

# **City of Claremont, New Hampshire**

## **Claremont Hazard Mitigation Plan Final Draft – November 2004**

**Prepared with the Assistance of:**



Upper Valley Lake Sunapee  
Regional Planning Commission

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**SECTION I:****INTRODUCTION****Introduction****Section I**

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**BACKGROUND**

The New Hampshire Office of Emergency Management (NHOEM) 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 NHOEM has provided funding to the Upper Valley Lake Sunapee Regional Planning Commission (UVLSRPC), to facilitate the development of local Hazard Mitigation Plans for several of its communities. UVLSRPC began preparing a local Hazard Mitigation Plan for the City of Claremont in January 2004.

**PURPOSE**

The *Claremont Hazard Mitigation Plan* serves as a strategic planning tool for use by the City of Claremont 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.

**AUTHORITY**

The Claremont Hazard Mitigation Committee prepared the *Claremont 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 Office of Emergency Management (OEM) operating under the guidance of the Federal Emergency Management Agency (FEMA). After a public hearing held in the \_\_\_\_\_, the Claremont City Council adopted the *Plan* on \_\_\_\_\_, 2004.

**SCOPE OF THE PLAN**

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

- I. Flooding (Including hurricanes, 100-year floodplain events, debris-impacted infrastructure, erosion, mudslides, rapid snow pack melt, river ice jams, dam breach and/or failure)
- II. Wind (Including hurricanes, tornadoes, "Nor'easters," downbursts and lightning)

- III. Fire (Including forest fires and issues such as isolated homes and residential areas)
- IV. Ice & Snow Events (Including heavy snow storms, ice storms, and “Nor’easters,”) )
- V. Earthquake (Including landslides and other geologic hazards related to seismic activity)
- VI. Other Events (Including hazardous materials events and terrorism).

## **METHODOLOGY**

Using the *Hazard Mitigation Planning for New Hampshire Communities* handbook, as developed by the Southwest Regional Planning Commission (SWRPC), the Claremont Hazard Mitigation Committee, in conjunction with the UVLSRPC, developed the content of the *Claremont Hazard Mitigation Plan* by following the ten-step process set forth in the handbook. The Committee held a total of six meetings beginning on January 12, 2004 and ending on September 21, 2004. *All meetings were posted at Claremont City Hall and open to the general public.* Once the Federal Emergency Management Agency (FEMA) has approved the *Plan*, the Claremont City Council will hold a public hearing to formally adopt it.

The following are dates of meetings that were vital to the development of this Plan:

- January 12, 2004: Claremont Hazard Mitigation Committee meeting
- February 18: Committee meeting
- March 9: Committee meeting
- May 27: Committee meeting
- June 17: Committee meeting
- September 1: Meeting with EMD
- September 21: Committee meeting

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

### **Step 1: Map the Hazards**

Committee members identified areas where damage from natural disasters had previously occurred, areas of potential damage, and man-made facilities and infrastructure that were at risk for loss of life, 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**

Committee members identified facilities that were considered to be of value to the city 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 Claremont Hazard Mitigation Committee. In addition, a summary listing of “Critical Facilities” is presented at the end of Section II.

### **Step 3: Identify Plans/Policies Already in Place**

Using information and activities in the handbook, the Committee and UVLSRPC staff identified existing mitigation strategies that are already implemented in the city related to flood, wind, fire, ice and snow events and earthquakes. A summary chart and the results of this activity are presented in Section III of the *Plan*.

### **Step 4: Identify the Gaps in Protection/Mitigation**

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. A summary chart and the results of these activities are presented in Section III of the *Plan*.

### **Step 5: Determine Actions to Take**

During an open brainstorming session, the Hazard Mitigation Committee developed a list of other possible hazard mitigation actions and strategies for the City of Claremont. Ideas proposed included Emergency Response/Coordination (e.g. *Purchase back-up emergency power for all schools*), Planning/Policies (e.g. *Coordinate regional hazard mitigation meeting*), Public Works (e.g. *Develop snow removal policy/plan*) and public education (e.g. *Distribute information about City emergency shelters*).

### **Step 6: Evaluate Feasible Options**

The Hazard Mitigation Committee reviewed each of the ten hazard mitigation actions and strategies that were identified in the brainstorming session using Evaluation Charts from Step Six of the handbook. Each strategy was rated (good, average, or poor) for its effectiveness related to fourteen factors (e.g., damage reduction, environmental impact, social acceptability and financial feasibility). Each factor was then scored according to the STAPLEE chart outlined in chapter seven of the handbook and all scores were totaled for each strategy. Strategies were ranked by overall score for preliminary prioritization then reviewed again under step eight.

### **Step 7: Coordinate with other Agencies/Entities**

UVLSRPC staff reviewed the Emergency Operations Plan (EOP) that was prepared by the City of Claremont, as well as the Claremont Master Plan. This was done in order to determine if any conflicts existed or if there were any potential areas for cooperation.

### **Step 8: Determine Priorities**

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.

**Step 9: Develop Implementation Strategy**

Using the chart provided under step nine of the handbook, 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.

**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.

**People who participated in the development of this plan:**

Peter Chase, Emergency Management Director/Fire Chief  
Rick Bergeron, Deputy Fire Chief  
Alex Scott, Chief of Police  
Bill Wilmot, Assistant Chief of Police  
Paul Fredette, Public Works Director  
Anthony Lyons, Community Development Director  
Gerry Coogan, Planning Director  
Guy Santagate, City Manager  
Pete Petschik, Field Representative, NH Office of Emergency Management  
Victoria Boundy, UVLSRPC

A big thank you is due to Chief Chase, who invested a lot of time and thought into this project!

