure must meet the definition of “Historic Structure” in 44 CFR§59.1.				

## **Appendix C: Meeting Documentation**

### **AGENDAS: Sunapee Town Offices Meeting Room**

#### **Meeting # 1: May 28, 2008: 7:30 – 10:30 A.M.**

- Why do a Hazard Mitigation Plan? Lessen impact; grant qualification
- Goals of the plan (flip chart)
- \$5,000 In-Kind Match – tracking time
- What hazards may occur in Sunapee? Go through flip chart list. Eliminate irrelevant hazards.
- Identify and map past/potential hazards (map);
- Identify general areas where structures could be damaged;
- Potential development areas in town (especially in hazard areas);
- Identify & Locate critical facilities (emergency response & non-response); Identify special populations if any;
- Identify hazard mitigation efforts already in place (flip chart list of components to describe—see Springfield’s list as examples); and
- Identify gaps in the current mitigation efforts/programs

#### **Meeting #2: Wednesday, July 2, 2008: 7:30 – 10:30 A.M. Sunapee Town Offices Meeting Room**

- Determine probability of each hazard (flip chart & put results on Risk Assessment handout)
- Determine vulnerability of developed areas (flip chart & Assessing Vulnerability handout)
- Determine risk assessment based on previous two items
- Prioritize existing mitigation strategy improvements determined at first meeting (flip chart & Prioritizing Existing Mit handout)
- Develop implementation schedule for these strategies (handout)
- Brainstorm potential NEW mitigation efforts for all hazards
- Prioritize New mitigation efforts (flip chart and Prioritizing Proposed Mitigation Strategies handout)
- Develop a prioritized implementation schedule and discuss the adoption and monitoring of the plan

