Strafford, NH Multi-Hazard Mitigation Plan Update 2012

Prepared for New Hampshire Homeland Security & Emergency Management

By
Strafford Regional Planning Commission
Rochester, NH 03867

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Final

Multi-Hazard Mitigation Plan Update 2012

Acknowledgements

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The following organizations have contributed invaluable assistance and support for this project:

The 2004 Strafford Hazard Mitigation Committee
New Hampshire Homeland Security Emergency Management (HSEM)
Town of Strafford

The 2012 Town of Strafford Multi-Hazard Mitigation Planning Team

Twelve people have attended meetings and/or been instrumental in completing this plan:

- Scott Young — Chief of Police/EMD
- Michael Richard — Police Department
- Liz Evans — Planning and Zoning Administration
- JoAnn Brown — Board of Selectmen
- Lynn Sweet — Board of Selectmen
- Scott Whitehouse — Deputy Fire Chief
- Greg Messenger — Road Agent
- Irving Johnson — Citizen
- Julia Chase — NH Homeland Security Emergency Management
- Elizabeth Peck — Mitigation Planner HSEM
- Lance Harbour — State Hazard Mitigation Officer
- Kyle Pimental — SRPC Regional Planner

Plan Prepared and Authored By
Kyle Pimental, Regional Planner
Strafford Regional Planning Commission
150 Wakefield Street, Suite 12
Rochester, NH 03867
603-994-3500
www.strafford.org

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Executive Summary

The first Strafford Multi-Hazard Mitigation Plan was compiled to assist the Town of Strafford in reducing and mitigating future losses from natural and man-made hazardous events. This revised plan, like the first plan, was developed by Strafford Regional Planning Commission (SRPC) and participants from the Town of Strafford Hazard Mitigation Team. The Plan contains the tools necessary to identify specific hazards and aspects of existing and future mitigation efforts.

This plan addresses the following hazards that affect the Town:

- Flooding (Dam Breach/Heavy Rains)
- Nor'easter
- Severe Thunderstorms (Lightning, Hail)
- Wildfire
- Ice and Snow Events
- Earthquakes and Landslides
- Drought
- Radon
- Hurricane & Tropical Storms
- Tornadoes
- Extreme Heat
- Public Health Threats
- Extended Power Failures
- Hazardous Material Threats

This plan also provides an updated list of Critical Facilities and Key Resources (CF/KR) categorized as follows: Emergency Response Services (ERS), Non-Emergency Response Facilities (NERS), Facilities and Populations to Protect (FPP) and Potential Resources (PR). In addition, this plan addresses the Town's involvement in The National Flood Insurance Program (NFIP).

The revision process included reviewing other Town Hazard Plans, technical manuals, federal and state laws as well as research data. Combining the elements from these plans, the Team was able to produce this integrated multi-hazard plan. The Strafford Multi-Hazard Mitigation Plan is considered a work in progress. There are three situations, which will prompt revisiting this plan:

- *First, as a minimum, this plan **will** be **reviewed annually or after any emergency event by the EMD** to assess whether the existing and suggested mitigation strategies were successful. This review will focus on the assessment of the Plan's effectiveness, accuracy and completeness in monitoring of the implementation strategy. The review will also address recommended improvements to the Plan as contained in the FEMA plan review crosswalk, and address any weaknesses the Town identified that the Plan did not adequately address. This report will be filed with the Board of Selectmen.*

- *Second, the Plan will be thoroughly reviewed, revised and updated every **five years.** The public will be allowed and encouraged to participate in that revision process.*

- *Third, if the Town adopts any major modifications to its land use planning documents, the jurisdiction will conduct a Plan review and make changes as applicable.*

Public involvement was encouraged throughout this process and will continue to be stressed in future revisions. In the pre-meeting, Town officials were given a recommended list of people to invite and participate in the process. A press release was issued which encouraged public involvement and it was also stressed that public attendance was recommended. Finally, once conditional approval for this plan had been received, a public hearing was held before the Board of Selectmen to formally adopt the Plan. The public will have the opportunity for future involvement as the Plan will be periodically reviewed and the public will be included in all future reviews and updates to this plan. The public notice was and will be given by such means as: press releases in local papers, posting meeting information on the Town website, sending letters to federal, state, and local organizations impacted by the Plan, and posting notices in public places in the Town. There will also be a public hearing before the annual review and before the five year update is sent to FEMA to ensure that public comments and revisions will be considered.

Once final approval was met, copies of the Plan were distributed to the relevant Town Departments and personnel, HESM, and FEMA; the Plan was then distributed by these entities per requirements. Copies of the Plan remain on file at Strafford Regional Planning Commission (SRPC) in both digital and paper format.

Chapter 1: Multi-Hazard Planning Process

A. Authority and Funding

Strafford's first Multi-Hazard Mitigation Plan was prepared in accordance with the Disaster Mitigation Act of 2000 (DMA), Section 322, and Mitigation Planning, signed into law by President Clinton on October 30, 2000. This revised multi-hazard plan will be referred to as the "Plan". Strafford's Multi-Hazard Mitigation Plan was prepared by the Strafford Hazard Mitigation Planning Team with the assistance and professional service of Strafford Regional Planning Commission (SRPC) under contract with New Hampshire Homeland Security Emergency Management (HSEM) operating under the guidance of Section 206.405 of 44 CFR Chapter 1 (10-1-97 Edition). This plan was funded, in part, by HSEM through grants from FEMA (Federal Emergency Management Administration). Funds from town dues and matching funds for team member's time were also part of the funding formula.

B. Purpose & History of the FEMA Mitigation Planning Process

The ultimate purpose of Disaster Mitigation Act of 2000 (DMA) is to:

- "establish a national disaster hazard mitigation program –
- Reduce the loss of life and property, human suffering, economic disruption and disaster assistance costs resulting from natural disasters; and
- Provide a source of pre-disaster hazard mitigation funding that will assist States and local governments (including Indian tribes) in implementing effective hazard mitigation measures that are designed to ensure the continued functionality of critical services and facilities after a natural disaster."[1]

DMA 2000 amends the Robert T. Stafford Disaster Relief and Emergency Assistance Act by, among other things, adding a new section "322 – Mitigation Planning" which states:

"As a condition of a receipt of an increased Federal share for hazard mitigation measures under subsection (e), a State, local, or tribal government shall develop and submit for approval to the President a mitigation plan that outlines processes for identifying the natural hazards, risks, and vulnerabilities of the area under the jurisdiction of the government."[2]

HSEM's goal is to have all New Hampshire communities complete a local multi-hazard plan as a means to reduce future losses from natural and man-made events before they occur. HSEM outlined a process whereby communities throughout the state may be eligible for grants and other assistance upon completion of this multi-hazard plan. The state's regional planning commissions are charged with providing assistance to selected communities to develop local plans.

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

Strafford's Multi-Hazard Mitigation Plan is a planning tool for use into reducing future losses from natural and man-made disasters as required by the Disaster Mitigation Act of 2000; this plan will be adopted as an appendix to the master plan. The Multi-Hazard Mitigation planning process resulted in significant cross talk regarding all types of natural and man-made hazards by team members.

The DMA places new emphasis on local mitigation planning. It requires local governments to prepare and adopt jurisdiction-wide hazard mitigation plans as a condition to receiving Hazard Mitigation Grant Program (HMPG) project grants. Local governments must review yearly and update this plan every five years to continue program eligibility.

C. Jurisdiction

This plan addresses only one jurisdiction – the Town of Strafford, NH. Once approved by the Planning Team, the Plan was forwarded to HSEM and FEMA for Conditional Approval. Upon review and conditional approval by HSEM and FEMA, the Board of Selectmen held a public hearing, to consider public comments and signed a Resolution to Adopt the Plan.

D. Scope of the Plan

A community's multi-hazard mitigation plan often identifies a vast number of natural hazards and is somewhat broad in scope and outline. The scope and effects of this plan were assessed based on the impact of hazards on: *Critical Facilities and Key Resources (CF/KR); current residential buildings; other structures within the Town; future development; administrative, technical and physical capacity of emergency response services; and response coordination between federal, state and local entities.*

E. Multi-Hazard Planning Process

The planning process consisted of ten specific steps. Many factors affected the ultimate sequence of the planning process: length of meetings, community preparation and attendance, and other community needs. All steps were included but not necessarily in the numerical sequence listed. The list of steps is as follows:

Step 1: Establish and Orient a Hazard Mitigation Planning Team
Step 2: Identify Past and Potential Hazards
Step 3. Identification of Hazards and Critical Facilities
Step 4: Assessing Vulnerability – Estimating Potential Losses
Step 5: Analyze Development Trends
Step 6: Existing Mitigation Strategies and Proposed Improvements
Step 7: Develop Specific Mitigation Measures
Step 8: Prioritized Mitigation Measures
Step 9: Mitigation Action Plan
Step 10: Adopt and Implement the Plan

F: Involvement
Public, Neighboring Communities, Agencies, Non-profits and other interested parties

Public involvement was stressed during the initial meeting and community officials were given a list of potential team members. These included members of the board of selectmen, conservation commission, planning board, school board, zoning board, the police department, fire department, town library, tax collector, as well as local business owners and residents of Strafford. Community officials were urged to contact as many people as they could to participate in the planning process. A public notice, stressing the public nature of the process, was also sent to area newspapers.

Public Announcement
Town of Strafford Hazard Mitigation Planning Committee

Strafford Regional Planning Commission has begun the update process for Strafford's Local Hazard Mitigation Plan and the first meeting of the Strafford Hazard Mitigation Planning Committee has been scheduled for Wednesday, June 8th at 3:30 pm at the Police Station (34 Roller Coaster Road). The first meeting will include: a brief background of the Hazard Mitigation Planning process, necessary updates for the current 2005 Strafford Hazard Mitigation Plan, and first steps for reviewing recent natural hazard events, such as the 2006 flood. All citizens, businesses, officials and interested parties are invited. If you are unavailable to attend, please forward any ideas or concerns to: Kyle Pimental, Regional Planner, Strafford Regional Planning Commission, 994-3500 or kpimental@strafford.org or to Scott Young, Emergency Management Director at 664-5644 or straffordpd@metrocast.net. This update of the 2005 Strafford Hazard Mitigation Plan is funded by FEMA under contract to Strafford Regional Planning Commission, and is a collaborative planning process with the Town of Strafford.

G: Narrative Description of the Process and Methodology

The Plan was developed with substantial local, state and federal coordination; completion of this new multi-hazard plan required significant planning preparation. All meetings were geared to accommodate brainstorming, open discussion and an increased awareness of potential hazardous conditions in the Town.

Meeting 1: June 8, 2011

Present at this initial meeting were: JoAnn Brown (Selectmen), Lynn Sweet (Selectmen), Scott Whitehouse (Deputy Fire Chief), Scott Young (EMD), Irving Johnson (Citizen), Liz Evans (Planning/Zoning), and Kyle Pimental (Strafford Regional Planning Commission).

Kyle explained the evolution of the Multi-Hazard Mitigation planning and the steps necessary to complete the process. Using a full-color Geographic Information (GIS) map prepared by Kyle, the Towns boundaries, 100-year flood zone, any major developments

or subdivisions over the last six years were identified and discussed. A Packet of information was provided for each attendee that included: the Agenda, a sign up sheet, and the new format for the Multi-Hazard Mitigation Plan.

The team went through updated Hazard Mitigation Plan for suggestions, edits, and formatting. The team also filled in missing blanks on Statistics of Interest table. The team also went over Chapter 3 and identified three new hazards. The (3) new Hazards include: hazardous material threats, extended power outages, and public health threats. The team worked collaboratively in evaluating each hazard and its ranking. All hazards, including the new hazards were looked at and the rankings were determined on past history and potential future events.

The team was asked in general to provide an analysis of past and future development trends and future subdivision proposals. The team also commented on the base map and identified areas that have flooded in recent years. Circles were drawn were past flooding occurred and the map was given to the Road Agent to finish.

The homework for the next meeting is to identify critical facilities and calculating potential loss within the Town.

The next meeting was set for June 22, 2011 at 3:30pm.

Meeting 2: June 22, 2011

Present at this meeting were: Scott Young (EMD), Irving Johnson (Citizen), Liz Evans (Planning/Zoning), Greg Messenger, Matt Messenger (Road Agent/Son), and Kyle Pimental (Strafford Regional Planning Commission).

The team reviewed the three new hazards that were identified at the first meeting. It was agreed that the ranking and write-ups for each of the new hazards were appropriate. The team discussed the Critical Facilities Table and made final edits and changes. The team also acknowledged the importance of having their evacuation routes visible on the map. The team also identified all the dry hydrants, fire ponds, and other fire aids on a map.

The team reviewed the vulnerable structures, critical facilities, and key resources located in the potential and past flood areas. A percentage value of structure loss was given to each of the hazards, as it related to the Town.

The team also updated the mitigation strategies table. Each strategy was reviewed and changes were made as necessary. All gaps and improvements were identified and all recent accomplishments since the previous plan were discussed.

Lastly, the STAPLEE method was reviewed and a discussion on the NEW potential mitigation strategies took place. Kyle handed out copies of both the Barrington and New Durham examples and asked the group to come to the next meeting prepared with their own strategies and implementation/responsibility schedule.

The next meeting was set for July 6, 2011 at 3:30pm.

Meeting 3: July 6, 2011

Present at this meeting were: Scott Young (EMD), Lynn Sweet (Selectmen), Irving Johnson (Citizen), Liz Evans (Planning/Zoning), JoAnn Brown (Selectmen), and Kyle Pimental (Strafford Regional Planning Commission).

The team reviewed the current mitigation strategies table. Filled in and finalized all the gaps and improvements. The recent accomplishments table was reviewed and final edits were made.

The team came up with Potential Mitigation Strategies using the STAPLEE method. The STAPLEE method was developed by FEMA to determine the effectiveness in accomplishing the goals set forth in the plan. STAPLEE method analyzes the Social, Technical, Administrative, Political, Legal, Economic, and Environmental aspects of a project and is commonly used by the public for making planning decisions. Each proposed mitigation strategy was then evaluated and assigned a score based on the criteria each category was discussed and awarded the following scores: Good=3; Average=2; Poor=1.

Each strategy that was prepared was discussed by the committee and was evaluated, then scored accordingly. After scoring, an implementation schedule was discussed along with tow staff responsibilities.

Kyle agreed to email the group a final draft copy a week before the last meeting to give enough time to read through and made any final edits.

The last meeting was set for July 27, 2011 at 3:30pm.

Meeting 4: July 27, 2011

Present at this meeting were: Michael Richard (Police), Lynn Sweet (Selectmen), Irving Johnson (Citizen), Liz Evans (Planning/Zoning), JoAnn Brown (Selectmen), and Kyle Pimental (Strafford Regional Planning Commission).

The team reviewed the final draft copy of the plan and made minor edits and spelling corrections. Changes were made to the implementation schedule. The team discussed moving around the scheduled dates for completion of projects and combined a few of the projects they felt went hand-in-hand.

Kyle discussed the final process of the update and the next steps the Town would have to go through in their adoption process.

Kyle reviewed a sample critical facilities/potential & past hazards map and asked for feedback on which (GIS) layers the team would like to see on their maps.

Kyle told the team he would email them when FEMA gave their conditional approval letter in order to schedule a board of selectmen meeting for adoption.

Meeting Agendas

Meeting 1: June 8, 2011

1. Go through updated Hazard Mitigation Plan. Formatting. Edits. Suggestions.
2. Look for information on Strafford's History and Past Development Trends. Update Current and Future Development Trends.
3. Fill in missing blanks on Statistics of Interest Table.
4. Go over Chapter 3 and Identify/Hazard Identification.
   a. Update Hazards. Man-made (hazardous material spill, acts of terrorism).
   b. Other Hazards (epidemic/pandemic, extended power failure). Re-rank all hazards.
5. Mark up Base-Map.

a. Past Events/Past & Potential Events.

6. Look through Critical Facilities Table. Add/remove facilities.

Meeting 2: June 22, 2011

1. Review write-ups for the three new hazards that were identified in the first meeting. Make any edits or changes.
2. Map all dry hydrants, fire ponds, and/or any other fire aids.
3. Identify vulnerable structures, critical facilities, and key resources that are located in the potential and past flood areas.
4. Calculate the potential loss for each of the hazards identified.
5. Update Mitigation Strategies currently underway in Strafford. Identify gaps and make recommendations for improvements.
6. Update Table 6.1: Mitigation Strategies Matrix and Proposed Improvements.
7. Update Table 7.1: Accomplishments since Prior Plan(s) Approval.
8. Go over STAPLEE Method. Hand out and discuss Table 8.1: NEW Potential Mitigation Strategies. Look at examples from the Town's of Barrington and New Durham.
9. Discuss implementation, scheduling, and responsibilities.

Meeting 3: July 6, 2011

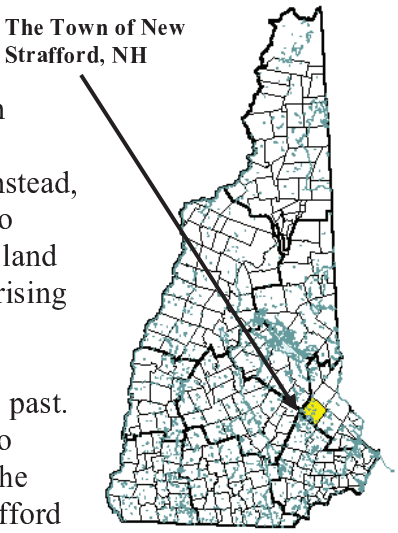
1. Review Current Mitigation Strategy table.
2. Review Accomplishments since Prior Plan(s)
3. Review gaps and improvements.
4. Discuss all new mitigation strategies. Rank strategies using STAPLEE method.
5. Implement strategies, schedule, and responsibilities.

Meeting 4: July 27, 2011

1. Review final document.
2. Review hazard map.
3. Discuss next steps in the update process.
4. Answer any final questions.