## HAZARD MITIGATION GOALS AND OBJECTIVES

The *State of New Hampshire Natural Hazards Mitigation Plan*, which was prepared and is maintained by the New Hampshire Office of Emergency Management (OEM), sets forth hazard mitigation goals and objectives for the State of New Hampshire. The City of Claremont concurred with these goals and adopted them.

1. To improve upon the protection of the general population, the citizens of the city and guests, from all natural and man-made hazards.
2. To reduce the potential impact of natural and man-made disasters on the city's critical support services.
3. To reduce the potential impact of natural and man-made disasters on critical facilities in the city.
4. To reduce the potential impact of natural and man-made disasters on the city's infrastructure.
5. To improve emergency preparedness.
6. To improve the city's disaster response and recovery capability.
7. To reduce the potential impact of natural and man-made disasters on private property.
8. To reduce the potential impact of natural and man-made disasters on the city's economy.
9. To reduce the potential impact of natural and man-made disasters on the city's natural environment.
10. To reduce the city's liability with respect to natural and man-made hazards generally.
11. To reduce the potential impact of natural and man-made disasters on the city'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 city.
12. To identify, introduce and implement cost effective hazard mitigation measures so as to accomplish the city's goals (above) and to raise the awareness and acceptance of hazard mitigation.

## COMMUNITY PROFILE

The City of Claremont is located in Sullivan County in West Central New Hampshire. Major highways in Claremont are NH Route 120 and NH Route 103, which links up with Interstate 91 in Ascutney, Vermont. Route 103 handles heavy traffic that flows from Interstate 91 to points East. There is a major rail freight service and some Amtrak passenger service operating on approximately 10 miles of track located on the western boundary of Claremont.

Claremont is situated on the Sugar River, with the Connecticut River serving as its western boundary. The city participates in the National Flood Insurance Program, and as a result has adopted regulations restricting construction in designated floodplains.

Claremont has a resident population of about 14,000. The city is governed by a nine-person City Council, one of whom is elected Mayor and Chief Executive Officer. Day-to-day business is handled by the City Manager, who is hired by the City Council and advises them on all community affairs. The City Council also appoints an Emergency Management Director. Claremont maintains the Police and Highway Departments, and is served by a combination Career and Call Fire Department.

## DEVELOPMENT TRENDS

During the last decade in Claremont, a loss of manufacturing jobs has contributed to a declining population (See Table I). The City has since then been focusing on both revitalizing their downtown and developing industrial areas and parks. In the downtown, both the Brown and Rand Blocks are offering a mix of retail and housing. "Big-box" developments are also planned for Washington Street. As the job market continues to grow and housing market continues to be tight in the Hanover/Lebanon area, Claremont will likely see growth in their housing market. Recently, there have been several proposed large housing developments in Claremont and this trend is likely to continue as the job market expands. As the population grows, demand for services will increase.

**TABLE I:  
Population Growth Comparisons: Claremont and Neighboring Communities**

Jurisdiction	1970	1980	1990	2000	Abs. Change 1980- 1990	% Change 1980- 1990	Abs. Change 1990- 2000	% Change 1990- 2000
Claremont	14,221	14,557	13,902	13,151	-655	-4	-751	-5
Newport	5,899	6,229	6,110	6,269	-119	-2	159	3
Unity	709	1,092	1,341	1,530	249	23	189	14
Sunapee	1,384	2,312	2,559	3,055	247	11	496	19
Sullivan County	30,949	36,063	38,592	40,458	2,529	7.0	1,866	4.8
NH	737,681	920,610	1,109,252	1,235,786	188,642	20.5	126,534	11.4

Source: U.S. Census Bureau, 1970-2000 Census

**SECTION II:  
HAZARD IDENTIFICATION  
AND POTENTIAL RISK ASSESSMENT**

**Hazard Assessment**

**Section II**

The Claremont 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 major past hazard events in the region is listed on page 15. Armed with this information, the Committee conducted a Hazard Analysis and Risk Assessment for the City of Claremont, located on pages 17-18.

**A. FLOODING**

The Claremont Hazard Mitigation Committee reviewed the following kinds on hazards related to *flooding*:

*1. Hurricanes*

“A hurricane is a heat engine that derives its energy from ocean water. These storms develop from tropical depressions which form off the coast of Africa in the warm Atlantic waters. When water vapor evaporates, it absorbs energy in the form of heat. As the vapor rises, it cools within the tropical depression, then condenses, releasing heat, which sustains the system.”<sup>1</sup>

Since 1635, ten hurricanes have reached New Hampshire: 1635, 1778, 1804, 1815, 1869, 1938, 1954, 1960, 1985 and 1991.<sup>2</sup>

All areas of the city of Claremont are potentially at risk for hurricane events. Committee members recall a hurricane event in the early 1990s, which had no significant impacts.

*2. 100-year Floodplain Events*

“Localized street flooding occasionally results from severe thundershowers, or over larger areas, from more general rain such as tropical cyclones and coastal ‘northeasters.’ More general and dangerous floods are rare but some result in the spring from large rainfall quantities combined with warm, humid winds that rapidly release water from the snow pack ... General flooding is also caused by major hurricanes that closely follow major rainstorms.

<sup>1</sup> State of New Hampshire Natural Hazards Mitigation Plan, p. 56

<sup>2</sup> Ibid.

