

## **XI. Natural Hazards**



**State Bridge on NH Route 107 in Raymond**

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### **Introduction**

Natural hazards can occur in many different places and they have the potential of impacting our built environment in diverse and often unpredictable ways. Floods, hurricanes, forest fires, blizzards, tornadoes, and earthquakes are examples of natural hazards. Disasters occur when man made structures and human populations become adversely affected by these naturally occurring events. The impact that natural hazards have upon human communities is largely a function of the development of the built environment. Land use planning decisions can either increase or decrease the social, economic and health consequences of natural hazard events. The process of community planning in preventing losses from these events is known as hazard mitigation.

Hazard Mitigation consists of practices and actions that reduce the exposure to and detrimental effects of natural hazards. There are many ways to implement hazard mitigation efforts such as preventing development within areas prone to hazards (such as floodplains, steep slopes, and coastal areas), requiring new development to use low impact design methods (LID) to prevent alterations of existing natural features, or addressing critical infrastructure needs within a town such as: utilities (electricity, and other power supplies), telecommunication, the water supply (drinking water, waste water/sewage, stemming of surface water), public health (hospitals and ambulances), transportation systems, financial services, and security services (police and military). Developing specific mitigation strategies is a vital part of any local Hazard Mitigation plan including focusing the strengths and resources of the community in preventing higher costs as a result of future natural hazards.

Flooding has been one of the most extensive natural hazards in Raymond. The spring floods of 2006, for example, caused significant damage along many roads in Raymond and throughout the state. In 2007, Raymond was hit particularly hard with 14 town roads closed due to high water. In that year, National Guard and U.S. Army units were stationed in Raymond to assist in public safety, rescue and clean-up efforts. Three bridges were closed and State Route 27 and 107 were not passable in a number of locations. The State Bridge on Route 107 was impassable for 4 weeks.<sup>96</sup> While the Town of Raymond has received flood damage assistance through the state and FEMA, these events have brought to light the importance of maintaining and protecting public infrastructure from hazardous events that have the potential to cause great loss and economic harm.

As the seasons change, residents, town officials, and emergency responders must work together and remain aware of the natural vulnerabilities that can occur within the community. While natural hazards will always remain part of the weather cycle, natural hazards planning can help the Town of Raymond avoid or mitigate the potential harm and destruction that these events can cause in the future. This study provides a description

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<sup>96</sup> See 2007 Town Report for Raymond, pg 55

and analysis of the major natural hazards and threats facing the Town of Raymond, summarizes Raymond's existing natural hazard mitigation plan, and sets forth goals, objectives and recommendations for mitigating future hazard events as part of the master plan.

Also included is a summary of the results of the UNH Master Plan Survey as related to natural hazards. There was no citizen-based Topic Group related to Natural Hazards.

## **UNH Survey Results**

Between September and October 2007, the University of New Hampshire Survey Center conducted a community-wide master plan survey of the perceptions, interests and attitudes of residents about the Town of Raymond and future planning initiatives for Raymond. A total of 4,580 surveys were delivered to all Raymond postal patrons in the "On the Common" newsletter on September 14, 2007. In addition, a reminder (post card) was mailed on October 4, 2007.

A total of 409 Raymond residents responded to the survey representing a response rate of nine percent. At the time of the survey, natural hazards, especially flooding, was on the minds of Raymond's residents. Many of the survey respondents indicated some variation of "flooding" being a negative factor or "how we get flooded out in May" in their responses to the following questions:

- Question 4: What do you like least about living in Raymond?
- Question 19: What factors make Raymond less attractive to you? Other specify

An Executive Summary of the Master Plan Survey and a copy of the survey questionnaire are contained within the Appendix of this plan.

## **Master Plan Community Forum Results**

On Saturday, January 26, 2008, Raymond citizens gathered at the High School to hear the various Topic Group Reports prepared for this Master Plan update. While there was no specific citizen-based group or Topic Group Report prepared for "Natural Hazards" there were a number of recommendations related to flooding concerns within the community. These recommendations include:

- Update and Improve the Town's flood disaster plan
  - Protect & restore natural buffers and vegetated areas to maintain & increase Town's flood storage potential.
  - *Forum Comments:* Improve public informing about flood hazards.
  - *Forum Comments:* Build upon the state flood plan information.

- *Forum Comments:* Explore passing local floodplain development regulations that are more restrictive than state or federal regulations concerning new development or redevelopment.

## **A. Natural Hazards Defined**

The Town of Raymond has identified five natural hazards which are likely to occur within region and subsequently affect the town in possibly unforeseen ways. These five natural hazards are defined below and can be found in the Town's existing 2003 Hazard Mitigation Plan. This plan was recently updated in 2009.

**Flooding** -- Includes: Riverine flooding; Ice jam flooding; Dam breach; Northeasters; Torrential Rain/Erosion; Hurricanes

Localized street flooding occasionally results from severe thundershowers, or from more general rain such as coastal "northeasters". Northeasters are large weather systems traveling from South to North passing along or near the seacoast and as the storm approaches, the intensity increases and the resulting counterclockwise cyclonic winds impact the coast and inland areas from a northeasterly direction. Often times with northeasters, sustained winds can meet or even exceed hurricane force, with larger bursts and may last for many more hours than typical hurricanes.

More common and often more disastrous floods generally occur in the spring from large rainfall quantities combined with warm and moist winds that can quickly release water from the snowpack. The seasonal rapid melting of the snowpack usually accelerates flooding, and when this is coupled with moderate to heavy rains, it can also result in flash-flood inundation events. Flooding incidents often result in associated erosion and deposition issues in and near river streambeds.