Chapter II: Community Profile

A. Introduction



The Town of Strafford is located in southeastern NH within Strafford County. The towns bordering Strafford are: Farmington, Rochester, and Barrington to the east and Barnstead, Northwood, and Pittsfield to the west, running from north to south respectively. Strafford contains 49.0 square miles of land area and 2.2 square miles of inland water, Bow Lake comprising most of this.

Strafford has only experienced minor natural hazards in the past. However, there is always the potential for natural hazards to occur, especially snow and ice storms and flooding due to the geographic area of Strafford, as well as wildfires since Strafford contains a large amount of forest area.

Incorporated: 1820

Origin: This territory was for a long time part of Barrington, and settled prior to the Revolution. It was incorporated as a separate town in 1820, taking its name from the county in which it is located. Earl of Strafford was a title of the Wentworth family in England. Strafford, Vermont is also named for the family. The name was also adopted by a state militia company in Dover, the Strafford Guards, who later became part of the New Hampshire National Guard. The company served as escort for the Marquis de Lafayette on his visit to America, and saw service in the Civil War.

Villages and Place Names: Berrys Corner, Bow Lake Village, Center Strafford, Hills Corner, Leighton Corners, Strafford Corner, Welshs Corner

Population, Year of the First Census Taken: 2,144 residents in 1820

Population Trends: Population change for Strafford totaled 2,879 over 50 years, from 770 in 1950 to 3,649 in 2000. The largest decennial percent change was a 77 percent increase between 1980 and 1990, which followed a 72 percent increase between 1970 and 1980. The 2008 Census estimate for Strafford was 4,065 residents, which ranked 94th among New Hampshire's incorporated cities and towns.

Population Density and Land Area, 2008 (*NH Office of Energy & Planning*): 83.0 persons per square mile of land area. Strafford contains 49.0 square miles of land area and 2.2 square miles of inland water area.

Source: Economic & Labor Market Bureau, NH Employment Security, 2009.
http://strafford.org/towns/towncensus/strafford2009.pdf

B. Strafford's History & Past Development Trends

The Town of Strafford comprises an area of 30,256 acres and contains regionally significant surface water features, including Bow Lake, the second largest lake in Strafford County at 1,160 acres, which is the source of the Isinglass River. Another land feature of Strafford is the Blue Hills Range, which forms a major divide between the Suncook-Merrimack watershed to the west, and the Isinglass, Cocheco and other watersheds that flow east to the seacoast (divides the Town in half). The headwaters of these streams lie along the flanks of the Blue Hills, which have a base elevation of 600-800 feet above sea level (Parker Mountain peak elevation, highest in the range, is over 1,420 feet). Strafford is fortunate in having an abundance of wetlands that act as sponges during periods of high rainfall and runoff and help regulate stream flow during drier periods.

Despite a rapidly growing population, Strafford has significant open space areas. These include some of the largest blocks of open space uninterrupted by active roadways in southeastern New Hampshire. In addition, there is considerable undeveloped frontage on great ponds and rivers as well as significant farmland resources. Further, the town still retains a very rural/agricultural appearance due to the continued presence of rolling, open fields, farmsteads with outbuildings, and tended woodlands, all in fairly large tracts. These large parcels not only contribute to the overall character but also provide important unfragmented habitats for wildlife. It is probable, however that in the near future these resources will be threatened as development expands.

Strafford is now primarily a bedroom community with few commercial or industrial enterprises. The historic neighborhood centers are still recognizable with churches and former grange halls intact. The agricultural roots of the town continue to characterize the community with historic architecture, open fields, stonewalls, hedgerows and wood lots, despite the closure of most of the working farms in the town. Development has occurred within close proximity of major commuting routes to Concord, Portsmouth, and Rochester, as well as around Bow Lake. In addition to the architecture, the town has an abundance of rural roadways lined by stonewalls, mature trees, open fields, pasture land, and woodlands. Many of the roads are maintained in an unpaved state, which adds to their historic character. Another valuable natural resource is the Town's scenic vistas. These include the views of Parker and Blue Job Mountains, lands along the Isinglass and Mohawk River corridors, and areas around the several lakes and ponds. Much of this land, however is in private hands, making it vulnerable to development.

C. Current & Future Development Trends

Since 1974 however, there has been a rapid encroachment by approved sub-divisions for housing on the town's forestlands. The increased demand for saw logs, fuel wood, and other timber products, has resulted in an increase in timber harvesting operations. The town of Strafford receives a 10% yield tax on all timber harvesting besides the regular land tax. The only town services directly associated with forestlands are town road maintenance and fire protection. The timber resources on private lands belong to the landowner while the wildlife is owned by the state. Generally, timber production and wildlife habitat management are compatible practices, however, the uncontrolled water level of beaver impoundment can be detrimental to timber production. Since 1948, Strafford has lost some valuable forestlands due to flooding by beaver.

Over the last 20 years Strafford has experienced a 30% loss in Agricultural acreage. While a small portion of this land has become idle, the bulk of the loss has been to development. The town currently has about 1,400 acres of agricultural land of all qualities. In addition to prime lands suitable for row and forage crops and lands in pasture, Strafford also has some unique lands where crops such as low bush blueberries are produced. There is only a handful of full-time, commercial farms left in Strafford. Much of the land is leased and is not contiguous with the acreage owned by the farmer. In addition, many parcels are small in size making their management more difficult and costly. Many Strafford residents are part-time farmers, raising their year supply of vegetables along with some homegrown beef, pork, poultry and dairy products. The soils occupying the prime agricultural lands are deep to bedrock, reasonably well drained, and are located on gentle to moderate slopes. These characteristics also make them desirable from the standpoint of ease of development. It must also be recognized that any future limitations, which might be imposed on wetlands, shallow soils, steep areas, etc., will tend to increase the pressure to develop agricultural lands.

The Town recognizes that it will grow and develop further in the coming years. There is a desire that this new development be directed and managed in a way that will complement the Town’s distinct character and rural traditions. Where there is interest in new commercial development, the Planning Board would like to steer this into the existing settlement crossroads rather than randomly placed in the rural countryside. This way, the existing centers would be enhanced and supported and the rural character of the surrounding countryside would be preserved. Recently, there has not been any commercial development and the several proposed subdivisions were bought out by conservation land grants.

Two problems that would occur with future development worth mentioning is that the community of Strafford is geographically dispersed and there is no central place to hold town-wide activities or to permanently set up special equipment for activities and instruction. Historically, this need was often fulfilled by activities at the school and social organizations such as the Grange. There were grange halls in all of the settlements in town but they now either meet sporadically, or are no longer active. The new town office is mostly used for governmental business. Additionally, Strafford has no public water or sewer systems, and, therefore, any sudden increase or premature development could severely impact Town resources

Table 2.1 Statistics of Interest to Multi-Hazard Mitigation Planning

Table 2.1: Statistics of Interest to Multi-Hazard Planning					
Town of Strafford		Phone	(603) 664-2192		
Stephen Leighton, Chairman		Fax	(603) 664-7276		
PO BOX 23		Email	Not available		
Center Strafford, NH 03815		Website	www.strafford.nh.gov		
Population	2008	2000	1990	1980	1970
Town of Strafford	4,065	3,649	2,936	1,663	965
Strafford County	121,914	112,676	104,348	85,324	70,431
Elderly Population (% over 65)	7.7%				
Median Age	37.4 years				
Regional Coordination					
County	Strafford				
Regional Planning Commission	Strafford Regional Planning Commission				
Watershed Planning Region(s)	Cocheco River				
Tourism Region	Lakes				
Municipal Services & Government					
Type of government	Selectmen				
Select Board	Yes; Elected				
Planning Board	Yes; Elected (2012)				
Library Trustees	Yes; Elected				
Conservation Commission	Yes; Appointed				
Health Officer	Yes				
Master Plan	Yes; 2002				
Capital Improvement Plan	Yes				
Emergency Operation Plan (EOP)	No				
Zoning & Land Use Ordinances	Yes; 2007				
Subdivision Regulations	Yes; 2011				
Capital Improvements Plan	Yes; 2007				
Building Permits Required	Yes				
Flood Ordinance	Yes				
Percent of Local Assessed Valuation by Property Type, 2008					
Residential Buildings	97.9%				
Commercial Land & Buildings	1.1%				
Public Utilities, Current Use, and	1.0%				

Table 2.1: Statistics of Interest to Multi-Hazard Planning	
Emergency Services	
Emergency Warning System(s)	No
Police Department	Yes; Full-time
Fire Department	Part-time
Fire Stations	Yes; 3
Town Fire Insurance Rating	9/10
Emergency Medical Services	Volunteer
Established EMD	Yes
Nearest Hospital	Frisbie Memorial, Rochester (10 miles, 70 staffed beds)
Utilities	
Public Works Director	No
Water Works Director	No
Water Supplier	Private wells; North Country Water Supply (Bow Lake)
Electric Supplier	PSNH
Natural Gas Supplier	None
Cellular Telephone Access	Yes
High Speed Internet	Business: Limited Residential: Limited
Telephone Company	Fairpoint, Union
Public Access Television Station	No
Pipeline(s)	No
Transportation	
Evacuation Routes	Routes 202A & 126
Nearest Interstate	Spaulding Turnpike, Exit 16; I-95, Exit 5
Railroad	No
Public Transportation	No
Nearest Airport	Skyhaven, Rochester
Nearest Commercial Airport	Manchester-Boston Regional (37 miles)
Housing Statistics, 2008	
Total Housing Units	1,802
Single-Family Units	1,612
Residential Permits (Net change)	4
Multi-Family Units	88
Residential Permits (Net change)	0
Manufactured Housing Units	102

Table 2.1: Statistics of Interest to Multi-Hazard Planning	
Income (1999)	
Per capita Income	$23,500
Median Household Income	$59,044
Median Earnings Male	$40,423
Median Earnings Female	$30,524
Families below the poverty level	1.0%
Other	
Web site	www.strafford.nh.gov
Local Newspapers	Fosters Daily Democrat; Strafford Community Calender; Suncook Valley Sun
911 GIS data available	Yes
Assessed structure value 2009	243,612,200
National Flood Insurance Program	Yes
Repetitive Losses	0
Information found in Table 2.1 was derived from local input or the Economic & Labor Market Information Bureau, NH Employment Security, 2009.	

Chapter III: Hazard Identification

A. Hazard Rankings

The Strafford Hazard Mitigation Committee considered what data was at hand and used its collective experience to formulate statements of recurrence potential. Each hazard type is assigned a general ranking of high (H), medium (M), or low (L) recurrence potential.

The first step in hazard mitigation is to identify hazards; the Team determined that the:

- 5 hazards ranked as having **high recurrence** in Strafford are: Flooding, Nor'easter, Severe Thunderstorms, Ice and Snow Events, and Radon.

- 5 hazards ranked as having **medium recurrence** in Strafford are: Hurricanes and Tropical Storms, Wildfire, Earthquake/Landslide, Extended Power Failures, and Drought.

- 4 hazards ranked as having **low recurrence** in Strafford are: Tornadoes, Public Health Threats, Hazardous Material Threats, and Extreme Heat.

B. Description of Hazards

The nature of each hazard type and the quality and availability of corresponding data made the evaluation of hazard potential difficult for those other than experts. The Strafford Hazard Mitigation Committee considered what data was at hand and used its collective experience to formulate statements of recurrence potential. Each hazard type is assigned a general ranking of high (H), medium (M), or low (L) recurrence potential.

Flooding (H)
Second only to winter storms, riverine flooding is the most common natural disaster to impact New Hampshire. Floods are a common and costly hazard. They are most likely to occur in the spring due to the increase in rainfall and the melting of snow; however, floods can occur at any time of the year as a result of heavy rains, hurricane, or a Nor'easter.

Based on extent of the floodplain, Strafford has significant flooding potential along Big River in the north and Berry's River in the east. The headwaters of the Mohawk River in central Strafford and the input stream to Bow Lake that roughly parallels Province Road in the southwest also have a fairly substantial floodplain area. Strafford has approximately 10% (2,909 ac) of its area in 100-yr. floodplain. According to the digital floodplain data available, much of the immediate shoreline of Bow Lake is in floodplain, but these areas are now mostly not considered floodplain due to Bow Lake being dam-controlled and recently having an official base elevation recognized. Although flooding of the full extent of these floodplains by definition would require a 100-yr. storm, smaller storms with a higher annual probability of occurrence could still flood significant portions of the floodplains. Some of the structures that would be impacted by a 100-yr.

storm could also be affected by smaller, more frequent flooding. That said, Strafford apparently has few structures in the floodplain that would be at risk.
Causes of flooding other than a 100-yr. rainstorm—severe tropical storm (hurricane or tropical storm), rapid snow pack melt, river ice jams, erosion and mudslide, and dam breach or failure—all have some potential to affect Strafford. Strafford has between a 5% and a 12% probability of being impacted by a named tropical storm sometime in any June to November storm season (AOML 2004). These storms often bring torrential rainfall. Some hurricanes have been known to deliver rainfall well in excess of that from a 500-yr. storm. The 100-yr. floodplain data available for this analysis does not well account for the effects of such special weather events. Although the storm could not be classified, a 1936 event was described at the time as causing "the greatest damage in New Hampshire's history" (Fahey 1936). Another extreme flooding event recalled by the Committee occurred in 1996 and resulted in a FEMA Disaster Declaration for Strafford County (#1144). Rapid snow melt in spring is always a significant potential flooding source, given the northern, relatively cold location and climate of Strafford, and has occurred multiple times in the past. Ice jam events, though the possibility of their occurrence definitely exists, seem not to have been a problem in the past. The Army Corps of Engineers Ice Jam Database contains no record of ice jams in Strafford, and the Committee did not encounter any record or reference to ice jamming in the Town. Erosion and mudslide in steep slope areas resulting from heavy rainfall could alter topology enough to cause flooding. Steep slopes are especially prevalent in the west and northwest of Town north of Bow Lake.

Finally, the potential for catastrophic flooding from dam breach or failure exists in Strafford. The dam at Bow Lake (#224.01) is a Class C, High Hazard Dam. The delineated dam inundation area for a 100-yr. storm breach is large and extends generally southeastward down the valley of the Isinglass River; across northern Barrington and into Rochester; then, after confluence with the Cocheco River, southeasterly down the Cocheco River valley to the dam in downtown Dover. Inundation waters would affect both Route 202 in Strafford and Route 125 in Barrington and would largely destroy any structures in their path. The original Bow Lake dam, an earthen construction, around 1832 did collapse, and "its waters went rushing and roaring for eighteen middles to Dover, doing much damage in their course. The county immediately replaced the dam by one of granite, it being now one of the most substantial ones in this part of the country" (Smith 1882). The granite dam, however, has never breached, has been continually inspected, and is in excellent condition. The probability of this particular flooding hazard occurring is quite small.

Overall, flooding potential in Strafford is high. Flood conditions will continue to affect the Town of Strafford. Both seasonal flooding and flooding due to extreme weather events have the potential to occur during all seasons.

Nor'easter (H)
Unlike the relatively infrequent hurricane, New Hampshire generally experiences at least 1 or 2 of these regional storms events each year with varying degrees of severity (NHOEM 2000). These storms have the potential to inflict more damage than many hurricanes, because the high storm surge and 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 nor'easters.

In the winter months, the State may experience the additional coincidence of blizzard conditions with many of these events. The added impact of the masses of snow and/or ice upon infrastructure often affects transportation and the delivery of goods and services for extended periods. Negative impacts upon the economy may also result.

The probability of Strafford experiencing at least one nor'easter in any given year is very high. Nor'easters surely do not occur every year but in most years. The Strafford Hazard Mitigation Committee could not locate any comprehensive databases that classify nor'easters as such. Data about many storms from multiple databases would have to be combined and reclassified to identify nor'easters specifically, and the time—and in some cases the expertise—were not available to calculate a specific average probability.

Severe Thunderstorms (H)

Thunderstorm related hazards that could impact the Town of Strafford include high winds and downburst, lightning, hail, and, torrential rainfall. Thunderstorms are common in New Hampshire but can be considered generally less severe than in other areas of the country, such as the Great Plains states. Severe thunderstorms do occur in New Hampshire, though. Thunderstorm data availability is scant and not at all comprehensive. The NCDC Storm Events database (NCDC 2004) lists 34 reports of severe thunderstorm winds in Strafford County from 1971 to 2004, more than 20 impacting county-wide (or regionally or state-wide) and one specifically impacting Strafford. Wind speeds of 50 knots (57 mph) or more were recorded. One weather front in July 1996 produced thunderstorms experienced statewide, with winds up to 134 mph. Mt. Washington, during the height of the storms, had a 3-hr. average wind speed of 120 mph and a gust to 154 mph. Some snowfall was even reported at the summit.

Besides the regular, storm-wide high winds in thunderstorms, individual downburst wind events can also issue from any thunderstorm. Organized databases of downburst information are not available, but the NH state mitigation plan (NHOEM 2000) highlights three different downbursts recorded in New Hampshire (none in Strafford Co.), one of them a microburst in Rockingham Co. that resulted in $ 2.5 million in damage, 11 injuries, and 5 deaths. Extreme damage is often done to structures and to electrical utility infrastructure. Aviation also has a history of severe impact from downburst.

Lightning can cause significant, sometimes severe, damage. Lightning strikes can cause direct damage to structures and serious injury or death to people and animals. Extensive damage also commonly results from secondary effects of lightning, such as electrical power surges, wildfire, and shockwave. Where lightning databases exist, most are proprietary or otherwise unavailable for use by the Hazard Mitigation Committee. The NH state plan (NHOEM 2000) does present a list of facts about lightning, one of which is that New Hampshire has the 16th highest lightning casualty rate among the states; Maine is 8th.

Finally, hail is fairly common part of thunderstorms in New Hampshire, but damaging hail is apparently not. The damage that can result is mostly to cars and windows. Other thunderstorm hazards are more threatening here. The NCDC Storm Events database lists 10 significant hailstorms over a 40-yr period. The data in those entries indicate hailstone size only up to 1 inch and accumulations of only a few inches or less. Hailstorm occurrence is probably considerably more common than would be indicted from these 10 records, but damage is probably not.

The annual recurrence probability of thunderstorms in general is effectively 100% with damaging ones occurring less often. Strafford will continue to experience thunderstorms and should expect to sustain significant damage periodically.