Significant flooding occurs periodically along the watercourses with resultant loss of lives and property.”<sup>3</sup>

Similar to many other New Hampshire communities, the city of Claremont developed along the waterways. As a result of this development pattern, the floodplains ... were rapidly settled. The shift to industrialization during the mid-nineteenth century compounded the problem ...” as “[r]esidents moved to the floodplains ... Such encroachment has led to problems, as the floodplains are extensions of the watercourses and ... carry excessive runoffs naturally. Flood safety is a great concern along these watercourses and can be greatly enhanced by flood hazard mitigation planning.”<sup>4</sup>

Flooding in Claremont has moderate impacts overall; however, flooding impacts on Washington Street and Beauregard Village can be moderate to critical. Low-lying areas of Claremont are subject to periodic flooding caused by overflow of the Connecticut and Sugar Rivers, and Redwater, Grandy, Tyler, Puckershire, and Spring Farm Brooks. The most severe flooding, particularly on the Connecticut River, occurs in early spring as a result of snowmelt and heavy rains. Repeated damage to structures in the floodplains has occurred during such floods as those in 1927, 1934, 1936, 1938, 1950, 1953, 1973, and 1976. The 1927 flood was the largest event of record and the March 1936 flood was the event of record on the Sugar River.<sup>5</sup>

### 3. 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.”<sup>6</sup>

Ice-jam related events seem to be almost annual occurrences, most of them in West Claremont on the Sugar River. See Appendix E for CRREL Ice Jam event listings. Bridges, culverts, water and sewer infrastructure, roads and water-based industrial sites may be especially vulnerable to this type of hazard.

### 4. Dam Breach and Failure

“The Department of Environmental Services (DES), through its Dam Bureau, is charged with the responsibility of ensuring the public safety as it relates to the regulation of dams. Specifically, authority is granted in the *Revised Statutes Annotated*, Chapter 482 ‘Dams,

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<sup>3</sup> Ibid. p. 12

<sup>4</sup> Ibid. pp. 12-13

<sup>5</sup> Claremont Flood Insurance Study, FEMA, February 15, 1984

<sup>6</sup> Ibid. p. 16

Mills and Flowage.<sup>7</sup> These laws enable DES to regulate the construction and reconstruction of dams, as well as to periodically inspect existing dams to ensure the design, construction, maintenance and operation meet accepted engineering standards ... These dams function to serve the needs of flood control, recreation, wildlife enhancement and water resources management.”<sup>7</sup>

## **B. WIND**

The Claremont Hazard Mitigation Committee reviewed the following kinds of hazards related to *wind*:

### *1. Hurricanes*

Wind speeds within hurricanes may reach 250 miles per hour in a Category 5 hurricane, as measured on the Saffir-Simpson Hurricane Scale. Tropical depressions are considered to be of hurricane force when winds reach 74 miles per hour. Damage resulting from winds of this force can be substantial, especially considering the duration of the event, which may last for many hours.<sup>8</sup>

All areas of Claremont are potentially at risk if a hurricane reaches Sullivan County, NH.

### *2. Tornadoes*

“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.”<sup>9</sup>

All areas of Claremont are potentially at risk for property damage and loss of life due to tornadoes. There are no records of damages from tornado events.

### *3. “Nor’easters”*

A Nor'easter is “[a] large weather system traveling from South to North passing along or near the seacoast. As the storm approaches New England and its intensity becomes increasingly apparent, the resulting counterclockwise cyclonic wind, impact the coast and inland areas from a northeasterly direction. The sustained winds may meet or exceed

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<sup>7</sup> Ibid. p. 17

<sup>8</sup> Ibid. p. 56

<sup>9</sup> Ibid. p. 54

hurricane force, with larger bursts, and may exceed hurricane events by many hours in terms of duration. These storms have complex meteorological derivations.”<sup>10</sup>

“Unlike the relatively infrequent hurricane, New Hampshire generally experiences at least one or two of these events each year with varying degrees of severity. These storms have the potential to inflict more damage than many hurricanes because ... high winds can last from 12 hours to 3 days, while the duration of hurricanes ranges from 6 to 12 hours. Infrastructure, including critical facilities, may be impacted by these events, and power outages and transportation disruptions (i.e. snow and/or debris impacted roads, as well as hazards to navigation and aviation) are often associated with the event.”<sup>11</sup>

All areas of Claremont are potentially at risk for property damage and loss of life due to “Nor’easters.”

#### *4. Downbursts*

“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. Depending on the size and location of these events, the destruction to property may be devastating. Downbursts fall into two categories.” Microbursts cover an area less than 2.5 miles in diameter, and macrobursts cover an area at least 2.5 miles in diameter.”<sup>12</sup>

Potentially all locations in Claremont are at risk for property damage and loss of life due to downbursts; there are occasional, isolated microburst events.

#### *5. Lightning*

“During the development of a thunderstorm, the rapidly rising air within the cloud, combined with the movement of the precipitation within the cloud, causes electrical charges to build up within the cloud. Generally, positive charges build up near the top of the cloud, while negative charges build up near the bottom. Normally, the Earth’s surface has a slight negative charge. However, as the negative charges build up near the base of the cloud, the ground beneath the cloud and the area surrounding the cloud becomes positively charged. As the cloud moves, these induced positive charges on the ground follow the cloud like a shadow. Lightning is a giant spark of electricity that occurs between the positive and negative charges within the atmosphere or between the atmosphere and the ground. In the initial stages of development, air acts as an insulator between the positive and negative charges. However, when the potential between the positive and negative charges becomes too great, there is a discharge of electricity that we know as lightning.”<sup>13</sup>

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<sup>10</sup> Ibid. p. 58

<sup>11</sup> Ibid.

<sup>12</sup> Ibid. p. 59

<sup>13</sup> Ibid. p. 63

Lightning kills an average of 87 people per year in the United States, and New Hampshire has the 16<sup>th</sup> highest casualty rate in the nation.<sup>14</sup> All areas of Claremont are potentially at risk for property damage and loss of life due to lightning.