#### **Meeting #3: Wednesday, July 23, 2008: 7:30 – 8:30 A.M. Sunapee Town Offices Meeting Room**

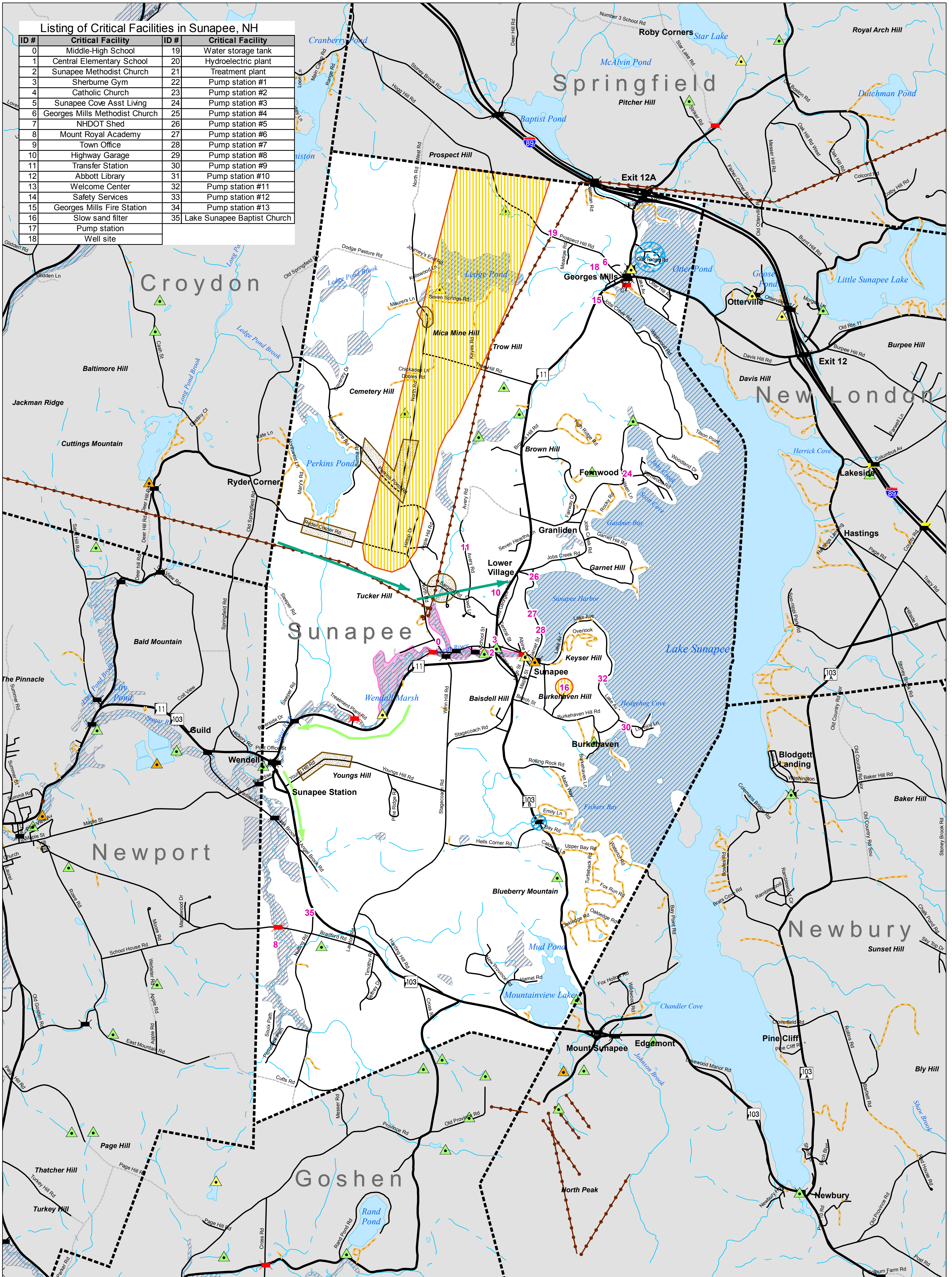
Review plan draft and revise

**APPENDIX D:**  
**Hazard Areas and Critical Facilities Map**



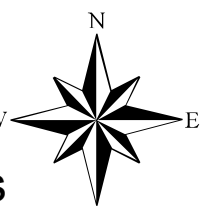
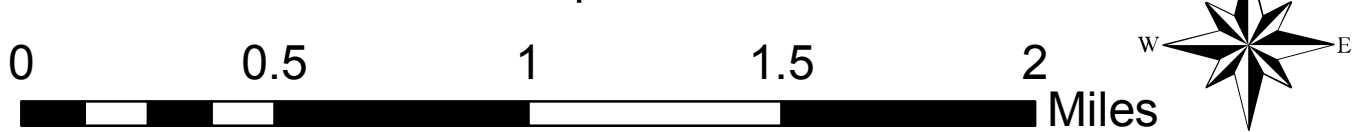
**Listing of Critical Facilities in Sunapee, NH**

ID #	Critical Facility	ID #	Critical Facility
0	Middle-High School	19	Water storage tank
1	Central Elementary School	20	Hydroelectric plant
2	Sunapee Methodist Church	21	Treatment plant
3	Sherburne Gym	22	Pump station #1
4	Catholic Church	23	Pump station #2
5	Sunapee Cove Asst Living	24	Pump station #3
6	Georges Mills Methodist Church	25	Pump station #4
7	NHDOT Shed	26	Pump station #5
8	Mount Royal Academy	27	Pump station #6
9	Town Office	28	Pump station #7
10	Highway Garage	29	Pump station #8
11	Transfer Station	30	Pump station #9
12	Abbott Library	31	Pump station #10
13	Welcome Center	32	Pump station #11
14	Safety Services	33	Pump station #12
15	Georges Mills Fire Station	34	Pump station #13
16	Slow sand filter	35	Lake Sunapee Baptist Church
17	Pump station		
18	Well site		



**Hazard Areas and Critical Facilities Map  
Sunapee Hazard Mitigation Plan**

1:24,000 1 inch equals 2,000 feet



Data drawn from NH GRANIT, the state's GIS clearinghouse, and represents the best available 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 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

**Legend**

- Town Boundaries
- Electric Transmission Line
- Roads**
  - State
  - Local
  - Not Maintained
  - Private
- Water Features**
  - Lake or Pond
  - Stream or River
- Dams by Hazard Class**
  - High hazard potential
  - Significant hazard potential
  - Low hazard potential
  - Non Menace
  - Ruins, removed, breached, notbuilt, or exempt
- Bridges by Condition**
  - Red List: More Frequent Inspection Required
  - Structurally Deficient or Functionally Obsolete
  - Other Bridges
- Water Features**
  - 100-Year Floodplain, FEMA, Sullivan Co. only
  - Inundation Area if Sunapee Dam Fails, in the case of a 100-year breach
- Hazard Areas**
  - Downburst
  - Microburst
  - Erosion
  - Local Flooding
  - Lightning
- Critical Facilities**
  - 1 Listed by number above