Ice & Snow Events (H)

Winter snow and ice events are common in New Hampshire. The NCDC Storm Events database (NCDC 2004) lists, among large winter weather events from 1993 to 2004, 33 Heavy Snow events, 2 Ice Storms, and 8 Winter Storms (nor'easters). On average, then, the expectation is for three to four large events per winter season. Heavy snows typically bring significant snow removal costs and costly delays in transportation schedules. Heavy, wet snows can also result in significant damage from high snow loads. The most severe damage, though, often comes from ice storms and winter nor'easters. The NCDC data indicate average annual recurrence probabilities of 18% and 73% respectively. Two events of those listed in the NCDC database are of particular note for their severity. The ice storm of January 7-9, 1998 had near statewide impact and resulted in a FEMA emergency declaration (#1199) for all but Rockingham Co. The nor'easter of December 7, 1996 was especially damaging to power systems and is described in the NCDC database as "the most extensive and costliest weather related power outage in the state's history," at least until 1996 when that database entry was made. The 1998 ice storm probably surpassed this storm in power systems impact. This storm is thought to have been of the same magnitude as the one that occurred in the region in 1929, indicating a return period of approximately 70 years (CRREL 1998). Strafford will continue regularly to receive impacts from severe, regional winter weather events. Due to its heavily forested nature, the Town is most highly exposed in terms of damage to forest resources and the secondary impacts of those damages.

Radon (H)

Radon exposure is a significant hazard in New Hampshire. According to a NH Bureau of Environmental & Occupational Health (BEOH) study looking at >15,000 indoor radon test results in single-family dwellings, households in northern, eastern, and southeastern regions of New Hampshire especially tend to have nominally high concentrations of radon in air or water (BEOH 2004); however, values in excess of the US Environmental Protection Agency's 4.0 picocurie per liter (pCi/L) action guideline have been found in nearly every community in New Hampshire. Values exceeding 100 pCi/L have been recorded in at least eight of New Hampshire's ten counties. The highest indoor radon reading in New Hampshire known to NHDES is greater than 1200 pCi/L; higher values probably exist. In the BEOH study, 44.0% of tests in Strafford Co. exceeded the 4.0 pCi/L action level and 13.0% even exceeded 12.0 pCi/L. Similarly, in the Town of Strafford between 20% and 30% of tests exceeded the 4.0 pCi/L action level. The probability of significant radon exposure is apparently quite high.

Hurricanes and Tropical Storms (M)

These severe tropical storms may occur anytime from early spring to late fall, and in general are less common than other storms, e.g. nor'easters. As wind events, historically hurricanes have caused damage in Strafford, most notably in 1938 and 1954. Quite a few other hurricanes have impacted the Town with high winds but relatively little damage. The Hazard Mitigation Committee notes that in 1993 a hurricane forced the evacuation of Camp Foss. The NOAA National Climatic Data Center's Storm Events database (NCDC 2004) indeed does not list any Hurricanes or tropical storms as directly affecting Strafford County. Other analyses show that Strafford has between a 5% and a 12% probability of being impacted by a named tropical storm sometime in any June to November storm season (AOML 2004). Because Strafford is considerably inland from the New Hampshire coast, wind speeds may be significantly diminished from their coastal strength, and significant impact on the Town would be dependent on the exact track of these concentrated storms.

Recurrence potential of hurricane and tropical storm hazards in Strafford is therefore moderate. Hurricanes and tropical storms will continue to affect the Town of Strafford. As many as 10 significant Hurricanes have impacted Strafford and the surrounding region and it is likely that that the region will be impacted by a significant storm of tropical origin within the foreseeable future.

Wildfire (M)

Strafford is a rural town, and much of the land cover of the Town is unfragmented woodland and grassland. Exposure to natural factors, such as lightning, that start wildfires is consequently high. "In 1826 a terrible fire burned over Parker's Mountain, and the fire frequently caught a half-mile from the burning mountain…the fire continued to burn about a month" (Smith 1882). Wildfires in New Hampshire historically have tended to run in 50-yr cycles (NHOEM 2000). The peak in wildfires in the late 1940's and early 1950's is thought to be related to the increased fuel load from trees downed in the 1938 hurricane. Here, 50 years later, New Hampshire officials are again concerned about the high fuel load created by the 1998 ice storm that hit New Hampshire. Strafford has experienced highly damaging and costly wildfires in the past and will undoubtedly experience them again. The probability of occurrence of wildfires in the future is effectively impossible for the Hazard Mitigation Committee to predict due to the dependence of wildfire on the occurrence of the causal hazards and the variability of numerous factors that affect the severity of a wildland fire. In general, though, the likelihood of wildfire seems moderate.

Earthquake/Landslide (M)

Earthquake is a common event in New Hampshire, but significantly damaging earthquake is uncommon. The Northeast States Emergency Consortium (NESEC) website presents a history of earthquake in the Northeast (NESEC 2004) and documents that New Hampshire is an area of high earthquake probability. Two hundred seventy (270) earthquakes occurred in New Hampshire from 1728 to 1989. Only four of significant magnitude (Richter Magnitude 4.2 or more), however, have occurred. Three of these quakes' epicenters were in the Lakes Region, and the fourth was on the NH-Quebec border. These data would suggest, then, that earthquakes are on average an annual occurrence but that significant quakes have an annual probability of occurrence (based on

the 1728-1989 period) of about 2%. USGS earthquake data (NSHMP 2004) puts all of Strafford Co. in an area with a 10% probability of exceeding in 50 years a peak ground acceleration (pga) of 5-6 %g. Furthermore, with similar probability the Lakes Region is in a 6-7 %g area. FEMA mitigation planning guidelines (FEMA 2001a) indicate that any community with a pga (%g) of 3% or greater (10%-50yr exceedance probability) should consider earthquake a potentially significant hazard and should profile this hazard.

Landslides would occur in Strafford in areas with steep slopes, where soils and loose bedrock formations would tend to slough off and move en masse downhill under gravity. Earthquakes could readily cause landslides, as could ground saturation from extended heavy precipitation events. Given seismic or precipitation events that could initiate landslide, landslide hazard is likely quite high in steep slope areas. In Strafford steep slopes are especially prevalent in the west and northwest of Town above Bow Lake, though they are present elsewhere. The Hazard Mitigation Committee did not have the expertise available to analyze the actual probability of landslide in Strafford. The USGS (1997) classifies landslide incidence regionally as very low (less than 1.5% of land area involved). The local probability in Strafford, however, will depend on specific soil/rock types and upon the probability of initiating events. The overall probability of landslide, then, is likely lower than that for the initiating events themselves.

Extended Power Failures (M)

When discussing extended power failure in this plan, it is referring to power failure that can last for a period of days or weeks. Many things can cause power failure: downed power lines (due to storm, wind, accident, etc); failure of public utilities to operate or failure of the national grid. Extended power failure can present not only lighting difficulties but also heating, water supply and emergency services. In Strafford, there have been extended power outages on occasion, the worst in recent years was the ice storm of 2008 where power was out for as long as 11 days in some places. There are back-up generators at the Town Office and Police Station that act as emergency housing facilities. The majority of residential homeowners in Strafford have purchased personal back-up generators in recent years.

Drought (M)

Periods of drought have occurred historically in New Hampshire. From the 1920's through the 1960's, four drought periods occurred: 1929-36, 1939-44, 1947-50, and 1960-69 (USGS 1998). These events have a return period of 10 to more than 25 years. The longest recorded continuous spell of less than normal precipitation occurred in 1960-69 interval. In more recent years, drought has again become a problem in New Hampshire. In 1999, a drought warning was issued by the Governor's Office. In March 2002, all counties in New Hampshire with the exception of Coos County were declared in Drought Emergency. This was the first time that low-water conditions had progressed beyond the Level Two, Drought Warning Stage. With extreme variation in environmental conditions due to global warming possibly on the rise, drought probability may grow in the future. Currently, drought possibility seems moderate. The large amount of water resources and relatively sparse population in New Hampshire have tended to minimize the impacts of drought events in the region, but this regional protection may be endangered in the future with increases in drought frequency or severity. The National Drought Mitigation Center

website (NDMC 2004) emphasizes that reliable drought prediction for regions above 30°N latitude is effectively impossible.

Tornadoes (L)

Tornadoes are rare in New Hampshire. The NCDC Storm Events database (NCDC 2004) lists only five tornadoes that have impacted Strafford County since 1950. One was an F1 event (73-112 mph) and the other four were F2 events (113-157 mph). These tornadoes also occurred one in each decade from the 1950's through the 1990's. The average annual probability of recurrence, therefore, is 10% (5/50 x 100). The probability would be slightly higher if local reports of tornadoes were considered; however, this 10% probability is for all of Strafford Co., not just Strafford. The actual probability for Strafford should be much lower, considering the great dependence of impact upon the actual track of any tornado. The Hazard Mitigation Committee identified two tornadoes that occurred in Strafford in recent decades, one in the 1970's and one in 1998. (See Table 2 above.) This admittedly minimal data nonetheless suggests a return period of about 25 years, i.e. an annual probability of occurrence of 4%. The tornado recurrence probability for Strafford, therefore, is relatively low.

Extreme Heat (L)

For this hazard, data specifically for Strafford—or even the State of New Hampshire, for that matter—is not available, at least in a form that is readily usable by other than climatology experts. Heat waves certainly have occurred regularly in the past, but the Hazard Mitigation Committee did not perform the very time-consuming task of compiling heat wave data from the typically daily temperature records to which one can normally gain access. Most compiled records seem to be proprietary with fee-based access. No records of deaths due to extreme heat were found for Strafford during the preparation of this plan. Anecdotally, the recurrence probability for extreme heat seems to be low. The region seems to experience none to several official heat waves each year, but these events are apparently mostly of minimal duration. The proximity of the region to the North Atlantic probably provides a significant moderating effect to such events. Given more time and expertise during plan updates in the future, the Hazard Mitigation Committee will attempt to address this hazard more carefully. The New Hampshire State Hazard Mitigation Plan (NHOEM 2000) indicates that the data and analysis for this hazard is being sought at the state level, as well.

Public Health Threats (L)

There is no active High School in Strafford; so many students attend Coe Brown Academy in Northwood. Because students are traveling for school, there is a threat of enabling infection and viruses to be transmitted from outside the town borders. There is also high attendance at Camp Foss and Beam Summer Camp with children coming from outside the Town. Because of these factors, an epidemic or pandemic could present a possible threat. Lastly, the Town's total population nearly doubles in the summer months due to summer rentals along Bow Lake. Because of the influx of residents from neighboring towns or even states, there is a threat of enabling infection and viruses to be transmitted. With the occurrence of worldwide pandemics such as SARS, H1N1 and Avian Flu, Strafford could be susceptible to an epidemic and subsequent quarantine.

Hazardous Material Threats (L)

Strafford does not have a major thoroughfare that is heavily traveled by vehicles carrying hazardous materials. There are small delivery trucks carrying materials to residents that use Routes 202A and Route 126, but speeds are often low and rarely are they carrying any hazardous substances. There is no freight train that runs through the Town and there have been no major reports of significant hazardous spills in the area. Although, this threat may not have a high probability in Strafford the Team decided to include it in this Plan as a potential hazard for the future.

C. Strafford Flood Insurance Program (NFIP) Status

Strafford has been a member of the National Flood Insurance Program (NFIP) since February 28, 1975. The Town does have significant portions of land in the 100-year floodplain; along the Big, Berry's, Isinglass, and Little River's. There are limited structures within this floodplain according to available GIS Flood Insurance Rate Map (FIRM) data and aerial imagery. Also, as reported in FEMA's Biennial Flood Report (last submitted on 5/11/2009), Strafford is listed as only having 19 structures in the floodplain and has had no repetitive loss claims[3].

As noted in the Special Flood Areas: "[4]*All subdivision proposals and proposals for other developments governed by these Regulations having lands identified as Special Flood Hazard Areas in the "Flood Insurance Study for the Town of Strafford, NH" together with the associated Flood Insurance Rate Maps and Flood Boundary and Floodway Maps of the Town of Strafford, dated February 28, 1975 (County of Strafford Map Revised May 17, 2005), or later revisions, shall meet the following requirements (amended 1-27-2005).*

A. *Subdivision proposals and proposals for other developments shall be located and designed to assure that all public utilities and facilities, such as sewer, gas, electrical and water systems are located and constructed to minimize or eliminate flood or eliminate flood damage and adequate drainage is provided to reduce exposure to flood hazards.*
B. *Subdivision proposals and other proposed new developments greater than 50 lots or 5 acres, whichever is less, shall include 100-year flood elevation data.*

Strafford has continued communication with FEMA to discuss NFIP compliance issues, especially with designated flood areas. In 2009, the New Hampshire Geological Survey conducted a fluvial erosion assessment on the Isinglass River, which originates in Strafford, to delineate potential hazard zones along the river. These zones were created and mapped for the Town of Strafford and have been used for planning purposes. In the future the Town will continue to look into revising their zoning ordinances that would improve floodplain management in the community.

D. Probability of Future Potential Disasters

Geographically, because Strafford is located in New Hampshire, it will always be highly susceptible to severe snow and ice storms. Further, because of the large forest area contained in Strafford, and by looking at the past hazard events, one can see that Strafford is also highly susceptible to forest fires, and should take appropriate precautions as such. Lastly, hurricanes, tornadoes, and flooding are less common in Strafford, however could reoccur in the future.

Table 3.1 provides more information on past and potential hazards in Strafford

[3] FEMA Biennial Flood Report; from February 2011 email, Jennifer Gilbert, NH Office of Energy & Planning
[4] Zoning and Land Use Ordinance. Town of Strafford, New Hampshire. 2007.

Table 3.1: Historic Hazard Identification

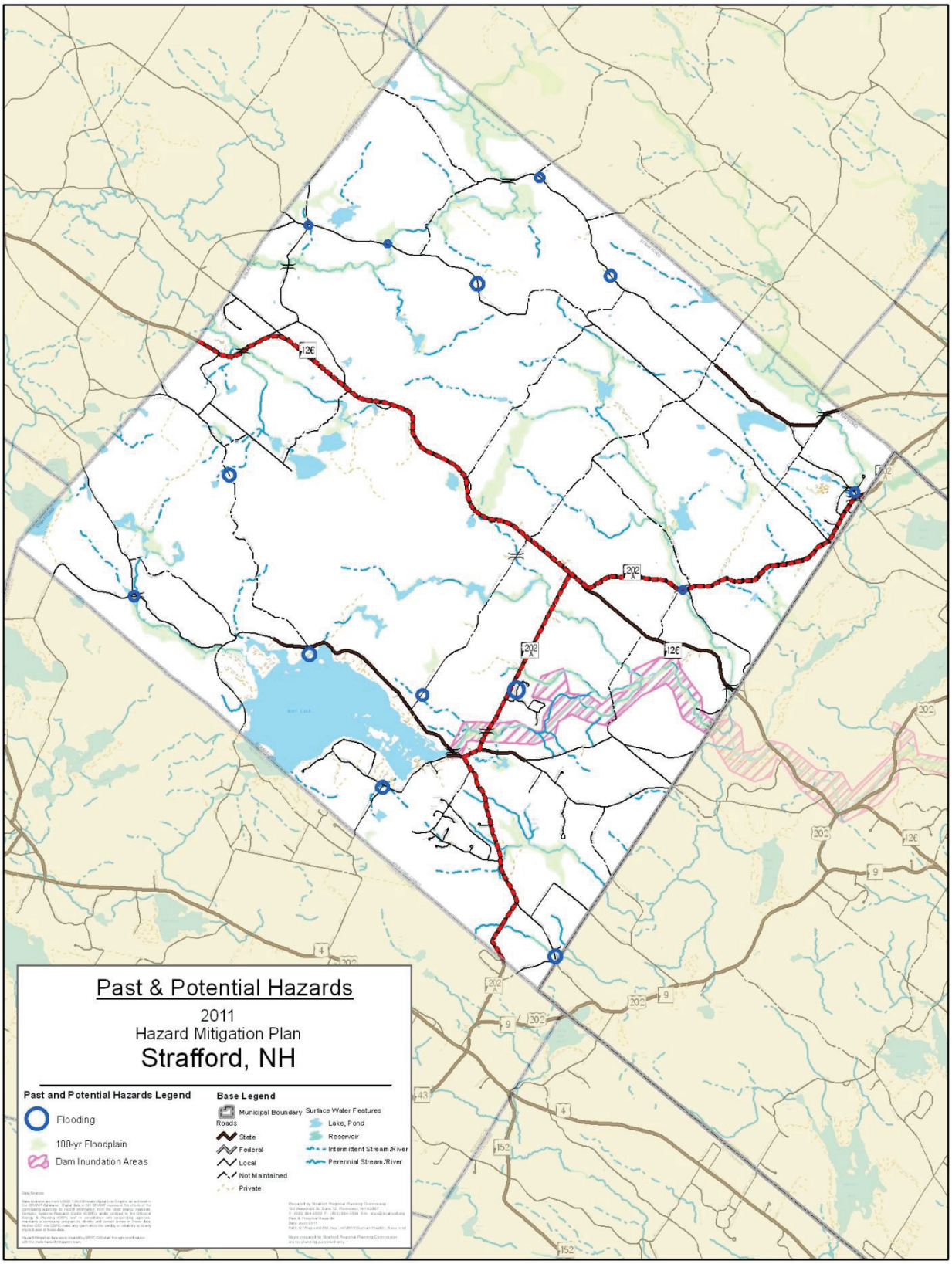
Blue = Past Events **Red = Recent & Potential Hazards**