### C. WILDFIRE

The Claremont Hazard Mitigation Committee reviewed *wildfire*:

“Historically, large NH wildland fires run in roughly 50 year cycles. The increased incidence of large wildland fire activity in the late 1940’s and early 1950’s is thought to be associated, in part, with debris from the Hurricane of 1938. Significant woody ‘fuel’ was deposited in the forests during that event. Present concerns of New Hampshire Department of Resources and Economic Development, Division of Forests & Lands are that the Ice Storm of 1998 has left a significant amount of woody debris in the forests of the region as may fuel future wildfires.”<sup>15</sup>

“NH averages 500 fires per year and averages ½ acre or less per fire due to the excellent coordination between Fire Towers and local Fire Departments.”<sup>16</sup> Wildfires occur about every 50 years in Claremont, according to Committee members. Both drought conditions, and increasing development intensify the wildland/urban interface, increasing the likelihood and occurrence of wildfire events in Claremont.

### D. ICE AND SNOW EVENTS

The Claremont Hazard Mitigation Committee reviewed the following kinds of hazards related to *ice* and *snow*:

#### 1. 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 creates a diminution of visual range. Such conditions, when extreme enough, are called ‘white outs’.”<sup>17</sup>

All areas of Claremont are potentially at risk for property damage and loss of life due to heavy snows. Heavy snowstorms are an annual event and occur throughout the city.

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<sup>14</sup> Ibid. p. 63

<sup>15</sup> Ibid. p. 34

<sup>16</sup> Ibid. p. 34

<sup>17</sup> Ibid. pp. 69-70

## 2. Ice Storms

“When a mass of warm moist air collides with a mass of cold arctic air, the less dense warm air will rise and the moisture may precipitate out in the form of rain. When this rain falls through the colder more dense air and comes in contact with cold surfaces, the latent heat of fusion is removed by convective and/or evaporative cooling. Ice forms on these cold surfaces and may continue to form until the ice is quite deep, as much as several inches. This condition may strain branches of trees, powerlines and even transmission towers to the breaking point and often creates treacherous conditions for highway travel and aviation. Notwithstanding the unique beauty of such events, the weight of formed ice (especially with a following wind) may cause power and phone lines to snap and the towers that support them to fail under the load of ice and/or bending or broken tree limbs. Debris impacted roads make emergency access, repair and cleanup extremely difficult. The recent Ice Storm of January 1998 was not unique in either its spatial scope or its devastating consequences. A similar event in 1929 is believed to have been comparable to this event.”<sup>18</sup>

All areas of Claremont are potentially at risk for property damage and loss of life due to ice storms, but especially the higher elevation areas.

## 3. “Nor’easters”

In the winter months, [Towns within] the State may experience the additional coincidence of blizzard conditions with many of these events as well as the added impact of the masses of snow and/or ice upon infrastructure thus, impacting upon transportation and the delivery of goods and services for extended periods of time, as well as various related impacts upon the economy. The entire area of the State may be impacted by these events... Heavy snow and/or rainfall may be experienced in different areas of the State and the heavy rains may contribute to flood conditions. 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.”<sup>19</sup>

All areas of Claremont are potentially at risk for property damage and loss of life due to “Nor’easters.”

## E. EARTHQUAKE

The Claremont Hazard Mitigation Committee reviewed the following kind of seismic hazards:

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<sup>18</sup> Ibid. p. 80

<sup>19</sup> Ibid. p. 70

*1. Earthquakes*

“A series of vibrations induced in the Earth’s crust by the abrupt rupture and rebound of rocks in which elastic strain has been slowly accumulating.”<sup>20</sup> “In general, New England is considered to have a moderate seismic vulnerability but a high seismic risk because of our built environment.”<sup>21</sup> All areas of Claremont are potentially at risk for property damage and loss of life due to earthquakes.

New England State Historical Earthquakes		
State	1568 - 1989	Of Earthquakes
Connecticut	1568 - 1989	137
Maine	1766 - 1989	391
Massachusetts	1627 - 1989	316
New Hampshire	1728 - 1989	270
Rhode Island	1766 - 1989	32
Vermont	1843 - 1989	69

Source: NESEC website

*2. Landslides*

“Webster: ‘The sliding of a mass of soil, detritus or rock on or from a steep slope.’ More specifically, a landslide is the downward movement of slope forming materials reacting under the force of gravity including: mudflows, mudslides, debris flows, rockslides, debris avalanches, debris slides and earth flows. ...Landslides may be formed when a layer of soil atop a slope becomes saturated by significant precipitation and slides along a more cohesive layer of soil or rock.”<sup>22</sup>

According to the Claremont Hazard Mitigation Committee, there are no vulnerable landslide areas in the city of Claremont.