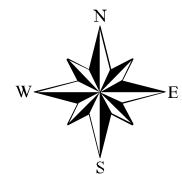
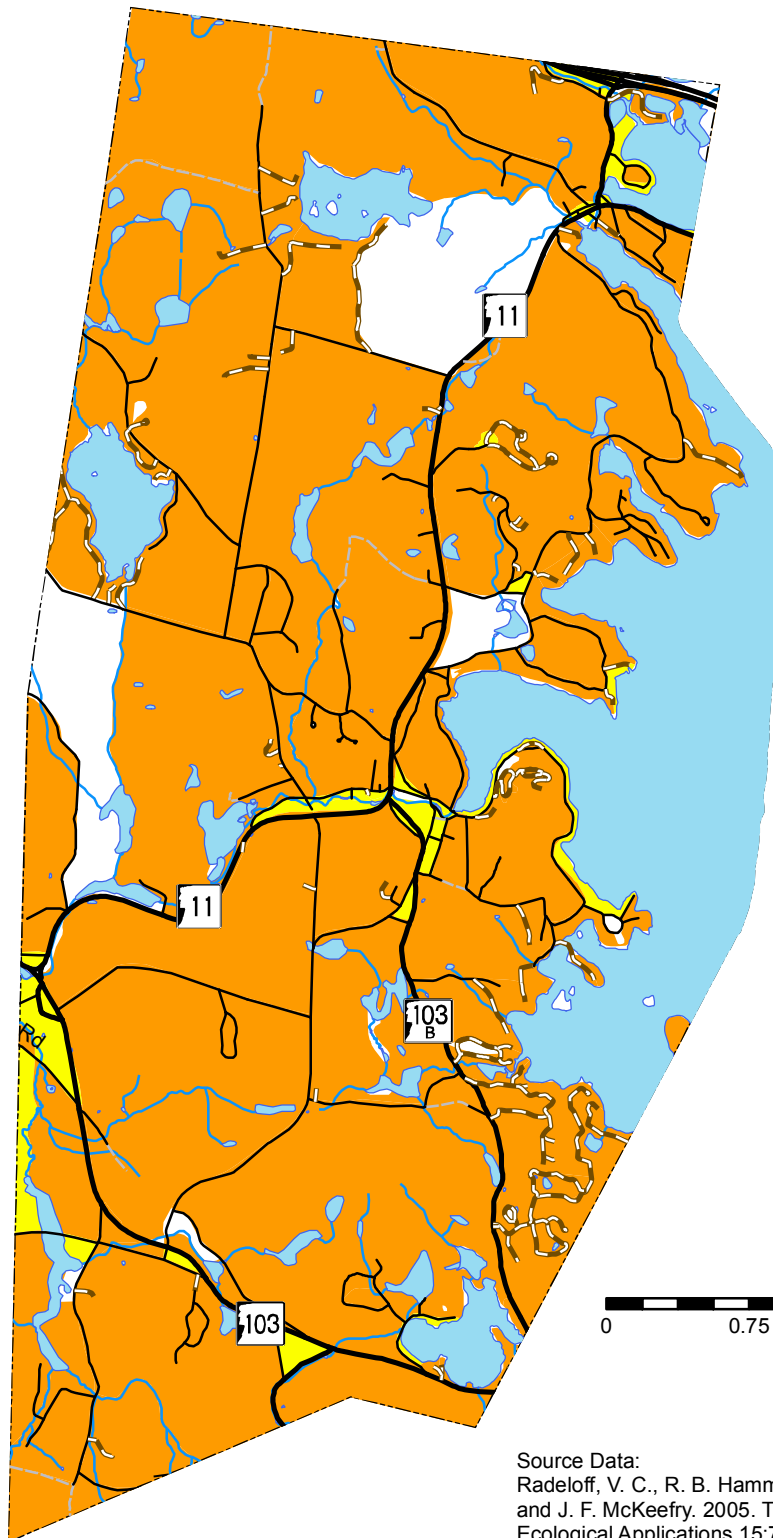
**APPENDIX E**

**Map of Wildland – Urban Interface Map  
for Wildfire Hazard Areas**

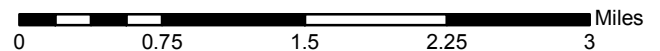
# Town of Sunapee NH Wildland - Urban Interface Map

## Legend

- |  |  |
|--|--|
|  Town Line      | <b>Water Features</b>  |
| <b>Road Network</b>  |  Lake/Pond    |
|  State          |  Reservoir    |
|  Local          |  Swamp/Marsh  |
|  Not Maintained |  Stream/River |
|  Private        |  |
| <b>Wildfire Risk Area</b>  |  |
|  Interface      |  |
|  Intermix       |  |



1:64,000



Source Data:  
Radeloff, V. C., R. B. Hammer, S. I Stewart, J. S. Fried, S. S. Holcomb,  
and J. F. McKeefry. 2005. The Wildland Urban Interface in the United States.  
Ecological Applications 15:799-805.

Base map features from NH GRANIT, digitized by Complex Systems  
Research Center, UNH.

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  
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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  
Upper Valley Lake Sunapee Regional Planning Commission,  
May 2008.