Hazard	Date	Location	Remarks	Source
Past or Potential Flooding Hazards: Riverine flooding is the most common disaster event in the State of New Hampshire (aside from frequent inconveniences from rather predictable moderate winter storms). Significant riverine flooding impacts upon some areas in the State in less than ten year intervals. The entire State of New Hampshire has a high flood risk.				
Flooding	**March 1936**	**State-wide**	**Worst flooding in NH history. In Strafford roads were repaired due to flood damage (20 workers).**	**"Raging Rivers and the WPA" by William P. Fahey. New Hampshire Administrator, WPA. October 1936.**
Flooding	**October 1996**	**Grafton, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan Counties, NH.**	**Heavy rains.**	**FEMA Disaster Declaration # 1144,**
Flooding	**May 2006**	**Belknap, Carroll, Hillsborough, Merrimack, Rockingham, and Strafford Counties.**	**Numerous roads were closed or washed out. Limited access.**	**FEMA Disaster Declaration #1643** *(Individual Assistance)* **& Local Knowledge**
Flooding	**April 2007**	**Grafton, Hillsborough, Merrimack, Rockingham, and Strafford Counties.**	**A number or roads were closed. Water did not recede quickly due to the ground being frozen. Route 202A, which is a major road, was closed along with a number of bridges. Limited access in/out of the Town.**	**FEMA Disaster Declaration #1695** *(Individual and Public Assistance)* **& Local Knowledge**
Past or Potential Wildfire Hazards: New Hampshire is heavily forested and is therefore vulnerable to wildfire, particularly during periods of drought. The proximity of many populated areas to the state's forested lands exposes these areas their populations to the potential impact of Wildfire.				
Forest Fire	**1826**	**Parker Mountain Fire**		**Smith 1882**
Wild Fire	**Early 1900s**	**Northeast of Bow Lake**		**2005 Hazard Committee**
Forest Fire	**1940s**	**Near "Perkins"**		**2005 Hazard Committee**

Hazard	Date	Location	Remarks	Source
Forest Fire	1999	Next to Wild Goose Pond		2005 Hazard Committee
Clear-cut	1990s	North of Bow Lake	High fire hazard due to a dirty clear-cut that left behind a lot of fuel debris.	2005 Hazard Committee
Forest Fire	1990s	Beach Island Fire	Collateral damage to house.	2005 Hazard Committee
Clear-cut	1990s	Western edge of Town.	High fire hazard due to a dirty clear-cut that left behind a lot of fuel debris.	2005 Hazard Committee
Brush Fire	1990s	Watkins Gravel Pit		2005 Hazard Committee
Forest Fire	1990s	Roberts Road Fire	Started by garbage pile burn (Glidden's)	2005 Hazard Committee
Fire	1990s	Cross Road and First Crown Pt. Road		2005 Hazard Committee
Past or Potential Tornado, Downburst (Wind Shear) & Hurricane Hazards: Tornados are spawned by thunderstorms and, occasionally by hurricanes, and may occur singularly or in multiples. A downburst is a severe localized wind blasting down from a thunderstorm. Downburst activity is very prevalent throughout the State, yet most go unrecognized unless significant damage occurs. Hurricanes develop from tropical depressions, which form off the coast of Africa. New Hampshire's exposure to direct and indirect impacts from hurricanes is real, but modest, as compared to other states in New England.				
Tornado	1970s	Range Road	Destroyed barn	2005 Hazard Committee
Tornado	1998	Wingate Road "Snackity" area	Building and tree damage in various areas	2005 Hazard Committee
Hurricane	1993	Town-wide	Camp Foss was evacuated	2005 Hazard Committee
Wind Storm	February 2010	Grafton, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan Counties	Limited power outage.	FEMA Disaster Declaration #1892 *(Public Assistance)* & Local Knowledge

Hazard	Date	Location	Remarks	Source
Past and Potential Severe Winter Weather Hazards: Severe weather in New Hampshire may include heavy snowstorms, blizzards, Nor'easters, and ice storms. Generally speaking, New Hampshire will experience at least one of these hazards during any winter season. Most New Hampshire communities are well prepared for such hazards.				
Ice Storm	January 1998	NH – Statewide		FEMA Disaster Declaration # 1199
Snowstorm	March 1993	New England	Snow removal.	FEMA Emergency Declaration # 3101
Snowstorm	March 2001	Cheshire, Coos, Grafton, Hillsborough, Merrimack, Rockingham, and Strafford Counties, NH.		FEMA Emergency Declaration #3166.
Winter storm	March 2003	Cheshire, Hillsborough, Merrimack, Rockingham, and Strafford Counties, NH.		FEMA Emergency Declaration# 3177.
Ice Storm	December 2008	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan Counties.	Power was not completely restored for 11 days in some places. School closures 3-4 days. Several road closures. Tree trimming and cut backs after storm.	FEMA Disaster Declaration #1812 *(Public Assistance)* & Local Knowledge
Snowstorm	March 2005	Belknap, Carroll, Cheshire, Grafton, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan	Snow removal. School closures.	FEMA Emergency Declaration #3207
Snowstorm	December 2008	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan	Snow removal. School closures.	FEMA Emergency Declaration #3297

Map 1: Historic & Potential Hazards



Chapter IV: Critical Facilities & Key Resources (CF/KR)

With team discussion and brainstorming, Critical Facilities and Key Resources (CI/KR) within Strafford were identified and mapped for the multi-hazard plan. The "ID" number in the following list is also represented in the CI/KR map located in the Map Documents in the Appendix. Facilities located in adjacent towns were not mapped.

Emergency Response Facilities (ERF)				
ERF's are primary facilities and resources that may be needed during an emergency response				
ID	Facility Name	Type of Facility	Address	Phone
	Town Hall	Emergency Shelter (Back-up EOC)	12 Mountain View Rd.	603-664-2192
	Police Department	Emergency Operations Center	34 Roller Coaster Rd.	603-664-7462
	Bow Lake Fire Station	Fire Station	523 Province Road	603-664-6863
	Center Fire Station	Fire Station	1187 Parker Mountain Rd.	603-664-2915
	Crown Point Fire Station	Fire Station	475 First Crown Point Rd.	603-335-7283
	NH DOT, Division 6 Shed	Emergency Fuel [Diesel only]	Parker Mountain Rd.	
	Strafford School	Emergency Shelter	22 Roller Coaster Rd.	603-664-2842
	Third Baptist Church – Christian Ed. Building	Emergency Shelter	30 Strafford Rd.	603-664-7750
	National Guard Training Center	Emergency Shelter	Academy Ave.	603-664-9187
Evacuation Routes (EVAC)				
	Route 202A		All: Barrington town line to Northwood town line	
	Route 126 (Parker Mountain Road)		Center Strafford northwest to Barnstead town line	
Telephone Facilities				
	Union Telephone Co. [switching station]		13 Central St. [Farmington, NH]	
	Switching Station		Drakes Hill Road	
	Switching Station		Water Street	
	Switching Station		Bow Lake Rd./Province Rd.	
	Switching Station		Barrington Rd.	
	Switching Station		Quinton Rd.	
[5]Bridges				
	Bridge (State # 044/166)	Wingate Road *over* Big River		
	Bridge (State # 049/097)	NH126 *over* Little River		
	Bridge (State # 057/135)	Barn Door Gap Road *over* Big River		
	Bridge (State # 069/164)	First Crown Point *over* Brook	In process of being funded. Was on municipal redlist.	
	Bridge (State # 065/040)	Northwood – Bow Lake Road *over* Brook	Rebuilt. Was on municipal redlist.	
	Bridge (State # 102/057)	Province Road *over* Caswell Brook		
	Bridge (State # 125/090)	Huckins Road *over* Brook		
	Bridge (State # 139/096)	NH202A *over* Brook		

[5] Bridges are those listed in the NH Bureau of Bridge Design's *Bridge Summary* book (NHDOT 2003).

Emergency Response Facilities (ERF)				
	Bridge (State # 140/055)	Province Road *over* Isinglass River		
	Bridge (State # 145/063)	NH202A *over* Isinglass River		
	Bridge (State # 159/115)	NH202A *over* Mohawk River		
	Bridge (State # 159/167)	Crown Point Road *over* Berry's River		
	Bridge (State # 172/158)	First Crown Point *over* Berry's River		
	Bridge (State # 174/154)	NH202A *over* Berry's River		
	Bridge (State # 182/105)	NH126 *over* Mohawk River		

Non-Emergency Response Facilities (NERF)				
NERF's are facilities that although critical, not necessary for the immediate emergency response effort; hazardous material facilities also included				
Power Stations				
	Facility Name	Type of Facility	Address	Phone
	North Country Water Supply	Water Supply	102 Bow Lake Estates Rd	
	Strafford Transfer Recycling Center	Recycling Center	114 Ricky Nelson Rd.	

Facilities and Populations to Protect (FPP)				
FPP's are facilities that need to be protected because of their importance to the Town and to residents who may need help during a hazardous event				
Schools, Churches, and Daycare Facilities				
ID	Facility Name	Type of Facility	Address	Phone
	Strafford School	School	22 Roller Coaster Rd.	603-664-2842
	Third Baptist Church – Christian Ed. Building	Church	30 Strafford Rd.	603-664-7750
	Whitehouse Early Learning Center	Day Care Facility	PO Box 238	603-664-5025
Historic Facilities				
	Historical Society (Waldron's Store)	Historic	520 Province Rd.	
	Strafford Historical Society (Austin Hall)	Historic	11 Strafford Road	603-664-7334
	James Stiles – Bicentennial Farm	Historic	1309 Parker Mountain Rd.	
	Lester Huckins – Bicentennial Farm	Historic	22 Hillside Drive	
	Third Baptist Church	Historic	30 Strafford Rd.	603-664-7750
	Bow Lake Baptist Church	Historic	530 Province Rd.	
	Crown Point Baptist Church	Historic	274 First Crown Point Rd.	
	Bow Lake Grange Hall	Historic	569 Province Rd.	
	Crown Point Grange	Historic	First Crown Point Rd.	
Commercial/Economic Development				
	Great Crates	Economic Development	393 Province Road	603-664-6822
	Strafford Pallet LLC	Economic Development	1493 Parker Mountain Rd	603-664-2706
	AMI Graphics	Economic Development	223 Drake Hill Road	603-664-7174

Potential Resources (PR)				
PRs are potential resources that could be helpful for emergency response in case of a hazardous event				
Fuel/Food/Water/Retail/Lodging				
ID	Facility Name	Type of Facility	Address	Phone
	Bow Lake Inn	Lodging	6 Drake Hill Road	603-664-9908
	Isinglass Store	Fuel Station	410 Rollercoaster Rd.	603-664-5622
	Sheilah's Deli & Market	Food/Spirits	564 Province Road	603-664-5551
Airport/Helipad				
	National Guard Training Center	Helipad	Academy Ave.	603-664-9187
Equipment/Hazardous Waste Facilities				
	Strafford Transfer Recycling Center	Hazardous Material	114 Ricky Nelson Rd.	
Recreational Facilities [Indoor & Outdoor]				
	Ballfield/Gymnasium	Indoor/Outdoor	Behind Strafford School	NA
	Town Dock/Beach	Outdoor	Water Street	NA
	Camp Foss / YMCA Camp	Outdoor	Willy Pond Road	603-269-3800
	Boy Scout Camp/Parker	Outdoor	Willey Rd.	
	Crown Point Campground	Outdoor	44 1st Crown Point Road Rochester, NH	603-332-0405
	Bow Haven Campground	Outdoor	Robbins Way	
Dams				
	Bow Lake Dam	High Hazard Class	NA	NA
	Berrys River Dam	Significant Hazard Class	NA	NA
	Camp Foss Sewage Lagoon	Significant Hazard Class	NA	NA
	Big Willey Pond Dam	Low Hazard Class	NA	NA
	Wildlife Pond Dam	Low Hazard Class	NA	NA
	Pine Rock Farm Pond Dam	Low Hazard Class	NA	NA

Water Resources (WR)				
Auxiliary Fire Aid				
ID	Facility Name	Type of Facility	Address	Phone
	Dry Hydrant	Fire Aid	Drakes Hill Road	NA
	Dry Hydrant	Fire Aid	Water Street	NA
	Dry Hydrant	Fire Aid	Water Street	NA
	Dry Hydrant	Fire Aid	Browns Road	NA
	Dry Hydrant	Fire Aid	Province Road	NA
	Dry Hydrant	Fire Aid	Irvine Rd. / First Crown Point Rd.	NA
	Active Hydrant	Fire Aid	Tasker Road	NA
	Active Hydrant	Fire Aid	On island in Bow Lake	NA
	Active Hydrant	Fire Aid	On northwest edge of Bow Lake	NA
	Active Hydrant	Fire Aid	Mt. Misery Rd.	NA
	Fire Pond	Fire Aid	Piper Penderhill Rd.	NA
	Fire Pond	Fire Aid	Parker Mtn. Rd./ Old Upper Cross Rd.	NA
	River Access	Fire Aid	Wingate Rd.	NA

Chapter V. Multi-Hazard Effects in Strafford

A. Identifying Vulnerable Structures

It is important to identify the critical facilities and other structures that are most likely to be damaged by hazards. In Strafford, there were 15 CR/KR within the potential and past flood areas (PPFA) that were identified in the risk assessment for a potential loss value estimate of $1,525,100.00 at 100%.

Critical Facilities & Key Resources in PPFA	100 % of Structure Value
Bridges/Evacuation Routes	
1) Bridge – Province Road over Isinglass River	270,000.00
2) Bridge – NH202A over Isinglass River[6]	450,000.00
	720,000.00
Dams	
3) Bow Lake Dam	Could not be determined
Auxiliary Fire Aid	
4) Dry Hydrant – Water Street	0.00
5) Dry Hydrant – Water Street	0.00
6) Dry Hydrant [Active] – Residential island on Bow Lake.	0.00
7) Dry Hydrant [Active] – On northwest shore of Bow Lake.	0.00
8) Fire Pond – Piper Penderhill Road	0.00
9) River Access – Wingate road	0.00
Recreational Facilities [Indoor & Outdoor]	
10) Ball Field/Gymnasium – Behind Strafford School	318,500.00
11) Town Dock/Beach	Could not be determined
Historic Facilities	
12) Bow Lake Grange Hall	186,700.00
Telephone Facilities	
13) Telephone Switching Station	Could not be determined
Fuel/Food/Water/Retail/Lodging	
14) Isinglass Store [Fuel Station]	
Total	1,525,100.00
15) Evacuation Route – 202A over Isinglass River[7]	

[6] The approximate assessed value for the bridges was calculated by multiplying $1,000.00 per square foot of bridge. This estimate was provided by the Bridge Design Bureau at NHDOT and includes all cost (engineering, consulting and in-house design, construction, etc.) to build a new bridge.

[7] One of Strafford's Evacuation Routes is located just under the Bow Lake Dam on 202A. The estimated loss for 100% structure value could not be determined, but was agreed would be substantial.

B. Identifying Future Vulnerable Structures

The Town of Strafford has had moderate growth from 2005-2007 but saw decrease in new construction in 2008. In 2009 Strafford rebounded with an 83% increase from 2008. Over the last 6 years the residential market has dominated construction. Of the 87 newly constructed buildings since 2004, 97% have been residential, as 2004 was the slowest year for growth yielding only 4 new buildings. In 2005, Strafford saw a surge of new construction with 30 new residential homes. Growth has slowly tapered off since 2005, following the trend with nearly every community in the region.

New Buildings 2009							
	2004	2005	2006	2007	2008	2009	Total
Single Family Detached	4	29	19	11	3	10	76
Duplex	0	0	0	1	1	0	2
Multi-Family [Triplex]	0	0	0	0	0	1	1
Mobile Home	0	1	1	3	0	0	5
Commercial	0	0	0	1	2	0	3
Total	4	30	20	16	6	11	87

[Note: No building permit information has been collected for 2010 and 2011]

By looking at these past development trends the Town recognizes that it will continue to grow slowly in the coming years. As mentioned in earlier sections, the Planning Board and other Town officials have tried to steer any major commercial developments into existing crossroads, out of rural countryside, and away from potential flooding dangers. Very few, if any, of these past developments have been constructed in the 100-year floodplain (there were only 19 structures identified in the 100-year floodplain in the 2009 Biennial Report, none of which had any repetitive losses). While there are no major subdivisions in the near future, Strafford has a Special Flood Hazard Area for all subdivisions and proposals for other developments to reduce or eliminate flood damage.

The New Hampshire Geological Survey has provided the Town with maps of the Fluvial Erosion Assessment, which was completed in the summer of 2009. This data will be used as a planning tool when discussing plans for new residential developments, commercial infrastructure, and critical facilities.

The Town will also use this Plan as a guide to determine where past hazards have been documented and try to steer potential development away from these hazard areas.

C. Calculating the Potential Loss

Assessed Value of All Structures (only)			
	2009	1% damage	5% damage
Residential	235,597,300	2,355,973	11,779,865
Manufactured	4,655,700	46,557	232,785
Commercial	2,790,500	27,905	139,525
Tax Exempt	568,700	5,687	28,435
Total	243,612,200	2,436,122	12,180,610
Source: Department of Revenue Administration; 2009 Report			

It is difficult to ascertain the amount of damage that could be caused by a natural or man-made hazard because the damage will depend on the hazard's extent and severity, making each hazard event somewhat unique. Therefore, we have used the assumption that hazards that impact structures could result in damage to either 0-1% or 1-5% of Strafford's structures, depending on the nature of the hazard and whether or not the hazard is localized.

Based on this assumption, the potential loss from any of the identified hazards would range from **$0 to $2,436,122** or **$2,436,122 to $12,180,610** based on the 2009 Strafford town valuation, which lists the assessed value of all structures in Strafford to **be $243,612,200** (see chart above).

Human loss of life was not included in the potential loss estimates, but could be expected to occur, depending on the severity and type of the hazard.

The Hazards

Flood (Heavy Rains)…….……$0 to $2,436,122

Inland floods are most likely to occur in the spring due to the increase in rainfall and melting of snow; however floods can occur at any time of year. A sudden thaw in the winter or a major downpour in the summer can cause flooding because there is suddenly a large amount of water in one place with nowhere for it to go. Although Strafford has limited structures within the 100-year floodplain zone, it was discussed that there are areas in town that have experienced repeated flooding with significant damage.