<sup>20</sup> Ibid. p. 37

<sup>21</sup> Ibid. p. 43

<sup>22</sup> Ibid. p. 45

**TABLE II:  
Past Hazard Events in Sullivan County and the State of New Hampshire**

Hazard	Date	Area Affected (River Basin or Region)	Remarks/Description
Flooding	March 11-21, 1936	Statewide	Double flood; due to rainfall and snowmelt
Flooding	September 21, 1938	Statewide	Hurricane
Flooding	August 1955	CT River Basin	Heavy rains caused extensive damage throughout basin
Flooding	April 1976	CT River	Rain and snowmelt
Flooding	July - August 1986	Statewide	Severe summer storms: heavy rains, tornados flash flood, and severe winds (FEMA DR-771-NH)
Flooding	August 7-11, 1990	Statewide	A series of storm events with moderate to heavy rains. FEMA DR-876-NH
Flooding	August 19, 1991	Statewide	Hurricane Bob - effects felt statewide
Flooding	October 1996	North/West NH	Sullivan County Declared: FEMA-DR-1077-NH
Flooding	October - Nov. 1995	North/West NH	Sullivan County Declared: FEMA DR-1144-NH
Flooding	June - July 1998	Central & Southern NH	Sullivan County Declared: FEMA DR-1231-NH
Tornado	May 23, 1782	Sullivan County	No further information available
Tornado	September 9, 1821	Sullivan County	" "
Tornado	July 1, 1831	Sullivan County	" "
Hurricane	September 21, 1938	Statewide	186 mph (max)
Winter Storms ("Nor'easters, blizzards, snowstorms)	Too numerous to mention here	Northeast	Most notable events between the years 1955-1985: blizzards of February 1958 and January 1966, triple snowstorms of 1960/61 winter, wind and snowstorm of February 1978, "Presidents' Day Storm of 1979, and paralyzing urban storm of February 1983.
Ice Storm	Dec. 17-20, 1929	NH	Disruption and damage to telephone, telegraph, and power system.
Ice Storm	Dec. 29-30, 1942	NH	Glaze storm; severe intensity
Ice Storm	Dec. - Jan., 1969/70	NH	Power disruption to many communities
Ice Storm	Jan. 8-25, 1979	NH	Major disruptions to power and transportation
Ice Storm	January 7, 1998	NH	52 communities in nine counties impacted, six injuries, one fatality, road closures, power outages, telephone service failure, other damages.
Earthquake	December 20, 1940	Ossipee, NH	5.5 on Richter scale (this list of earthquakes are those with magnitude 4.2 or more, 1924 - 1989.)
Earthquake	December 24, 1940	Ossipee, NH	5.5
Earthquake	December 28, 1947	Dover-Foxcraft, ME	4.5
Earthquake	June 10, 1951	Kingston, RI	4.6
Earthquake	April 26, 1957	Portland, ME	4.7
Earthquake	April 10, 1962	Middlebury, VT	4.2
Earthquake	June 15, 1973	In NH @ Quebec border	4.8
Earthquake	January 19, 1982	West of Laconia, NH	4.5

Sources: New Hampshire Office of Emergency Management; Northeast States Emergency Consortium (NESEC) Website; US Army Corps of Engineers Ice Jam Database

**TABLE III:  
Hazard Analysis and Risk Assessment - City of Claremont**

The City of Claremont Hazard Mitigation Committee reviewed each potential hazard and rated both the likelihood as **unlikely, possible, likely, and highly likely** and impact of that hazard as **limited, moderate, critical, or catastrophic**, and from both of those ratings determined a Community Vulnerability rating (**low, moderate, or high**). The Committee also identified the most vulnerable facilities and populations for each hazard type.

Hazard	Likelihood	Impact	Vulnerability	Most Vulnerable/Other Notes
Flooding	Highly Likely	Moderate	Moderate to High	Roads, culverts, bridges, Washington Street (road damage), Beauregard Village and Sullivan Street residential area
Hazardous Materials	Moderate	Moderate to Critical	Moderate to High	Rail line - derailment, crashes, prevailing west winds Trucks - travel secondary routes, Intersection Routes 120/11 biggest concern (Police, Fire, EMS, EOC located here) transfer incidents (local delivery) is greatest risk Fixed sites: 2 <sup>nd</sup> largest propane storage in NH
Wildfire	Possible	Limited	Low	Urban/wildland interface with increasing development
Structure Fire	Highly Likely	Moderate to Critical	Moderate to High	Downtown/Mill District has had 3 major mill fires and several downtown fires over recent years; Citywide threat is low
Winter Storm	Highly Likely	Moderate	Moderate to High	Roads, commuters, power; secondary impacts (e.g. hydrants are buried in 2-foot event)
Ice Storm	Possible	Moderate	Moderate	Mostly higher elevations
Hurricane	Likely	Critical	Moderate	Trees, residual flooding, houses, power
Earthquake	Possible	Critical	Moderate	Mill buildings, high school (construction), churches in W. Claremont; January 1982 - no damages recorded
Radiological	Unlikely	Limited	Low	Truck traffic, hospital, UPS and FedEx - small quantities, isolated

				events
Drought	Possible	Moderate	Moderate	Have had moderate droughts
School safety (earthquake, domestic terrorism)	Possible	Limited to Critical	Moderate	Limited emergency personnel and resources; large number of students; high and middle schools in high traffic area
Water Supply Contamination	Possible	Critical	Moderate	Not a targeted community; water supply is not secure
General Wind Events	Highly likely	Moderate	Moderate	There is some type of event every year; 1999 - power outages up to three days
Terrorism	Likely	Moderate	Moderate	Domestic terrorism potential (Industrial Park area; WalMart; several anthrax scares (Postal); residual effects from VT Yankee/Seabrook
Landslide	Unlikely	Limited	Low	No areas at risk
Airplane crashes	Possible	Limited	Low	Under Lebanon flight path

## CRITICAL FACILITIES/LOCATIONS

The Committee divided critical facilities/locations into structures, buildings, evacuation routes, and at-risk areas.

### Structures

- Bridges
- Dams
- Fuel storage areas
- Whitewater Reservoir - inundation area (Redwater Brook to Sugar River) - not secured
- Water Treatment Plant Reservoir (WalMart in inundation area) - not secured
- New Running Track (gathering place)
- Claremont International Speedway

### Buildings

- EOC - Police, Fire, EMS - in high traffic area (Note: A county mobile unit is being established in Unity)
- Emergency Shelters
  - Zotto Gym – 200 capacity
  - Stevens High School – 300 capacity, no back-up power
  - Claremont Middle School – 150 capacity, no back-up power
  - Disnard School - 100
  - St. Mary's Gym- 200
  - NH National Guard Armory (with permission) - 150
- Schools
- Hospital
- Integrated Health Services - Rt. 120/Hanover Street
- Courthouse/City Hall
- Downtown - National Historic Register District
- WalMart
- Churches, West Claremont
  - Union Church
  - St. Mary's Church - oldest Catholic Church in State of NH
- Daycare
  - Milestones - Charlestown Rd./Rt. 12
  - Numerous others of various sizes
- Elderly housing complexes
  - Hillside Terrace - in downtown intersection (traffic and hazmat concerns)
  - Marion Phillips - traffic/hazmat
  - Sugar River Mill Complex, Main Street - on River and across street from dam; truck traffic and hazmat concerns