Flood (Dam Breach)…….$2,436,122 to $12,180,610

All of the dams, except for the Bow Lake Dam, have a low or significant hazard classification, which means they have a relatively low hazard potential because of the size and location. Failure or misoperation of any number of these dams would result in a possible economic loss to structures and property but no probable loss of lives. The Team identified the Bow Lake Dam as their biggest concern. The Bow Lake Dam is classified as a high hazard dam and has a high hazard potential that would result in probable loss of human life due to water levels and velocity. Because the dam is classified as a high hazard dam it is inspected by the state on a yearly basis and all reports have been that the dam is in good working condition, yet the threat still remains.

Severe Winter Storms (Ice Storms & Nor'easters)……...…$0 to $2,436,122

Heavy snowstorms typically occur from December through April. New England usually experiences at least one or two heavy snowstorms with varying degrees of severity each year. Power outages, extreme cold and impacts to infrastructure are all effects of winter storms that have been felt in Strafford in the past. All of these impacts are a risk to the community, including isolation, especially of the elderly, and increased traffic accidents. Damage caused as a result of this type of hazard varies according to wind velocity, snow accumulation, duration and moisture content. Seasonal accumulation can also be as significant as an individual snowstorm.

Winter snow and ice storms often cause trees to fall creating widespread power outages by downing power lines. Road closures are also often a result of snow accumulations, ice storms and downed power lines, although Strafford's Road Agent is able to keep the Town's roads clear most of the time.

Heavy snow and ice storms can also cause widespread damage to forested areas. The December 2008 ice storm knocked out power for as many as 400,000 customers throughout the State (five times larger than those who lost power in the ice storm of 1998, which was previously the most devastating storm on record). Ice storms in Strafford could be expected to cause damage ranging from a few thousand dollars to several million, depending on the severity of the storm.

The Hazard Mitigation Committee may in the future be able to find some damage curve data, possibly generated from some modeling research, that would allow for at least some rough estimation of damage assuming a storm of a particular magnitude

Severe Thunderstorms & Lightning…….$0 to $2,436,122

Severe lightning as a result of summer storms or as a residual effect from hurricanes have occurred in Strafford. Due to the possibility of trees being toppled by lightning (Strafford has over 24,000 acres of forested land) onto power lines and creating sparks and the fact that many of the buildings in Strafford are considerably old, lightning is a significant disaster threat. Lightning could do damage to specific structures, injure or kill an individual but the direct damage would not be widespread.

Power outages and other utility interruptions are common in thunderstorms in the region, so losses in the hundreds of thousands of dollars should be expected to occur relatively frequently. Strafford will continue to experience significant thunderstorms, some of them severe. Although lightning is a potential problem, the Town reports few occurrences, none of which were severe. Based on this factor and the localized nature of lightning strikes, the potential loss value was determined.

Radon……..……Structure Loss Value Cannot Be Estimated

A naturally occurring radioactive gas with carcinogenic properties, radon is a common problem in many states. New Hampshire is one of them, specifically areas with shallow depth to granite bedrock. New Hampshire tends to have a particular problem with radon in drinking water, but airborne radon is also a significant hazard. There have been reports by the EPA that lung cancer deaths nationwide can be attributed to radon exposure, but nothing inclusive has been determined at this point. With assistance from epidemiological health experts, for future plan updates the Committee may be able to use the life-table or concentration risk analysis methodologies in the EPA study (EPA 2003) together with demographic and behavioral health data for Strafford to arrive at a reasonable estimate of risk from radon.

Hurricanes and Tropical Storms……...……..$2,436,122 to $12,180,610

The Town of Strafford will likely experience impact from a storm of tropical origin in the foreseeable future, but the level of losses would vary with the exact track of such a storm. Because Strafford is not a coastal town vulnerable to storm surge, the high winds from a storm would be the factor most likely to cause damage. The Hurricane of 1938, Hurricane Carol, and Hurricane Diane all caused some damage occurring to the utilities infrastructure in Strafford and severely damaged the woodland resources of the Town. These storms caused power outages, significant damage to residential structures from high winds, and heavy rain.

Although hurricanes could fit into several different categories (wind and flooding), the Team considered hurricanes to be separate events. Hurricanes are rare in New Hampshire, but they should not be ruled out as a potential hazard.

Wildfires……....$2,436,122 to $12,180,610

Wildfire is defined as an uncontrolled and rapidly spreading fire. They often occur during drought and when woody debris on the forest floor is readily available to fuel the fire. Strafford is heavily wooded, has experienced massive wildfire before—in large part due to high fuel load from the 1938 hurricane, and has the potential for major wildfire again due to the fuel load from the 1998 and 2008 ice storms. Also, the Committee identified several areas where dirty forest clear-cuts in the 1990's left large amounts of fuel on the ground.

In general, if a wildfire occurred in one of the large, unfragmented woodland areas, the cost of the timber loss would probably be in the range of several million dollars. If structures along the edges of the wildfire areas are involved—and there are a significant number of them, mostly residential—then the damages to those structures could also amount to several million dollars. The possibility of extensive wildfire is perhaps higher for the west central area of Town around Parker Mountain, because that area is far less accessible for fire fighting than other areas; however, it is also more sparsely settled, so damages might not be much different than in other areas.

Earthquakes/Landslide……..……..$0 to $2,436,122

An earthquake is a rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric and phone lines, and often cause landslides, flash floods, fires, and avalanches. There have been just two earthquakes that registered a 5.50 or higher on the Richter scale in New Hampshire's history. They took place just four days apart from each other in December 1940, near Ossipee Lake[8]. It is well documented that there are fault lines running throughout New Hampshire, but high magnitude earthquakes have not been frequent in New Hampshire history.

Landslide risk in Strafford is similarly low, if not lower. Approximately 14% of the land area of Strafford has slopes greater than 15%. Sufficient data was not available to determine what structures are in the steep slope areas, but the number is certainly quite small; except for a private residence located on First Crown Point Road, which is built on significant steep slopes and has a potential public safety factor. Landslide incidence is very low in the region in general, so the losses from a landslide incident would be minimal, even more so on an annualized risk basis.

Drought……..……$0 to $2,436,122

A drought is defined as a long period of abnormally low precipitation, especially one that adversely affects growing or living conditions. They generally are not as damaging and disruptive as floods and are more difficult to define. In Strafford specifically, drought apparently has not had significant impact. No records of losses in Strafford due to drought could be identified. On a statewide total basis, losses may be significant and even increasing; however, the effects seem to have been localized. Drought effects in New Hampshire have tended to be moderated by the state's relatively large water supply and by its relatively sparse population; therefore, risk from drought, for now, seems low, even with a moderate probability of drought recurrence. The cost of drought is difficult to calculate, as any cost would primarily result from an associated fire risk and diminished water supply.

Tornados……....$2,436,122 to $12,180,610

Tornadoes are relatively uncommon natural hazards in New Hampshire; on average, about six touch down each year. Damage largely depends on where the tornado strikes. If it were to strike an inhabited area, the impact could be severe. In the State of New Hampshire, the total cost of tornadoes between 1950 and 1995 was $9,071,389[9]. Because the recurrence probability is low; the probability that any highly valuable asset in particular would be hit is low; and the general magnitude of a tornado in Strafford would likely be F2 or less, damages would be expected to be relatively low, with several assets of significant value impacted.

[8] USGS: Earthquakes; http://earthquake.usgs.gov/earthquakes/states/events/1940_12_20.php
[9] The Disaster Center (NH); http://www.disastercenter.com/newhamp/tornado.html

Extreme Temperatures……..……..$0 to $2,436,122

In New England, temperature extremes are quite common. Winter temperatures can fall well below freezing and summer temperatures, laden with high humidity can soar to nearly 100°F. In the past, there was more concern about extreme cold temperatures, but with improved heating systems and local communications, most New Hampshire residents are able to cope with extreme cold. Extreme cold temperatures that can last for extended periods of time have had an adverse effect on some residential housing due to the age of the building and the inability to retain heat. Also, during extreme heat conditions, both town officials and the community as a whole should be concerned and should look after its citizens to ensure that extreme temperatures do not create a life or property threatening disaster.

No records of extreme heat-related losses in Strafford were found during preparation of this plan. Extreme heat hazard is in general a particular problem in cities and for older people. Neither condition applies to Strafford. Losses would stem mostly from impacts to life safety—illness or death due to heatstroke and other heat-induced effects.

Given the apparent low recurrence potential for severe extreme heat events and the small exposure of older population in Strafford, the Hazard Mitigation Committee feels, in general, that the expected risk from this hazard should be low.

Public Health Threat……..……..$0 to $2,436,122

Strafford's unique geography provides its citizens and tourists alike the opportunity for summer and winter recreation activities, which often brings outdoor enthusiasts into the Town. Because of the influx of residents from neighboring towns or even states, there is a threat of enabling infection and viruses to be transmitted from outside the town borders. Because of these factors, an epidemic or pandemic could present a possible threat to Strafford. With the occurrence of worldwide pandemics such as SARS, H1N1 and Avian Flu, Strafford could be susceptible to an epidemic and subsequent quarantine.

Hazardous Material Threat……..……..….$0 to $2,436,122

The possibility of vehicular accidents involving hazardous materials is identified as a mild threat in Strafford. Routes 202A and 126 are both heavily traveled, but usually only small delivery vehicles carrying materials to residents and rarely are they carrying harmful substances. There have been no major reports of a hazardous spill, yet the Team decided to include the potential threat for future planning purposes.

Extended Power Outages……..……...$0 to $2,436,122

Extended power outages have occurred in Strafford, both as a result of local line damage from high winds and severe storms. If a major and/or extended power outage occurs and lasts for more than a week, a significant hardship on individual residents could result, particularly those citizens who are elderly or handicapped.

Chapter VI: Multi-Hazard Goals and Existing Mitigation Strategies

A. Multi-Hazard Mitigation Goals

Before identifying new mitigation actions to be implemented, the Team reviewed and adopted the following multi-hazard goals. These goals were based on the State of New Hampshire Natural Hazards Mitigation Plan that was prepared and is maintained by HSEM.

- *To improve upon the protection of the general population, the citizens of Strafford and visitors, from all natural and man-made hazards.*
- *Protect especially vulnerable populations, e.g. the very young and the elderly from particularly extreme hazards, e.g. extreme heat or cold.*
- *To improve communication between all emergency response personnel, including contacts of shelters and private citizens who contain skills that would be useful in emergency situations.*
- *To increase public awareness on important information during natural hazard events, such as evacuation routes, location of shelters, etc.*
- *To provide adequate shelters for Town residents containing the proper equipment.*
- *To increase the Fire and Police stations readiness by providing alternative methods for them to have amore timely reaction during a natural hazard event.*
- *To provide accessible roads for emergency personnel response and evacuation of residents/.*

B. Mitigation Strategies Currently Underway in Strafford

The Hazard Mitigation Committee established an initial list of mitigation actions by conducting a brainstorming session. The Committee reviewed these objectives and concluded that, with some modification, the objectives would constitute a usable framework for identifying and categorizing potential mitigation actions.

Gaps in the existing mitigation measures are related to public education, coordination of emergency operations, emergency fuel availability, and backup power. The Town of Strafford should have a website, so that materials on fire prevention and what to do in case of emergencies is conveniently available to the public. Coordination between emergency agencies, such as the National Guard, Strafford School, Fire Station, and Police Station should be improved.

Also, the Town only has one small source of emergency fuel. This emergency fuel station is in fact the only place in Town to get fuel, so the committee may want to find an alternative solution for this problem. Lastly, the essential facilities and potential shelters have inadequate or no backup power generation.

Summary of Recommended Improvements

The Strafford Multi-Hazard Mitigation Committee recommends the following improvements to existing programs:

1) **Strafford Town Website**. The Town should have a website, so that material on fire prevention and what to do in case of emergencies is conveniently available to the public.

2011 Update: Completed. The Town now has a website and the Police Department is currently upgrading their website to hold the new EMD page.

2) **Coordination Between Emergency Agencies**. Coordination between National Guard, Strafford School, Fire Station, and Police Station should be improved.

2011 Update: Completed. The coordination between emergency agencies has greatly improved over the last few years. The Town of Strafford and their emergency agencies work closely and have developed a good relationship with the National Guard. The Strafford School is currently hiring new administration and there may be a need to increase facilitation with new management.

3) **Emergency Fuel**. The Town only has one small source of emergency fuel. The committee may want to find an alternative solution for this problem.

2011 Update: Completed. The Town has invested in an alternative emergency fuel source ¾ of mile down on Roller Coaster Road. The Road Agent has both diesel/gas fuels. Fuel cards were also purchased for IRVING gas use. There was also discussion that there were a number of private sources within the Town. It was suggested that the Committee develop a list of residential property owners that have emergency fuel and are willing to work with the Town in an emergency situation. It was discussed that the Strafford Community Calendar would be a good resource to reach out to residents.

4) **Back-up Power**. Essential facilities and potential shelters have inadequate or no back-up power generator.

2011 Update: Completed/Continuing. There is now back-up power at both the Police Department and the Town Hall, both of which are used as emergency shelters. Currently, the Town is looking for a generator to be installed at the Strafford School. Conversations with other town officials have been taking place and there is reason to believe there will be progress in purchasing another generator for the School in the future.

Existing Protection Matrix

The Strafford Hazard Mitigation Planning Committee has developed the summary matrix of existing hazard mitigation strategies presented on the following pages. This matrix, a summary of the preceding information, includes the type of existing protection (Column 1), a description of the existing protection (Column 2), the area of town affected (Column 3), the effectiveness and or enforcement of the strategy (Column 4), the identified improvements or changes needed (Column 5), and the 2011 Update (Column 6).

Table 6.1: Existing Mitigation Strategies Matrix and Proposed Improvements

Existing Program/Activity	Description	Type of Hazard	Type of Activity	Area of Town Covered	Effectiveness/ Enforcement	2011 update
Prohibit or restrict subdivision of land considered unsafe for development	Unsafe means land subject to flooding, erosive action, unstable slope or fill, or unhealthful.	Flooding; Multi-Hazard	Prevention	Town-wide	Planning Board (Subdivision Regulations)	Strafford last updated their subdivision regulations in 2011. The Town will continue to monitor these existing programs and make any necessary changes as needed.
Restrict subdivision of land considered unsuitable.	Unsuitable means high water table, bedrock, or other impervious strata is close to the surface or excessive slope.	Multi-Hazard	Prevention	Town-wide	Planning Board (Subdivision Regulations)	Strafford last updated their subdivision regulations in 2011. The Town will continue to monitor these existing programs and make any necessary changes as needed.
No filling or dredging in wetlands.	Normally will not permit the filling or dredging of ponds, streams, and wetlands.	Multi-Hazard	Prevention	Town-wide	Planning Board (Subdivision Regulations)	Strafford last updated their subdivision regulations in 2011. The Town will continue to monitor these existing programs and make any necessary changes as needed.
Grading and drainage provision.	Excessive grading destruction of natural cover is not permitted.	Multi-Hazard	Prevention	Town-wide	Planning Board (Subdivision Regulations)	Strafford last updated their subdivision regulations in 2011. The Town will continue to monitor these existing programs and make any necessary changes as needed.
Dead-end streets drainage.	Must have a landscaped and drained center island.	Multi-Hazard	Prevention	Town-wide	Planning Board (Subdivision Regulations)	Strafford last updated their subdivision regulations in 2011. The Town will continue to monitor these existing programs and make any necessary changes as needed.

Existing Program/Activity	Description	Type of Hazard	Type of Activity	Area of Town Covered	Effectiveness/ Enforcement	2011 update
Fire Protection	Subdivisions with frontage on bodies of water must provide access at suitable intervals for fire fighting equipment.	Fire	Emergency Preparedness	Town-wide	Planning Board (Subdivision Regulations)	There is still a need for road improvements for fire and safety on Beaver Way & Whig Hill. They are both one-way in/out streets and will remain problematic for emergency personnel access and evacuation for residents. A similar problem exists on Kooaukee Bridge, as it is the only way to get in and out of the island.
Street Drainage	Streets must have adequate drainage facilities. Construction must comply with Standard Specifications for Road and Bridge Construction and NHDOT.	Flooding	Prevention	Town-wide	Planning Board (Subdivision Regulations)	Strafford last updated their subdivision regulations in 2011. The Town will continue to monitor these existing programs and make any necessary changes as needed.
Special Flood Hazard Areas	Subdivision proposals having lands identified as Special Flood Hazard Areas must meet special requirements.	Flooding	Planning	Town-wide	Planning Board (Subdivision Regulations)	Strafford last updated their subdivision regulations in 2011. The Town will continue will continue to adopt and revise as needed for best flood hazard management.
Foundations	All structures must be set on solid foundations of cement, brick, stone, or other acceptable masonry.	Multi-Hazard	Prevention	Town-wide	Building Code Inspector (Building Regulations)	The Town will continue to monitor these existing programs and make any necessary changes as needed.

Existing Program/Activity	Description	Type of Hazard	Type of Activity	Area of Town Covered	Effectiveness/ Enforcement	2011 update
Chimney Construction	Chimney regulations such as dimension and material requirements.	Fire	Prevention	Town-wide	Building Code Inspector (Building Regulations)	The Town will continue to monitor these existing programs and make any necessary changes as needed.
Floodplain Development Regulations	Must have required permits and inspections.	Flooding	Planning	Town-wide	Building Code Inspector (Building Regulations)	The Town will continue to adopt and revise as needed.
100-Year Flood Elevation Determination	Special requirements for subdivisions determined as this.	Flooding	Planning	Areas within the 100-year floodplain	Building Code Inspector (Building Regulations)	The Town will continue to adopt and revise as needed.
Fire or other ruins cannot be left on property	RSA 155-B	Fire	Prevention	Town-wide	Zoning Ordinance	Strafford last updated their zoning ordinances in 2011. The Town will continue to monitor these existing programs and make any necessary changes as needed.
Mobile Home Foundation Requirement	Must have concrete slab at least equal in size of mobile home. Also, enclosed or skirted from base to concrete.	Multi-Hazard	Prevention	Town-wide	Zoning Ordinance	Strafford last updated their zoning ordinances in 2011. The Town will continue to monitor these existing programs and make any necessary changes as needed.
Burn Permits	State Regulations	Fire	Prevention	Town-wide	Chief Ranger of Concord appoints Fire Warden	Will continue to work with the State when needed.

Existing Program/Activity	Description	Type of Hazard	Type of Activity	Area of Town Covered	Effectiveness/ Enforcement	2011 update
Fire Pit Inspections	State Regulations	Fire	Prevention	Town-wide	Chief Ranger of Concord appoints Fire Warden	Will continue to work with the State when needed.
Fire Tower	A look out for fires.	Fire	Emergency Preparedness	Strafford/ Farmington Border	NH Department of Resources and Economic Develoment (DRED)	Structure work was completed on the tower. There is also now a new parking lot that leads to one of the Towns recreational trails. The Committee agreed these improvements have helped with public education and outreach.
Mutual Aids	Dispatch out of Laconia	Multi-Hazard	Emergency Preparedness	Agreements with Lakes Region and other Towns	Fire Department	System is in place and will continue to operate.
“Bad weather” 24-hour manning of fire station	Someone at the fire station during “bad weather” for emergency purposes.	Multi-Hazard	Emergency Preparedness	Town-wide	Fire Chief and Captains	Back-up portable generators have been purchased for each of the fire stations. There is also a generator at the National Guard Training Center.
Winter Storm Plowing	Plowing of roads, parking lots, etc.	Winter Storm Events	Emergency Preparedness	Town-wide	Road Agent	Transfer Station still needs place to put snow from time to time. The Town has an option to use space at the Sand-Shed, but has only been utilized once or twice in major storms.
Winter Storm parking ban.	State Regulations.	Multi-Hazard	Prevention	Town-wide	Road Agent	Will continue to work with the State when needed.

Existing Program/Activity	Description	Type of Hazard	Type of Activity	Area of Town Covered	Effectiveness/ Enforcement	2011 update
Agreement with Red Cross	Use of Town Buildings.	Multi-Hazard	Emergency Preparedness	Town-wide	EMD	The Town Hall and the Police Department have become the central buildings the Red Cross would use in an emergency situation. Both have emergency shelter capabilities and back-up generators.
Emergency Management Plan	Emergency Operations Plan, Evacuation Procedures, Acute illness or Injury Plan, Fire Aid and Emergency Care, Crisis Intervention Plan, Weather Emergency Procedures, Bomb Threat Procedures.	Multi-Hazard	Emergency Preparedness	Strafford School	Superintendent of Schools, Principle, and other school and emergency personnel.	The Emergency Management Plan was completed in 2008. It was developed by a Committee and then adopted by the Board of Selectmen. It is due for an update in 2012.
Strafford School District: Emergency Procedures, Quick Reference Guide	Accidents, bomb threat, breech of security, earthquakes, electrical outage, evacuation/relocation, fire, hazardous material release, and tornado.	Multi-Hazard	Emergency Preparedness	Strafford School	Strafford School Personnel and Police, Fire, and Ambulance	Continues to operate as needed. The School has practiced evacuation drills and experienced a live event in the spring of 2011, due to a chemical spill. Emergency procedures are monitored and will continue to be practiced in the future.

Note: The Town of Strafford has recently received a grant from the Piscataqua Region Estuaries Partnership (PREP) in order to help with storm water regulations. They held their first meeting in March, 2011.

Chapter VII: Prior Mitigation Plan(s)

A. Date(s) of Prior Plan(s)

Strafford participated in a prior mitigation plan that was developed by the Strafford Hazard Mitigation Planning Committee and adopted by the Board of Selectmen in 2004. This Plan, the "Multi-Hazard Mitigation Plan, Strafford, NH" is an updated version.

All Committee members agreed that the ranking of the actions as presented below was valid as far as it went; however, they felt that this scoring scheme does not consider the practicality, relative cost, immediacy of need, or potential mitigation gain associated with each of the actions very well.

Table 7.1: Accomplishments since Prior Plan(s) Approval

Rank	Proposed Mitigation Action	Update 2011
1	National Guard Training Center should have an on-site telephone number available for other emergency personnel, and have someone at the Nat. Guard Training Ctr. act as a "contact" for other emergency personnel.	Completed. The National Guard Training Center does have an on-site telephone number available but it is an outside line; it is not a local number. George Spaulding is currently the acting contact at the Training Center.
2	Open up Whig Hill for emergency personnel access and evacuation for residents.	This has not been completed and remains problematic for the Town. There has been public pushback and the Committee agreed it would remain a discussion item for the future.
3	Have alternative way to get in and out of island (only way currently is Kooauke Bridge).	This has not been completed. The Town has explored options, but constructing another bridge to the island would be much too expensive.
4	Purchase and install back-up generator in Strafford School.	This has not been completed, but the Town has plans to apply for grant funding for upgrades and equipment purchasing.
5	Purchase and install back-up generator in Strafford Fire Station.	Portable generators have been purchased for each of the fire stations with one extra.
6	Locate and construct an emergency fuel station.	Completed. There is now an emergency fuel station located on Roller Coaster Road, ¾ of a mile past the Police Department.
7	Establish Town Website to contain emergency information.	Completed. The Police Department website is currently being reworked to include a new EMD page that will contain all emergency information.
8	Create pamphlet series with emergency information to distribute to residents.	Completed. Emergency information and NFIP brochures are available at Town Offices.
9	Create evacuation plans so first responders know how and where to direct traffic.	Completed. First responders received direct training and this process will continue in the future.

Rank	Proposed Mitigation Action	Update 2011
10	Develop list of local people who could assist in disasters by operating their own or Town's equipment.	This has not been completed. Instead a list of emergency personnel was created. Strafford developed a list of doctors, nurses, and other medical staff who would be available in an emergency situation.
11	Create library documents that can be referenced at the Town Hall.	Completed. All Hazard Mitigation documents were put together and made available at both the library and Town Hall.
12	Encourage residents to get to know their neighbors and check in on each other in an emergency situation.	Completed and will be a continuous strategy to explore in the future. Currently, there are subdivision neighborhood associations that have evolved; Beaver Dam Association, Whig Hill, and Bow Lake Estates all actively participate.
13	Fix/Replace dry hydrants so that they are active hydrants and can be used for fighting fires.	Completed/In process. The previously inactive dry hydrant on Water Street has been replaced. And there are plans to continue to fix/replace other inactive and damaged dry hydrants throughout the Town.

Chapter VIII: New Mitigation Strategies & STAPLEE

A. Feasibility and Prioritization

Table 8.1 reflects the newly identified potential multi-hazard mitigation strategies as well as the results of the STAPLEE Evaluation as explained below. It should also be noted that although some areas are identified as "Multi-Hazard", many of these potential mitigation strategies overlap.

The goal of each proposed mitigation strategy is reduction or prevention of damage from a multi-hazard event. To determine their effectiveness in accomplishing this goal, a set of criteria was applied to each proposed strategy that was developed by the FEMA. The STAPLEE method analyzes the **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic and **E**nvironmental aspects of a project and is commonly used by public administration officials and planners for making planning decisions. The following questions were asked about the proposed mitigation strategies discussed in Table 8.1.

Social: ..... Is the proposed strategy socially acceptable to the community? Is there an equity issue involved that would result in one segment of the community being treated unfairly?

Technical: ..... Will the proposed strategy work? Will it create more problems than it solves?

Administrative: ..... Can the community implement the strategy? Is there someone to coordinate and lead the effort?

Political: ..... Is the strategy politically acceptable? Is there public support both to implement and to maintain the project?

Legal: ..... Is the community authorized to implement the proposed strategy? Is there a clear legal basis or precedent for this activity?

Economic: ..... What are the costs and benefits of this strategy? Does the cost seem reasonable for the size of the problem and the likely benefits?

Environmental: ..... How will the strategy impact the environment? Will it need environmental regulatory approvals?

Each proposed mitigation strategy was then evaluated and assigned a score based on the above criteria. Each of the STAPLEE categories were discussed and were awarded the following scores: Good = 3; Average = 2; Poor = 1. An evaluation chart with total scores for each new strategy is shown in Table 8.1.

The ranking of strategies with the scores displayed in the following pages was merely a guideline for further prioritizing. The team then prioritized the strategies and prepared the action plan using additional criteria:

- Does the action reduce damage?
- Does the action contribute to community objectives?
- Does the action meet existing regulations?
- Does the action protect historic structures?
- Can the action be implemented quickly?

The prioritization exercise helped the committee seriously evaluate the new hazard mitigation strategies that they had brainstormed throughout the multi-hazard mitigation planning process. While all actions would help improve the Town's multi-hazard and responsiveness capability, funding availability will be a driving factor in determining what and when new mitigation strategies are implemented.

B. The Team's Understanding of Multi-Hazard Mitigation Strategies

The Team determined that any strategy designed to reduce personal injury or damage to property that could be done prior to an actual disaster would be listed as a potential mitigation strategy. This decision was made even though not all projects listed in Tables 8.1 and 9.1 (Implementation Plan) are fundable under FEMA pre-mitigation guidelines. The Team determined that this Plan was in large part a management document designed to assist the Board of Selectmen and other town officials in all aspects of managing and tracking potential emergency planning strategies. For instance, the team was aware that some of these strategies are more properly identified as readiness issues. The Team did not want to "lose" any of the ideas discussed during these planning sessions and thought this method was the best way to achieve that objective.

Table 8.1: Potential Mitigation Strategies & STAPLEE

New Mitigation Project	Type of Hazard	Affected Location	Type of Activity	S	T	A	P	L	E	E	Total
(1) Obtain NFIP brochures from FEMA and have them available at the Town Offices for new developers and current homeowners.	Flood	Town-wide	Education & Awareness	3	3	3	3	3	3	3	21
(2) Purchase and install a generator to power the Strafford School.	Multi-Hazard	Strafford School	Emergency Preparedness	3	3	3	3	3	2	3	20
									Budget Constraints		
(3) Maintain transportation infrastructure by identifying and assessing potential areas of concern in order to have a better assessment during emergency and evacuation situations.	Multi-Hazard	Town-wide	Prevention	3	3	3	2	3	2	3	19
							Change is difficult		Budget Constraints		
(4) Set aside funds in order to purchase equipment cots, pillows, blankets, etc. for both emergency shelters.	Multi-Hazard	Emergency Shelters	Emergency Preparedness	3	3	3	3	3	2	3	20
									Budget Constraints		
(5) Purchase a small generator and equipment for fuel pumps.	Multi-Hazard	Town Fuel Depot	Emergency Preparedness	3	3	3	3	3	3	3	21

New Mitigation Project	Type of Hazard	Affected Location	Type of Activity	S	T	A	P	L	E	E	Total
(6) Develop a list of residents who have an emergency back-up fuel supply (tanks) that would become available to the Town for use of emergency vehicles in an emergency situation. Also, develop a list of residents who own and can operate emergency equipment that would become available to the Town in an emergency situation.	Multi-Hazard	Town-wide	Emergency Preparedness & Prevention	2 Some community members may not want to participate	3	2 Relying on volunteers	3	3	3	3	19
(7) Locate all the underground storage tanks (both oil/gas) in the Town.	Multi-Hazard	Town-wide	Prevention	2 Residents might not want this information public	3	2 Relying on volunteers	3	3	3	3	19
(9) Make all documents relating to the Hazard Mitigation Update available at the Town Library and Town Hall.	Multi-Hazard	Library & Town Hall	Education & Awareness	3	3	3	3	3	3	3	21

New Mitigation Project	Type of Hazard	Affected Location	Type of Activity	S	T	A	P	L	E	E	Total
(10) Continue to provide outreach assistance to elderly and special needs populations by organizing staff and coordinating within Town departments. Look into options such as "Meals on Wheels" for residents staying home.	Multi-Hazard	Town-wide	Education & Awareness	3	3	3	3	3	3	3	21
(11) Brainstorm and implement new ideas to address the Fire/EMS safety access challenges to the residents that live in the Bow Lake Estates. Address winter access roads and reach out to local camps to help maintain those roads.	Multi-Hazard	Bow Lake Estates & Town-wide	Emergency Preparedness	3	3	2 Relying on volunteers	3	3	1	3	18

*Red Cross visited the Town of Strafford in August 2011 to survey their Town facilities and offered a few action items of their own to be added to the Plan.

- An Automated External Defibrillator (AED) installed at the Town Hall.
- A provision for pets during an emergency (either finding a volunteer to take pets, or making a non-carpeted space with an outside door available at the Strafford School).
- Laundry and shower facilities installed at the Strafford School.

It was agreed that these action items would be looked at by the Committee and the Town in the future.

Chapter IX: Implementation Schedule for Prioritized Strategies

After reviewing the finalized STAPLEE numerical ratings, the Team prepared to develop the Implementation Plan (Table 9.1). To do this, team members created four categories into which they would place all the potential mitigation strategies.

- **Category 0** was to include those items, which were "continuous", that is those that are being done and will continue to be done in the future.

- **Category 1** was to include those items under the direct control of town officials, within the financial capability of the Town using only town funding, those already being done or planned, and those that could generally be completed within one year.

- **Category 2** was to include those items that the Town did not have sole authority to act upon, those for which funding might be beyond the Town's capability, and those that would generally take between 13—24 months.

- **Category 3** was to include those items that would take a major funding effort, those that the Town had little control over the final decision, and those that would take in excess of 24 months to complete.

Each potential mitigation strategy was placed in one of the three categories and then those strategies were prioritized within each category.

Once this was completed, the Team developed an implementation plan that outlined who is responsible for implementing each strategy, as well as when and how the actions will be implemented. The following questions were asked in order to develop an implementation schedule for the identified priority mitigation strategies.

WHO? Who will lead the implementation efforts? Who will put together funding requests and applications?

WHEN? When will these actions be implemented, and in what order?

HOW? How will the community fund these projects? How will the community implement these projects? What resources will be needed to implement these projects?

In addition to the prioritized mitigation projects, Table 9.1, Implementation Plan, includes the responsible party (WHO), how the project will be supported (HOW), and what the timeframe is for implementation of the project (WHEN).

Table 9.1: Implementation Plan

Rank	New Mitigation Project	Responsibility and/or Oversight	Funding and/or Support	Cost Effectiveness Low Cost = < $1,000 Medium Cost = $1,000 - $5,000 High Cost = > $5,000	Timeframe	STAPLEE Score (21 being the highest)
0 - 1	Obtain NFIP brochures from FEMA and have them available at the Town Offices for new developers and current homeowners.	EMD	No Charge	NFIP brochures are free and would not cost the Town anything. Residents and homeowners would highly benefit from the information provided.	FY2012	21
1 - 1	Set aside funds in order to purchase equipment cots, pillows, blankets, etc. for both emergency shelters.	EMD	Local & Grants	Town would pursue grants and private donations for these items, and apply for funding from the Fire Auxiliary. This would be a lost cost of less than $1,000.	FY2012	20
1 - 2	Purchase a small generator and equipment for fuel pumps.	EMD	Grants	Seek grant funding (EMPG) so no additional cost for taxpayers.	FY2012	21
1 - 3	Make all documents relating to the Hazard Mitigation Update available at the Town Library and Town Hall.	EMD	No Charge	Having these documents made readily available would increase public education and coincide with other outreach strategies at little to no cost, less than $1,000.	FY2012	21
2 -1	Purchase and install a generator to power the Strafford School.	EMD & Strafford School	Grants	Grant funded to reduce costs for the Town to no cost or requiring only matching funds from the taxpayers. Low cost of less than $1,000.	FY2012-2013	20
2 - 2	Maintain transportation infrastructure by identifying and assessing potential areas of concern in order to have a better assessment during emergency and evacuation situations.	EMD & Selectmen	Local & Grants	Transportation infrastructure will be identified with the coordination of this plan. Depending on the size of construction projects, this would be a medium cost of $1,000-$5,000. This action would highly benefit the Town.	FY2012-2013	19

Rank	New Mitigation Project	Responsibility and/or Oversight	Funding and/or Support	Cost Effectiveness	Timeframe	STAPLEE Score (21 being the highest)
2 - 3	Continue to provide outreach assistance to elderly and special needs populations by organizing staff and coordinating within Town departments. Look into options such as "Meals on Wheels" for residents staying home.	Joint effort with Fire, Police, other Town agencies	Local	Outreach strategies have already taken place and will continue to do so. This action will highly benefit elderly and special needs populations at a low cost of less than $1,000.	FY2012-2013	21
2 - 4	Locate all the underground storage tanks (both oil/gas) in the Town.	Town Staff & SRPC	Local	Volunteer time for research and staff time for Fire Department and Town to coordinate and distribute the information. This action item would be a low cost of less than $1,000.	FY2013-2014	19
3 - 1	Develop a list of residents who have an emergency back-up fuel supply (tanks) that would become available to the Town for use of emergency vehicles in an emergency situation. Develop a list of residents who own and can operate emergency equipment that would become available to the Town in an emergency situation.	Road Agent, Town Staff & EMD	Local	Volunteer time for research and staff time for Fire Department and Town to coordinate and distribute the information. This action item would be a medium cost of $1,000-$5,000.	FY2013-2015	20
3 - 2	Brainstorm and implement new ideas to address the Fire/EMS safety access challenges to the residents that live in the Bow Lake Estates. Address winter access roads and reach out to local camps to help maintain those roads.	Joint effort with Town agencies	Local & Grants	Potential serious economic impact for the Town if additional road construction, bridge construction or year-round maintenance of private road of private roads is required; all the above would be very costly. Alternative measures to ensure safe access will be explored. This action item would be a high cost of greater than $5,000.	FY2013-2016	18

Chapter X: Monitoring, Evaluation and Updating the Plan

A. Introduction

A good mitigation plan must allow for updates where and when necessary, particularly since communities may suffer budget cuts or experience personnel turnover during both the planning and implementation states. A good plan will incorporate periodic monitoring and evaluation mechanisms to allow for review of successes and failures or even just simple updates.

B. Multi-Hazard Plan Monitoring, Evaluation and Updates

To track programs and update the mitigation strategies identified through this process, the Town will review the multi-hazard mitigation plan annually or after a hazard event. Additionally, the Plan will undergo a formal review and update at least every five years and obtain FEMA approval for this update or any other major changes done in the Plan at any time. The Emergency Management Director is responsible for initiating the review and will consult with members of the multi-hazard mitigation planning team identified in this plan. The public will be encouraged to participate in any updates. Public announcements will be made through advertisements in local papers, postings on the town website, and posters disseminated in town. A formal public hearing will be held before reviews and updates are official.