### **Evacuation Routes**

- Primary evacuation routes:
- Secondary evacuation routes:

### **General At-Risk Areas**

- Downtown/Mill District
- Washington Street

## Critical Facilities in Claremont

Facility Name	Facility Type	Is it a Critical Facility?	Is it a Hazardous Facility?	Threats	Value
EOC	Emergency Operations	Yes	No	HazMat, structure fire, earthquake	See City Hall
Zotto Gym	Emergency Shelter	No	No	Structure fire, hazmat	4 M
Stevens High School	Emergency shelter (Sec)	No	No	Structure fire, hazmat	24 M
Claremont Middle School	Emergency shelter (Sec.)	No	No	Structure fire, hazmat	18 M
Disnard School	Emergency shelter (Sec.)	No	No	Structure fire, hazmat	15 M
St. Mary's Gym	Emergency Shelter (Sec.)	No	No	Structure fire, hazmat	4 M
NH National Guard Armory	Back-up emergency shelter	No	No	Structure fire, hazmat	2 M
Hospital	At-Risk population	Yes	No	Structure fire, hazmat	30 M
Integrated Health Services	At-Risk population	Yes	No	Structure fire, hazmat	7 M
Courthouse/ City Hall	Municipal/ Emergency Operations	Yes	No	HazMat, earthquake, structure fire	50 M
Downtown (National Historic Register District)	Area at Risk	—	No	Flooding, structure fire, HazMat, earthquake	200 M
WalMart	Area at Risk	No	?	Flooding, HazMat	2 M
Union Church	At-Risk population	No		Structure fire, hazmat	4 M
St. Mary's Church	At-Risk population	No	No	Structure fire, hazmat	8 M
Hillside Terrace	At-Risk Population	No	No	Structure fire, hazmat	6 M
Marion Phillips	At-Risk Population	Yes	No	Structure fire, hazm	15 M
Sugar River Mill Complex		Yes	No	Flooding, structure fire, hazmat	24 M
Washington Street	Area at Risk	—	Yes	Flooding, HazMat	400 M
Claremont International Speedway	Area at Risk	No	No	Domestic terrorism (minor risk)	1 M

## POTENTIAL LOSS ESTIMATES

In order to determine potential dollar losses to vulnerable structures due to natural and man-made hazards, each hazard area was analyzed with results shown below. Human losses are not calculated during this exercise, but could be expected to occur depending on the type and severity of the hazard. These figures exclude the contents of the structure. UVLSRPC and the Claremont Emergency Management Director calculated the information below based on vulnerability and risk discussions held during Claremont Hazard Mitigation Committee meetings.

### Flooding

#### Beauregard Village:

- Estimated number of buildings in hazard area: 30 residences
- Flooding about every three years; typically flooded basements
- 1970s flood: a person drowned; many people moved out of area
- 6-8 existing mobile homes – potential for significant damage
  - Worst-case scenario: Complete losses of 6 mobile homes at cost of approximately \$55K each
- City does have an evacuation plan for this area

#### Washington Street:

- Road Damage – Just completed a \$4 M road widening project

#### Sugar River Drive area:

- 150 dwellings in area; failing culvert

### Hazardous Material Incident

Worst-Case Scenario: Event downtown. Three emergency services within 1/8 mile of each other; elderly housing; school. No losses estimated.

### Structure Fire

#### Downtown:

- 1976, and 2 earlier ones (dates not recalled): Total destruction of occupied businesses – damage in millions of dollars

Mill District:

- Fires in 1978, 1980, ~1990
- 2 out of 3 mills were occupied; total losses
- Losses in the millions of dollars

**Winter Storms**

- Closing of schools and loss of access to roads biggest challenges
- Secondary costs as a result, e.g. snow loads on roofs make access more difficult in fires
- No losses estimated

## **SECTION III: EXISTING MITIGATION STRATEGIES AND PROPOSED IMPROVEMENTS**

### **Existing Mitigation**

### **Section III**

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#### **REVIEW OF EXISTING PROGRAMS**

The Claremont Hazard Mitigation Committee identified the following existing mitigation strategies:

#### **Emergency Response**

- Emergency Plan: up-to-date; includes hazmat
- Generators - not adequate - Fire/Police have; EMS and schools do not have
- Shelter needs – back-up emergency power
- Radio communications
- Schools - have kitchen facilities but no emergency power
- Fire
  - 18 F/T; 20 Call
  - Training needs (see Police)
  - Significant rural/suburban housing development anticipated; continued economic development; build-out of Lebanon/Hanover area
- Mutual Aid
  - Law Enforcement - all of Sullivan County
  - Fire - 4 or 5 mutual aid organizations
- Police
  - 4 F/T dispatchers - need 5 (relied on heavily for any big event)
  - Training needs: Hazmat training (ongoing); mock emergency response
  - Training has to be done on OT- significant expense
  - No serious equipment needs, just training

#### **Planning and Development Dept.**

- 10 Staff, 3 F/T, including Planner and Building Inspector
- Town Plan - plan to update
- Conservation Commission
- Building Code - State code - looking at revisions
- National Flood Insurance Program
- Just beginning to look at zoning and code changes - there is resistance
- Downtown economic development - Main Street program, etc.