Changes will be made to the Plan to accommodate projects that have failed or are not considered feasible after a review for their consistency with STAPLEE, the timeframe, the community's priorities or funding resources. Priorities that were not ranked high, but identified as potential mitigation strategies, will be reviewed as well during the monitoring and update of the plan to determine feasibility of future implementation. In keeping with the process of adopting this multi-hazard mitigation plan, a public hearing to receive public comment on plan maintenance and updating will be held during the annual review period and before the final product is adopted by the Select Board. Chapter XI contains a representation of a draft resolution for Strafford to use once a conditional approval is received from FEMA.

C. Integration with Other Plans

This multi-hazard plan will only enhance mitigation if balanced with all other town plans. Strafford will take the necessary steps to incorporate the mitigation strategies and other information contained in this plan with other town activities, plans and mechanisms, such as comprehensive land use planning, capital improvements planning, site plan regulations, and building codes to guide and control development in the Town of Strafford, when appropriate. The local government will refer to this Plan and the strategies identified when updating the Town's Master Plan, Capital Improvements Program, Zoning Ordinances and Regulations, and Emergency Action Plan; this Plan will become a section of the Strafford Emergency Management Plan. The Select Board and the Hazard Mitigation Committee will work with town officials to incorporate elements

of this Plan into other planning mechanisms, when appropriate. The Emergency Management Director along with other members of the Hazard Mitigation Committee will work with the Planning Board to include the updated Hazard Mitigation Plan as a chapter in the Town's Master Plan. In addition, the Town will review and make note of instances when this has been done and include it as part of their annual review of the Plan.

Chapter XI: Signed Community Documents and Approval Letters

A. Conditional Approval Letter from FEMA
Email received on March 30, 2012

Congratulations!

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

The FEMA letter of formal approval will confirm the jurisdiction's eligibility to apply for Mitigation grants administered by FEMA and identify related issues affecting eligibility, if any. If the plan is not adopted within one calendar year of FEMA's Approval Pending Adoption, the jurisdiction must update the entire plan and resubmit it for FEMA review. If you have questions or wish to discuss this determination further, please contact me at marilyn.hilliard@fema.gov or 617-956-7536.

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

B. Signed Certificate of Adoption

Multi-Hazard Mitigation Plan 2012

B. Signed Certificate of Adoption

APR 6 2012

CERTIFICATE OF ADOPTION

Town of Strafford, New Hampshire
Board of Selectmen
A Resolution Adopting the Strafford, NH Multi-Hazard Mitigation Plan Update 2012

Plan Dated: April 2, 2012
Conditionally Approved: March 30, 2012

WHEREAS, the Town of Strafford received funding from the NH Office of Homeland Security and Emergency Management under a Flood Mitigation Assistance Project Grant and assistance from Strafford Regional Planning Commission in the preparation of the Strafford Multi-Hazard Mitigation Plan; and

WHEREAS, several public planning meetings were held between June 8, 2011 and July 27, 2011 regarding the development and review of the Strafford, NH Multi-Hazard Mitigation Plan Update 2012; and

WHEREAS, the Strafford, NH Multi-Hazard Mitigation Plan Update 2012 contains several potential future projects to mitigate hazard damage in the Town of Strafford; and

WHEREAS, a duly-noticed public meeting was held by the Strafford Board of Selectmen on April 3rd to formally approve and adopt the Strafford, NH Multi-Hazard Mitigation Plan Update 2012.

NOW, THEREFORE BE IT RESOLVED that the Strafford Board of Selectmen adopts the Strafford, NH Multi-Hazard Mitigation Plan Update 2012.

ADOPTED AND SIGNED this day of April 3, 2012

Strafford Board of Selectmen Chair

Town Seal or Notary

Date 4/3/12

DIANE WALDRON
NOTARY PUBLIC
State of New Hampshire
My Commission Expires
May 20, 2014

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C. Final Approval Letter from FEMA

U.S. Department of Homeland Security
FEMA Region 1
99 High Street
Boston, MA 02110

FEMA

May 23, 2012

R. Stephen Leighton, Chair
Strafford Board of Selectmen
12 Mountain View Drive
Strafford, NH 03884

Dear Mr. Leighton:

Thank you for the opportunity to review the Town of Strafford, NH Hazard Mitigation Plan. The Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA) Region I has evaluated the plan for compliance with 44 CFR Part 201. The plan satisfactorily meets all of the mandatory requirements set forth by the regulations. Congratulations on this achievement!

With this plan approval, the Town is eligible to apply for Mitigation grants administered by FEMA. Requests for mitigation funding will be evaluated individually according to the specific eligibility and requirements of each of these programs. Furthermore, a specific mitigation activity or project identified in your community's plan may not meet the eligibility requirements for FEMA funding, and even eligible mitigation activities are not automatically approved for FEMA funding under the programs referenced above.

The Town's Hazard Mitigation Plan must be reviewed, revised as appropriate, and resubmitted to FEMA for approval within **five years of the plan approval date of May 22, 2012** in order to maintain eligibility as an applicant for mitigation grants. Over the next five years, we encourage the town to continue updating the plan's assessment of vulnerability, adhere to its maintenance schedule, and begin implementing, when possible, the mitigation actions proposed in the plan.

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

Sincerely,

Don R. Boyce
Regional Administrator

DRB:mh

cc: Lance Harbour, Acting State Hazard Mitigation Officer
Beth Peck, NH Homeland Security and Emergency Management Planner
Kyle Pimental, Strafford Regional Planning Commission
Jennifer Gilbert, NFIP Coordinator

Enclosure

Appendices

Appendix A: Bibliography

Appendix B: Summary of Possible Multi-Hazard Mitigation Strategies

Appendix C: List of Contacts

Appendix D: Technical and Financial Assistance for Multi-Hazard Mitigation

- Hazard Mitigation Grant Program (HMGP)
- Pre-Disaster Mitigation (PDM)
- Flood Mitigation Assistance (FMA)
- Repetitive Flood Claims (RFC)
- Severe Repetitive Loss (SRL)

Appendix A: Bibliography

Documents

- Local Multi-Hazard Mitigation Planning Guide, FEMA, July 1, 2008
- Multi-Hazard Mitigation Plans
    - Town of Albany, 2010
    - Town of Goffstown, 2009
    - New Durham Hazard Mitigation Plan 2010
    - Barrington Hazard Mitigation Plan 2010
- Natural Hazard Mitigation Plan, 2004, State Hazard Mitigation Goals http://www.nh.gov/safety/divisions/hsem/HazardMitigation/documents/guide/APPENDIX_D.pdf
- Disaster Mitigation Act (DMA) of 2000, Section 101, b1 & b2 and Section 322a *http://www.fema.gov/library/viewRecord.do?id=1935*
- Economic & Labor Market Information Bureau, NH Employment Security, 2009; Census 2000 and Revenue Information derived from this site; *http://www.nh.gov/nhes/elmi/htmlprofiles/strafford.html*
- NCDC [National Climatic Data Center, National Oceanic and Atmospheric Administration]. 2010. *Storm Events*

Photos

- Scott Young, Chief of Police/EMD

Appendix B: Summary of Possible Multi-Hazard Mitigation Strategies

I. RIVERINE MITIGATION

A. Prevention

Prevention measures are intended to keep the problem from occurring in the first place, and/or keep it from getting worse. Future development should not increase flood damage. Building, zoning, planning, and/or code enforcement personnel usually administer preventative measures.

1. **Planning and Zoning -** Land use plans are put in place to guide future development, recommending where - and where not - development should occur and where it should not. Sensitive and vulnerable lands can be designated for uses that would not be incompatible with occasional flood events - such as parks or wildlife refugees. A Capital Improvements Program (CIP) can recommend the setting aside of funds for public acquisition of these designated lands. The zoning ordinance can regulate development in these sensitive areas by limiting or preventing some or all development - for example, by designating floodplain overlay, conservation, or agricultural districts.

2. **Open Space Preservation -** Preserving open space is the best way to prevent flooding and flood damage. Open space preservation should not, however, be limited to the floodplain, since other areas within the watershed may contribute to controlling the runoff that exacerbates flooding. Land Use and Capital Improvement Plans should identify areas to be preserved by acquisition and other means, such as purchasing easements. Aside from outright purchase, open space can also be protected through maintenance agreements with the landowners, or by requiring developers to dedicate land for flood flow, drainage and storage.

3. **Floodplain Development Regulations -** Floodplain development regulations typically do not prohibit development in the special flood hazard area, but they do impose construction standards on what is built there. The intent is to protect roads and structures from flood damage and to prevent the development from aggravating the flood potential. Floodplain development regulations are generally incorporated into subdivision regulations, building codes, and floodplain ordinances.

   Subdivision Regulations: These regulations govern how land will be divided into separate lots or sites. They should require that any flood hazard areas be shown on the plat, and that every lot has a buildable area that is above the base flood elevation.
   Building Codes: Standards can be incorporated into building codes that address flood proofing for all new and improved or repaired buildings.
   Floodplain Ordinances: Communities that participate in the National Flood Insurance Program are required to adopt the minimum floodplain management regulations, as developed by FEMA. The regulations set

minimum standards for subdivision regulations and building codes. Communities may adopt more stringent standards than those set forth by FEMA.

4. **Stormwater Management** - Development outside of a floodplain can contribute significantly to flooding by covering impervious surfaces, which increases storm water runoff. Storm water management is usually addressed in subdivision regulations. Developers are typically required to build retention or detention basins to minimize any increase in runoff caused by new or expanded impervious surfaces, or new drainage systems. Generally, there is a prohibition against storm water leaving the site at a rate higher than it did before the development. One technique is to use wet basins as part of the landscaping plan of a development. It might even be possible to site these basins based on a watershed analysis. Since detention only controls the runoff rates and not volumes, other measures must be employed for storm water infiltration - for example, swales, infiltration trenches, vegetative filter strips, and permeable paving blocks.

5. **Drainage System Maintenance -** Ongoing maintenance of channel and detention basins is necessary if these facilities are to function effectively and efficiently over time. A maintenance program should include regulations that prevent dumping in or altering water courses or storage basins; regrading and filling should also be regulated. Any maintenance program should include a public education component, so that the public becomes aware of the reasons for the regulations. Many people do not realize the consequences of filling in a ditch or wetland, or regrading.

B. Property Protection

Property protection measures are used to modify buildings subject to flood damage, rather than to keep floodwaters away. These may be less expensive to implement, as they are often carried out on a cost-sharing basis. In addition, many of these measures do not affect a building's appearance or use, which makes them particularly suitable for historical sites and landmarks.

1. **Relocation -** Moving structures out of the floodplain is the surest and safest way to protect against damage. Relocation is expensive, however, so this approach will probably not be used except in extreme circumstances. Communities that have areas subject to severe storm surges, ice jams, etc. might want to consider establishing a relocation program, incorporating available assistance.

2. **Acquisition -** Acquisition by a governmental entity of land in a floodplain serves two main purposes: 1) it ensures that the problem of structures in the floodplain will be addressed; and 2) it has the potential to convert problem areas into community assets, with accompanying environmental benefits. Acquisition is more cost effective than relocation in those areas that are subject to storm surges, ice jams, or flash flooding. Acquisition, followed by demolition, is the most appropriate strategy for those buildings that are simply too expensive to move, as

well as for dilapidated structures that are not worth saving or protecting. Acquisition and subsequent relocation can be expensive, however, there are government grants and loans that can be applied toward such efforts.

3. **Building Elevation -** Elevating a building above the base flood elevation is the best on-site protection strategy. The building could be raised to allow water to run underneath it, or fill could be brought in to elevate the site on which the building sits. This approach is cheaper than relocation, and tends to be less disruptive to a neighborhood. Elevation is required by law for new and substantially improved residences in a floodplain, and is commonly practiced in flood hazard areas nationwide.

4. **Floodproofing -** If a building cannot be relocated or elevated, it may be floodproofed. This approach works well in areas of low flood threat. Floodproofing can be accomplished through barriers to flooding, or by treatment to the structure itself.

   Barriers: Levees, floodwalls and berms can keep floodwaters from reaching a building. These are useful, however, only in areas subject to shallow flooding.
   Dry Floodproofing: This method seals a building against the water by coating the walls with waterproofing compounds or plastic sheeting. Openings, such as doors, windows, etc. are closed either permanently with removable shields or with sandbags.
   Wet Floodproofing: This technique is usually considered a last resort measure, since water is intentionally allowed into the building in order to minimize pressure on the structure. Approaches range from moving valuable items to higher floors to rebuilding the floodable area. An advantage over other approaches is that simply by moving household goods out of the range of floodwaters, thousands of dollars can be saved in damages.

5. **Sewer Backup Protection -** Storm water overloads can cause backup into basements through sanitary sewer lines. Houses that have any kind of connection to a sanitary sewer system - whether it is downspouts, footing drain tile, and/or sump pumps, can be flooded during a heavy rain event. To prevent this, there should be no such connections to the system, and all rain and ground water should be directed onto the ground, away from the building. Other protections include:

   • Floor drain plugs and floor drain standpipe, which keep water from flowing out of the lowest opening in the house.
   • Overhead sewer - keeps water in the sewer line during a backup.
   • Backup valve - allows sewage to flow out while preventing backups from flowing into the house.

6. **Insurance** - Above and beyond standard homeowner insurance, there is other coverage a homeowner can purchase to protect against flood hazard. Two of the most common are National Flood Insurance and basement backup insurance.

   National Flood Insurance: When a community participates in the National Flood Insurance Program, any local insurance agent is able to sell separate flood insurance policies under rules and rates set by FEMA. Rates do not change after claims are paid because they are set on a national basis.
   Basement Backup Insurance: National Flood Insurance offers an additional deductible for seepage and sewer backup, provided there is a general condition of flooding in the area that was the proximate cause of the basement getting wet. Most exclude damage from surface flooding that would be covered by the NFIP.

C. Natural Resource Protection

Preserving or restoring natural areas or the natural functions of floodplain and watershed areas provide the benefits of eliminating or minimizing losses from floods, as well as improving water quality and wildlife habitats. Parks, recreation, or conservation agencies usually implement such activities. Protection can also be provided through various zoning measures that are specifically designed to protect natural resources.

1. **Wetlands Protection** - Wetlands are capable of storing large amounts of floodwaters, slowing and reducing downstream flows, and filtering the water. Any development that is proposed in a wetland is regulated by either federal and/or state agencies. Depending on the location, the project might fall under the jurisdiction of the U.S. Army Corps of Engineers, which in turn, calls upon several other agencies to review the proposal. In New Hampshire, the N.H. Wetlands Board must approve any project that impacts a wetland. Many communities in New Hampshire also have local wetland ordinances.

   Generally, the goal is to protect wetlands by preventing development that would adversely affect them. Mitigation techniques are often employed, which might consist of creating a wetland on another site to replace what would be lost through the development. This is not an ideal practice since it takes many years for a new wetland to achieve the same level of quality as an existing one, if it can at all.

2. **Erosion and Sedimentation Control -** Controlling erosion and sediment runoff during construction and on farmland is important, since eroding soil will typically end up in downstream waterways. Because sediment tends to settle where the water flow is slower, it will gradually fill in channels and lakes, reducing their ability to carry or store floodwaters.

3. **Best Management Practices -** Best Management Practices (BMPs) are measures that reduce non-point source pollutants that enter waterways. Non-point source pollutants are carried by storm water to waterways, and include such things as lawn fertilizers, pesticides, farm chemicals, and oils from street surfaces and industrial sites. BMPs can be incorporated into many aspects of new

developments and ongoing land use practices. In New Hampshire, the Department of Environmental Services has developed Best Management Practices for a range of activities, from farming to earth excavations.

D. Emergency Services

Emergency services protect people during and after a flood. Many communities in New Hampshire have emergency management programs in place, administered by an emergency management director (very often the local police or fire chief).

1. **Flood Warning -** On large rivers, the National Weather Service handles early recognition. Communities on smaller rivers must develop their own warning systems. Warnings may be disseminated in a variety of ways, such as sirens, radio, television, mobile public address systems, or door-to-door contact. It seems that multiple or redundant systems are the most effective, giving people more than one opportunity to be warned.

2. **Flood Response -** Flood response refers to actions that are designed to prevent or reduce damage or injury, once a flood threat is recognized. Such actions and the appropriate parties include:

    • Activating the emergency operations center (emergency director)
    • Sandbagging designated areas (Highway Department)
    • Closing streets and bridges (police department)
    • Shutting off power to threatened areas (public service)
    • Releasing children from school (school district)
    • Ordering an evacuation (Board of Selectmen/emergency director)
    • Opening evacuation shelters (churches, schools, Red Cross, municipal facilities)

These actions should be part of a flood response plan, which should be developed in coordination with the persons and agencies that share the responsibilities. Drills and exercises should be conducted so that the key participants know what they are supposed to do.

3. **Critical Facilities Protection -** Protecting critical facilities is vital, since expending efforts on these facilities can draw workers and resources away from protecting other parts of town. Critical facilities fall into two categories:

    Buildings or locations vital to the flood response effort:
    • Emergency operations centers
    • Police and fire stations
    • Highway garages
    • Selected roads and bridges
    • Evacuation routes

Buildings or locations that, if flooded, would create disasters:
- Hazardous materials facilities
- Schools

All such facilities should have their own flood response plan that is coordinated with the community's plan. Schools will typically be required by the state to have emergency response plans in place.

4. **Health and Safety Maintenance -** The flood response plan should identify appropriate measures to prevent danger to health and safety. Such measures include:

    - Patrolling evacuated areas to prevent looting
    - Vaccinating residents for tetanus
    - Clearing streets
    - Cleaning up debris

The Plan should also identify which agencies will be responsible for carrying out the identified measures. A public information program can be helpful to educate residents on the benefits of taking health and safety precautions.

E. Structural Projects

Structural projects are used to prevent floodwaters from reaching properties. These are all man-made structures, and can be grouped into the six types discussed below. The shortcomings of structural approaches are:

- Can be very expensive
- Disturb the land, disrupt natural water flows, & destroy natural habitats.
- Are built to an anticipated flood event, and may be exceeded by a greater-than expected flood
- Can create a false sense of security.

1. **Diversions -** A diversion is simply a new channel that sends floodwater to a different location, thereby reducing flooding along an existing watercourse. Diversions can be surface channels, overflow weirs, or tunnels. During normal flows, the water stays in the old channel. During flood flows, the stream spills over the diversion channel or tunnel, which carries the excess water to the receiving lake or river. Diversions are limited by topography; they won't work everywhere. Unless the receiving water body is relatively close to the flood prone stream and the land in between is low and vacant, the cost of creating a diversion can be prohibitive. Where topography and land use are not favorable, a more expensive tunnel is needed. In either case, care must be taken to ensure that the diversion does not create a flooding problem somewhere else.

2. **Levees/Floodwalls -** Probably the best known structural flood control measure is either a levee (a barrier of earth) or a floodwall made of steel or concrete erected between the watercourse and the land. If space is a consideration, floodwalls are typically used, since levees need more space. Levees and floodwalls should be set back out of the floodway, so that they will not divert floodwater onto other properties.

3. **Reservoirs -** Reservoirs control flooding by holding water behind dams or in storage basins. After a flood peaks, water is released or pumped out slowly at a rate the river downstream can handle. Reservoirs are suitable for protecting existing development, and they may be the only flood control measure that can protect development close to a watercourse. They are most efficient in deeper valleys or on smaller rivers where there is less water to store. Reservoirs might consist of man-made holes dug to hold the approximate amount of floodwaters, or even abandoned quarries. As with other structural projects, reservoirs:

   • are expensive
   • occupy a lot of land
   • require periodic maintenance
   • may fail to prevent damage from floods that exceed their design levels
   • may eliminate the natural and beneficial functions of the floodplain.

4. **Channel Modifications -** Channel modifications include making a channel wider, deeper, smoother, or straighter. These techniques will result in more water being carried away, but, as with other techniques mentioned, it is important to ensure that the modifications do not create or increase a flooding problem downstream.

   Dredging: Dredging is often cost-prohibitive because the dredged material must be disposed of in another location; the stream will usually fill back in with sediment. Dredging is usually undertaken only on larger rivers, and then only to maintain a navigation channel.

   Drainage Modifications: These include man-made ditches and storm sewers that help drain areas where the surface drainage system is inadequate or where underground drainage ways may be safer or more attractive. These approaches are usually designed to carry the runoff from smaller, more frequent storms.

5. **Storm Sewers -** Mitigation techniques for storm sewers include installing new sewers, enlarging small pipes, street improvements, and preventing back flow. Because drainage ditches and storm sewers convey water faster to other locations, improvements are only recommended for small local problems where the receiving body of water can absorb the increased flows without increased flooding. In many developments, streets are used as part of the drainage system, to carry or hold water from larger, less frequent storms. The streets collect runoff and convey it to a receiving sewer, ditch, or stream. Allowing water to stand in

the streets and then draining it slowly can be a more effective and less expensive measure than enlarging sewers and ditches.

F. Public Information

Public information activities are intended to advise property owners, potential property owners, and visitors about the particular hazards associated with a property, ways to protect people and property from these hazards, and the natural and beneficial functions of a floodplain.

1. **Map Information -** Flood maps developed by FEMA outline the boundaries of the flood hazard areas. These maps can be used by anyone interested in a particular property to determine if it is flood-prone. These maps are available from FEMA, the NH Homeland Security and Emergency Management (HSEM), the NH Office of Energy and Planning (OEP), or your regional planning commission.

2. **Outreach Projects -** Outreach projects are proactive; they give the public information even if they have not asked for it. Outreach projects are designed to encourage people to seek out more information and take steps to protect themselves and their properties. Examples of outreach activities include:

    • Presentations at meetings of neighborhood groups
    • Mass mailings or newsletters to all residents
    • Notices directed to floodplain residents
    • Displays in public buildings, malls, etc.
    • Newspaper articles and special sections
    • Radio and TV news releases and interview shows
    • A local flood proofing video for cable TV programs and to loan to organizations
    • A detailed property owner handbook tailored for local conditions.

    Research has shown that outreach programs work, although awareness is not enough. People need to know what they can do about the hazards, so projects should include information on protection measures. Research also shows that locally designed and run programs are much more effective than national advertising.

3. **Real Estate Disclosure -** Disclosure of information regarding flood-prone properties is important if potential buyers are to be in a position to mitigate damage. Federally regulated lending institutions are required to advise applicants that a property is in the floodplain. However, this requirement needs to be met only five days prior to closing, and by that time, the applicant is typically committed to the purchase. State laws and local real estate practice can help by making this information available to prospective buyers early in the process.

4. **Library -** Your local library can serve as a repository for pertinent information on flooding and flood protection. Some libraries also maintain their own public information campaigns, augmenting the activities of the various governmental agencies involved in flood mitigation.

5. **Technical Assistance -** Certain types of technical assistance are available from the NFIP Coordinator, FEMA, and the Natural Resources Conservation District. Community officials can also set up a service delivery program to provide one-on-one sessions with property owners.

An example of technical assistance is the *flood audit*, in which a specialist visits a property. Following the visit, the owner is provided with a written report detailing the past and potential flood depths and recommending alternative protection measures.

6. **Environmental Education -** Education can be a great mitigating tool if people can learn what not to do before damage occurs. The sooner the education begins the better. Environmental education programs for children can be taught in the schools, park and recreation departments, conservation associations, or youth organizations. An activity can be as involved as course curriculum development or as simple as an explanatory sign near a river.

Education programs do not have to be limited to children. Adults can benefit from knowledge of flooding and mitigation measures; decision makers, armed with this knowledge, can make a difference in their communities.

II. EARTHQUAKES

A. Preventive

1. Planning/zoning to keep critical facilities away from fault lines
2. Planning, zoning and building codes to avoid areas below steep slopes or soils subject to liquefaction
3. Building codes to prohibit loose masonry overhangs, etc.

B. Property Protection

1. Acquire and clear hazard areas
2. Retrofitting to add braces, remove overhangs
3. Apply Mylar to windows and glass surfaces to protect from shattering glass
4. Tie down major appliances, provide flexible utility connections
5. Earthquake insurance riders

C. Emergency Services

1. Earthquake response plans to account for secondary problems, such as fires and hazardous material spills

D. Structural Projects

1. Slope stabilization

III. DAM FAILURE

A. Preventive

1. Dam failure inundation maps
2. Planning/zoning/open space preservation to keep area clear
3. Building codes with flood elevation based on dam failure
4. Dam safety inspections
5. Draining the reservoir when conditions appear unsafe

B. Property Protection

1. Acquisition of buildings in the path of a dam breach flood
2. Flood insurance

C. Emergency Services

1. Dam condition monitoring
2. Warning and evacuation plans based on dam failure

D. Structural Projects

1. Dam improvements, spillway enlargements
2. Remove unsafe dams

IV. WILDFIRES

A. Preventive

1. Zoning districts to reflect fire risk zones
2. Planning and zoning to restrict development in areas near fire protection and water resources
3. Requiring new subdivisions to space buildings, provide firebreaks, on-site water storage, wide roads, multiple accesses
4. Building code standards for roof materials and spark arrestors
5. Maintenance programs to clear dead and dry brush, trees
6. Regulation on open fires

B. Property Protection

1. Retrofitting of roofs and adding spark arrestors
2. Landscaping to keep bushes and trees away from structures
3. Insurance rates based on distance from fire protection

C. Natural Resource Protection

1. Prohibit development in high-risk areas

D. Emergency Services

1. Fire Fighting

V. WINTER STORMS

A. Prevention

1. Building code standards for light frame construction, especially for wind-resistant roofs

B. Property Protection

1. Storm shutters and windows
2. Hurricane straps on roofs and overhangs
3. Seal outside and inside of storm windows and check seals in spring and fall
4. Family and/or company severe weather action plan & drills:

    • include a **NOAA** Weather Radio
    • designate a shelter area or location
    • keep a disaster supply kit, including stored food and water
    • keep snow removal equipment in good repair; have extra shovels, sand, rock, salt and gas
    • know how to turn off water, gas, and electricity at home or work

C. Natural Resource Protection

1. Maintenance program for trimming trees and shrubs

D. Emergency Services

1. Early warning systems/NOAA Weather Radio
2. Evacuation plans

Appendix C: List of Contacts

NH Homeland Security & Emergency Management

Hazard Mitigation Section 271-2231

Federal Emergency Management Agency (Boston)..... 877-336-2734

NH Regional Planning Commissions:

Central NH Regional Planning Commission 226-6020
Lakes Region Planning Commission..... 279-8171
Nashua Regional Planning Commission..... 424-2240
North Country Council RPC..... 444-6303
Rockingham Planning Commission..... 778-0885
Southern New Hampshire Planning Commission..... 669-4664
Southwest Region Planning Commission..... 357-0557
Strafford Regional Planning Commission 742-2523
Upper Valley Lake Sunapee RPC 448-1680

NH Executive Department:
New Hampshire Office Energy & 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..... 271-3434
Rivers Management and Protection Program..... 271-8801
Bureau of Dams..... 271-3503

NH Fish and Game Department 271-3421

NH DRED..... 271-2411
Natural Heritage Inventory 271-3623
Division of Forests and Lands 271-2214
Division of Parks and Recreation 271-3556

NH Department of Transportation 271-3734

US Department of Commerce:

National Oceanic and Atmospheric Administration:
National Weather Service; Gray, Maine..... 207-688-3216

US Department of Interior:
US Fish and Wildlife Service..... 223-2541
.
US Geological Survey..... 225-4681

US Department of Agriculture:
Natural Resource Conservation Service..... 868-7581

New Hampshire State Police 846-3333

Additional Websites of Interest

Natural Hazards
Research Center, U. of Colorado
http://www.colorado.edu/hazards/

National Emergency Management Association
http://nemaweb.org

NASA-Earth Observatory
http://earthobservatory.nasa.gov/NaturalHazards/category.php?cat_id=12

NASA Natural Disaster Reference
Reference of worldwide natural disasters
http://gcmd.nasa.gov/records/NASA-NDRD.html

National Weather Service
Weather Warnings, 60 Second Updates
http://nws.noaa.gov

FEMA, National Flood Insurance Program, Community Status Books
http://fema.gov/business/nfip/

Florida State & NWS University Atlantic
Hurricane Site
http://www.met.fsu.edu/orgs/explores/

National Lightning Safety Institute
List of Lightning Safety Publications
http://lightningsafety.com

NASA Optical Transient Detector
Space-based sensor of lightning strikes
http://www.gr.ssr.upm.es/~jambrina/rayos/thunder.msfc.nasa.gov/otd.html

LLNL Geologic & Atmospheric Hazards
General Hazard Information
https://www.llnl.gov/

The Tornado Project Online
Recent tornado information & details
http://www.tornadoproject.com/

National Severe Storms Laboratory
Information & tracking of severe storms
Http://www.nssl.noaa.gov/
USDA Forest Service

Forest Fire & Land Management Information
http://www.fs.fed.us/fire

Appendix D: Technical and Financial Assistance for Multi-Hazard Mitigation

FEMA's Hazard Mitigation Assistance (HMA) grant programs provide funding for eligible mitigation activities that reduce disaster losses and protect life and property from future disaster damages. Currently, FEMA administers the following HMA grant programs[10]:

- Hazard Mitigation Grant Program (HMGP)
- Pre-Disaster Mitigation (PDM)
- Flood Mitigation Assistance (FMA)
- Repetitive Flood Claims (RFC)
- Severe Repetitive Loss (SRL)

FEMA's HMA grants are provided to eligible Applicants (States/Tribes/Territories) that, in turn, provide sub-grants to local governments and communities. The Applicant selects and prioritizes subapplications developed and submitted to them by subapplicants. These subapplications are submitted to FEMA for consideration of funding. Prospective subapplicants should consult the office designated as their Applicant for further information regarding specific program and application requirements. Contact information for the FEMA Regional Offices and State Hazard Mitigation Officers is available on the FEMA website, www.fema.gov.

HMA Grant Programs
The HMA grant programs provide funding opportunities for pre- and post-disaster mitigation. While the statutory origins of the programs differ, all share the common goal of reducing the risk of loss of life and property due to Natural Hazards. Brief descriptions of the HMA grant programs can be found below. For more information on the individual programs, or to see information related to a specific Fiscal Year, please click on one of the program links.

A. Hazard Mitigation Grant Program (HMGP)

HMGP assists in implementing long-term hazard mitigation measures following Presidential disaster declarations. Funding is available to implement projects in accordance with State, Tribal, and local priorities.

What is the Hazard Mitigation Grant Program?

The Hazard Mitigation Grant Program (HMGP) provides grants to States and local governments to implement long-term hazard mitigation measures after a major disaster declaration. Authorized under Section 404 of the Stafford Act and administered by FEMA, HMGP was created to reduce the loss of life and property due to natural disasters. The program enables mitigation measures to be implemented during the immediate recovery from a disaster.

[10] Information in Appendix E is taken from the following website and links to specific programs unless otherwise noted; http://www.fema.gov/government/grant/hma/index.shtm

Who is eligible to apply?

Hazard Mitigation Grant Program funding is only available to applicants that reside within a presidentially declared disaster area. Eligible applicants are:

- State and local governments
- Indian tribes or other tribal organizations
- Certain non-profit organizations

Individual homeowners and businesses may not apply directly to the program; however a community may apply on their behalf.

How are potential projects selected and identified?

The State's administrative plan governs how projects are selected for funding. However, proposed projects must meet certain minimum criteria. These criteria are designed to ensure that the most cost-effective and appropriate projects are selected for funding. Both the law and the regulations require that the projects are part of an overall mitigation strategy for the disaster area.

The State prioritizes and selects project applications developed and submitted by local jurisdictions. The State forwards applications consistent with State mitigation planning objectives to FEMA for eligibility review. Funding for this grant program is limited and States and local communities must make difficult decisions as to the most effective use of grant funds.

For more information on the **Hazard Mitigation Grant Program (HMGP),** go to: http://www.fema.gov/government/grant/hmgp/index.shtm

B. Pre-Disaster Mitigation (PDM)

PDM provides funds on an annual basis for hazard mitigation planning and the implementation of mitigation projects prior to a disaster. The goal of the PDM program is to reduce overall risk to the population and structures, while at the same time, also reducing reliance on Federal funding from actual disaster declarations.

Program Overview

The Pre-Disaster Mitigation (PDM) program provides funds to states, territories, Indian tribal governments, communities, and universities for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event.

Funding these plans and projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations. PDM grants are to be awarded on a competitive basis and without reference to state allocations, quotas, or other formula-based allocation of funds.

C. Flood Mitigation Assistance (FMA)

FMA provides funds on an annual basis so that measures can be taken to reduce or eliminate risk of flood damage to buildings insured under the National Flood Insurance Program.

Program Overview
The FMA program was created as part of the National Flood Insurance Reform Act (NFIRA) of 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP).

FEMA provides FMA funds to assist States and communities implement measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the National Flood Insurance Program.

Types of FMA Grants
Three types of FMA grants are available to States and communities:

- Planning Grants to prepare Flood Mitigation Plans. Only NFIP-participating communities with approved Flood Mitigation Plans can apply for FMA Project grants
- Project Grants to implement measures to reduce flood losses, such as elevation, acquisition, or relocation of NFIP-insured structures. States are encouraged to prioritize FMA funds for applications that include repetitive loss properties; these include structures with 2 or more losses each with a claim of at least $1,000 within any ten-year period since 1978.
- Technical Assistance Grants for the State to help administer the FMA program and activities. Up to ten percent (10%) of Project grants may be awarded to States for Technical Assistance Grants

D. Repetitive Flood Claims (RFC)

RFC provides funds on an annual basis to reduce the risk of flood damage to individual properties insured under the NFIP that have had one or more claim payments for flood damages. RFC provides up to 100% federal funding for projects in communities that meet the reduced capacity requirements.

Program Overview
The Repetitive Flood Claims (RFC) grant program was authorized by the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004 (P.L. 108–264), which amended the National Flood Insurance Act (NFIA) of 1968 (42 U.S.C. 4001, et al).

Up to $10 million is available annually for FEMA to provide RFC funds to assist States and communities reduce flood damages to insured properties that have had one or more claims to the National Flood Insurance Program (NFIP).

Federal / Non-Federal Cost Share
FEMA may contribute up to 100 percent of the total amount approved under the RFC grant award to implement approved activities, if the Applicant has demonstrated that the proposed activities cannot be funded under the Flood Mitigation Assistance (FMA) program.

E. Severe Repetitive Loss (SRL)

SRL provides funds on an annual basis to reduce the risk of flood damage to residential structures insured under the NFIP that are qualified as severe repetitive loss structures. SRL provides up to 90% federal funding for eligible projects.

Program Overview
The Severe Repetitive Loss (SRL) grant program was authorized by the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004, which amended the National Flood Insurance Act of 1968 to provide funding to reduce or eliminate the long-term risk of flood damage to severe repetitive loss (SRL) structures insured under the National Flood Insurance Program (NFIP).

Definition
The definition of severe repetitive loss as applied to this program was established in section 1361A of the National Flood Insurance Act, as amended (NFIA), 42 U.S.C. 4102a. An SRL property is defined as a residential property that is covered under an NFIP flood insurance policy and:

> (a) That has at least four NFIP claim payments (including building and contents) over $5,000 each, and the cumulative amount of such claims payments exceeds $20,000; or
> (b) For which at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building.

For both (a) and (b) above, at least two of the referenced claims must have occurred within any ten-year period, and must be greater than 10 days apart.

Purpose:
To reduce or eliminate claims under the NFIP through project activities that will result in the greatest savings to the National Flood Insurance Fund (NFIF).

Federal / Non-Federal cost share:

75 / 25 %; up to 90 % Federal cost-share funding for projects approved in States, Territories, and Federally-recognized Indian tribes with FEMA-approved Standard or Enhanced Mitigation Plans or Indian tribal plans that include a strategy for mitigating existing and future SRL properties.