### **Public Works**

- DPW needs a repeater station, as the radio system doesn't cover the entire City. There was a question as to whether or not the City could apply for Homeland Security funding for this. There was also a discussion about the Fire Dept. giving their old radios to Public Works, as they received new digital and analog with federal funding.
- It would be beneficial if all Claremont agencies/departments, such as the school dept. and DPW, meet and discuss radio communications, e.g. the possibility of having one standard emergency channel with one dispatcher assigned to those.

### **Summary of Recommended Improvements**

The Claremont Hazard Mitigation Team recommended improvements to existing programs as follows:

- Seek back-up emergency power for other buildings, especially schools and shelters.
- Both Police and Fire have significant training needs, including hazmat response and mock emergency response, but is prohibitively expensive to do as overtime.
- The Town Plan needs to be updated (in progress).
- The City should look at revising the Building Code.
- The City should revisit the zoning regulations.
- The DPW needs a repeater station, and there is need for all departments to meet to discuss radio communications in the City.

### Existing Protection Matrix

A summary matrix of existing hazard mitigation strategies is presented on the next page. This matrix includes the type of existing protection (Column 1), its current status (Column 2), enforcement of the strategy (Column 3), the effectiveness and identified improvements/changes needed (Column 4), and possible follow-up action steps (Column 5).

Existing Protection	Current Status	Enforcement/Overseen	Effectiveness/Improvements/Changes Needed	Possible Action Step
Emergency Plan	Up-to-Date	EMD	None; needs periodic updating	None
Claremont Emergency Plan	Discussion of beginning update	Planning Dept.	Add hazmat section for rail line	
Zoning regulations		Planning Dept.	None known	
Back-up emergency power	Fire/Police have	EMD	Schools and shelters do not have	Pursue funding
Emergency shelters		EMD	Back-up power needs	Pursue funding
Radio Communications			DPW needs	Consult with other City departments
Fire Dept.	Staffing and equipment are adequate	EMD	Additional training needed	Pursue training opportunities
Police	Equipment adequate	Police Chief	Additional training needed; another dispatcher needed	Pursue training opportunities
Master Plan	1991	Planning	Plan to update	Reference hazard mitigation
Building Code	State Code	Planning	Revisions needed	Pursue in future
National Flood Insurance Program (NFIP)	Member		Updated engineering/mapping needed	Request to FEMA
DPW	Staffing and equipment adequate	DPW Director	Repeater; coordinated radio communications with other depts.	Inter-departmental meetings

## SECTION IV: NEWLY IDENTIFIED MITIGATION STRATEGIES AND CRITICAL EVALUATION

### Proposed Mitigation

### Section IV

#### Summary of New Strategies

The Claremont Hazard Mitigation Committee brainstormed potential mitigation actions at meetings on June 17, September 9, and September 21, 2004. The new proposed measures are organized by the type(s) of hazard event to be mitigated. The Committee did not brainstorm actions for landslide events, as they felt there are no areas vulnerable to this type of event.

#### **Multi-Hazard** (Flooding, HazMat, Fires, Wind events, Winter storms, Earthquake, Terrorism, Drought)

- Organize meeting with city departments, agencies, school to discuss radio communications and Incident Management System. Establish policy for County Mobile Unit.
- Pursue back-up emergency power for City schools.
- National Incident Management System (unified incident command) training needed for all field medical responders (schools, Police, DPW, Fire). Chief Chase is a trainer for NIMS. The Fire Academy and Bureau of Emergency Mgmt could both provide this training, perhaps with Emergency Management Planning Grant (EMPG) funding, which is available year-round.
- Compile all emergency-related plans, including Emergency Plan, Hazard Mitigation Plans, and dam plans, and make available to all City department heads.
- Encourage a more formalized Mutual Aid Compact to develop for Public Works Departments: Call Dave Fluharty, UNH Technology Transfer Center, as a starting point.
- Hold a meeting on hazard mitigation with surrounding towns that are also developing plans (Newport, Cornish, Plainfield).
- In updating Master Plan Land Use chapter, focus on where to concentrate development, from a hazard mitigation/emergency planning perspective.
- Coordinate hazmit plan updates and emergency planning with Valley Regional Hospital.
- Distribute public information about hazard mitigation/emergency response, for example, educating about the City's emergency shelters, so that people are aware of where they are and when they are used: Utilize CCTV, advertisements, signage, printed materials, and other strategies.

#### **Hazardous Materials**

- Continue pursuing hazardous materials response and emergency response training sessions and technical assistance from state and private agencies.

- Develop Rail Line HazMat Response Plan, perhaps in concert with Cornish and Charlestown. Also develop Passenger Rail Mass Casualty Plan.
- Establish truck route around center of City for trucks carrying hazardous materials: Check Keene's truck ordinance (which sets maximum tonnage), ask DOT for average daily traffic numbers for trucks in Claremont.

### **Flooding**

- Request updated flood maps from FEMA for Sugar River and find out status of Connecticut River updates.
- Replace Sugar River Drive culvert.
- Inventory and map drainage infrastructure for City.

### **Winter Storm Events**

- Develop snow removal policy/plan to plan for major snow event and for routine maintenance purposes.

### **Terrorism/Public Health**

- Develop follow-up implementation plan to address vulnerabilities in Water Vulnerability Plan.

### **Ongoing Mitigation/Coordination with other City activities**

- The City is currently updating its Master Plan and the Hazard Mitigation Committee reinforced the need to incorporate hazard mitigation planning and reference the Hazard Mitigation Plan in the Master Plan.
- The Committee reinforced the need to coordinate hazard mitigation and emergency planning with Valley Regional Hospital.
- The Planning Department will request updated flood maps from FEMA for the Sugar River and determine the status of Connecticut River floodplain mapping updates.
- The Emergency Management Director will compile all emergency-related plans, including Emergency Plan, Hazard Mitigation Plans, and dam plans, and make it available to all City department heads.

### **Mitigating Impacts on New and Existing Built Environment**

Each action was reviewed with respect to its potential effectiveness in reducing the effects of hazard events on both new and existing buildings and infrastructure in the respective area(s). Most of the proposed actions are quite global in nature, as the Committee focused much of their attention on improving interdepartmental and regional communication and coordination. The Committee felt this was an important first step in ensuring that future mitigation and implementation actions accomplish multiple city goals, are regionally consistent and have wide benefit. The remaining action recommendations that are more specific to particular hazards and/or geographic areas all address reducing the effects of hazards on both new *and* existing buildings and infrastructure.

### Summary of Critical Evaluation

The Claremont Hazard Mitigation Committee reviewed each of the newly identified mitigation strategies using the following "STAPLEE" criteria: Social acceptability; Technical feasibility; Administrative workability; Political acceptability; Legal authority to implement; Economic impact; Environmental compatibility. The 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. The highest possible total score is 21.

We then looked at cost/benefit considerations, estimating cost and possible funding sources. A more detailed cost-benefit analysis will be undertaken at the time of project implementation, and the Committee will ensure that the benefits equal or exceed costs before proceeding.

Organize interdepartmental meeting to discuss radio communications and Incident Management System.	21	Staff time only	N/A	Better coordination will enhance capabilities
Set up National Incident Management System training for all field medical responders.	21	Overtime costs for trainees	EMPG funding	NH BEM will provide assistance
Establish policy and plans for mobile EOC unit.	20	Staff time	N/A	Only involves staff time
Pursue back-up emergency power for City schools	20	5 schools at \$80K each	Federal & local funds	Expensive but critical
Continue pursuing hazmat response and emergency response training	18	Overtime costs	Technical assistance	Necessary for better ER
Convene regional hazard mitigation meeting	19	Staff time	N/A	UVLSRPC & NH BEM assistance
Engineering study for alternative truck route	14	\$300K	FHWA (Federal)	Politically challenging
Develop rail line hazmat plan	20	Staff time	N/A	Incorporate in EM Plan
Advocate for formalized Mutual Aid Compact for Public Works Depts.	21	Staff time	N/A	Ongoing
Develop snow removal policy for major event and ongoing maintenance	21	Staff time	N/A	No dollar cost, will improve efficiency
Sugar River Drive culvert replacement	21	\$150K	Federal/local match	Applied for PDM funds
Inventory and map drainage infrastructure	21	\$300K	Federal/state/local	Would benefit Fire & Public Works
Public education program for residents	21	Perhaps printing costs	Unknown	Low cost with wide benefit

## SECTION V: PRIORITIZED IMPLEMENTATION SCHEDULE

Implementation

Section V

Mitigation Action	Agency/Responsibility	Timeline	Funding Source
Organize interdepartmental meeting to discuss radio/ICMS	Hazard Mitigation Committee	18 mos.	N/A
Set up ICMS training for all field medical responders.	EMD	18 mos.	Emergency Management Planning Grant (EMPG) or other federal funds
Establish policy and plans for mobile EOC unit.	EMD	6 mos.	N/A
Pursue back-up emergency power for City schools	EMD	2007 for High School	Federal Funds with local match
Continue pursuing hazmat response and emergency response training	EMD and Police	Ongoing	EMPG or other federal funds
Convene regional hazard mitigation meeting	HazMit Committee with Pete Petschik of NH BEM	18 mos.	N/A
Engineering study for alternative truck route	Public Works Director	3-5 years	FHWA funds
Develop rail line hazmat plan	EMD	1 year	Perhaps EMPG or other grant for EMD staff time
Mutual Aid Compact – Public Works	PWD	1 year to initiate	N/A
Develop snow removal policy for major event and ongoing maintenance	Highway Super.	1 year	N/A
Sugar River Drive culvert replacement	PWD	1 year	Pre-Disaster Mitigation (PDM) funding (federal)
Inventory and map drainage infrastructure	PWD	3 years	Federal/State/Local
Public education program for residents	HazMit Committee	2 years	Perhaps funding for printing

## **SECTION VI: ADOPTION AND IMPLEMENTATION OF THE PLAN**

**Adoption**

**Section VI**

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A good plan needs to be periodically monitored and evaluated for 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, it is recommended that the City of Claremont revisit the Hazard Mitigation Plan *annually, or after a hazard event*. The Claremont Emergency Management Director is responsible for initiating this review and should consult with the Hazard Mitigation Committee. Changes should 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 STAPLEE criteria, the timeframe, the community's priorities, and funding resources. Priorities that were not ranked highest, but that were identified as potential mitigation strategies, should be reviewed as well during the monitoring and update of this plan, to determine feasibility for future implementation. During the annual review period, there should be a public hearing to receive public comment, and the City Council should adopt the final Plan. The public should continue to be involved in the hazard mitigation planning process.

### **Implementation Through Existing Programs**

In future years, the information in this plan may be incorporated as a separate chapter in the Master Plan. In addition, the City Council, during the Capital Improvement Process, will review and consider the inclusion of proposed projects outlined in this plan. The City's Emergency Management Director will ensure ongoing consistency between the City's Hazard Mitigation Plan and the Emergency Plan.

### **Public Participation**

All hazard mitigation meeting agendas will continue to be posted publicly and the meetings open to the general public. Public and informational hearings will be broadcasted on the local access television station.

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

NH OEM's *State of New Hampshire Natural Hazards Mitigation Plan* (9/99)

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

FEMA's *Community Based Hazard Mitigation Planning: Lowering the Risks and Costs of Disasters* (8/98)

*City of Claremont Emergency Management Plan*