**Epping Street during 2007 Flood**

General flooding is also caused by hurricanes that occur or follow major rainstorms and can vary in intensity based upon size, duration, and the combination or proximity of other events. Hurricanes are measured using the Saffir/Simpson Scale with a scale number (category) of 1 at the lowest and 5 at the highest (with wind speeds > 155 mph).

Floodwaters from large storms or from a combination of events can quickly inundate dams, culverts, bridges, and other diverting structures that are not adequately designed to handle such flow. Moreover, the debris carried by floodwaters can also compromise the effectiveness of otherwise adequately designed bridges, dams, culverts, and diverting structures. Storm debris carried by floodwaters can often compromise a given flooding hazard by becoming obstructions to normal stormwater flow.

**Winter Weather** – Includes: Ice Jams, Snow Storms

Ice that forms in riverbeds and against structures can present hazardous conditions. Moreover, meltwater and/or stormwater can add to this situation and apply additional vertical and/or lateral force upon structures. Moving ice can often scour abutments and riverbanks and ice often creates temporary dams. This adds to creating additional flood hazards where none previously existed.

Heavy snow loads can be a source of roof failure. Infrastructure, including critical facilities, can be impacted during snow events. Power outages and transportation can often be disrupted (including debris-impacted roads) and the placement of significant snow amounts can be a problem, particularly in the downtown area of Raymond.

**Wildfire** – Includes: Lighting Strikes/ Man made hazards (fire related)

New Hampshire is generally heavily forested and is exposed to fire hazards, particularly during periods of drought. Raymond, although not heavily forested, has had an unfortunate history with wildfire events and the proximity of the populated areas of Raymond are very susceptible to such hazards. All types of fire events, either natural or man-made, must be handled efficiently and effectively so as not to repeat historically devastating events (particularly the downtown area of Raymond).

**Drought**

Information relating to drought from the *State of New Hampshire Natural Hazards Mitigation State Plan* (October 2000) refers to hydrological drought as evidenced by extended periods of negative departures from normal rainfall. Rockingham County was impacted by drought in the 1960's which is particularly significant for the agricultural and livestock assets that are negatively impacted by such events. During the summer of 1999, Raymond, as well as the entire State experienced relatively dry conditions.

## **Extreme Heat**

Information relating to extreme heat from the State of New Hampshire Natural Hazards Mitigation State Plan (October 2000) refers to hottest summer on record as 1999, with over 13 days of temperatures above 90 degrees, 5 days above 95 degrees, and 2 days above 97 degrees. Rockingham County receives occasional extreme heat events and these events can impact the health of humans and livestock. Moreover, utilities are at significant strain as the demand for artificial cooling rises.

## **The Stafford Act and Related Federal Legislation**

The Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) (Public Law 100-707) is a United States federal law designed to bring an orderly and systemic means of federal natural disaster assistance for state and local governments in carrying out their responsibilities to aid citizens. Congress amended the Stafford Act by passing the Disaster Mitigation Act of 2000 (Public Law 106-390) and again in 2006 with the Pets Evacuation and Transportation Standards Act (Public Law 109-308). This legislation provides major disaster relief and provides federal funding to local governments. The most recent amendment to this legislation was a response to the abandonment of thousands of pets and animals in Louisiana after Hurricane Katrina.

## **B. Existing Hazard Mitigation Plan**

The Town of Raymond adopted a Hazard Mitigation Plan in September of 2003 as a requirement of legislation stemming from the Federal Disaster Mitigation Act of 2000. This plan was prepared by the Rockingham County Conservation District (RCCD) in 2003 and it was recently updated in 2009 by the Southern New Hampshire Planning Commission (SNHPC) working in cooperation with town officials. A Hazard Mitigation



**2007 Flood Damage along NH Rt. 107**

Plan identifies natural hazards affecting the town and the risks they present to property in terms of potential losses. The plan also identifies measures currently in place and those that could be implemented in the future to mitigate such natural disasters. Categories of natural hazards that are usually addressed in a hazards mitigation plan are: flooding, wind, fire, ice and snow events, and earthquake.

The Town of Raymond's Hazard Mitigation Plan identifies ten critical elements that would help the town mitigate the impact of future natural hazard events. These ten elements are: 1) Form a Local Hazard Mitigation Planning Committee; 2) Set Hazard Mitigation Goals; 3) Hazard Identification; 4) Critical Facilities Analysis; 5) Capability Assessment; 6) Identify the Areas in Need of Protection/Mitigation; 7) Develop Objectives; 8) Develop Specific Mitigation Measures; 9) Adopt and Implement the Plan; and 10) Monitor and Update the Plan.

The goals identified in Raymond's 2009 Hazard Mitigation Plan update are as follows:

1. To improve upon the protection of the general population, the citizens and guests of the Town of Raymond, from all identified natural and man-made hazards.
2. To reduce the potential impact of identified natural and man-made disasters on the Town of Raymond's Emergency Response Services.
3. To reduce the potential impact of identified natural and man-made disasters on Critical Facilities in the Town of Raymond.
4. To reduce the potential impact of identified natural and man-made disasters on the Town of Raymond's infrastructure.
5. To improve the Town of Raymond's Emergency Preparedness, and Disaster Response and Recovery Capability.
6. To reduce the potential impact of identified natural and man-made disasters on private property in the Town of Raymond.
7. To reduce the potential impact of identified natural and man-made disasters on the Town of Raymond's economy.
8. To reduce the potential impact of identified natural and man-made disasters on the Town of Raymond's natural environment.
9. To reduce the Town of Raymond's liability with respect to identified natural and man-made hazards through a community education program.
10. To reduce the potential impact of identified natural and man-made disasters on the Town's specific historic treasures and interests as well as other tangible and intangible characteristics which add to the quality of life of the citizen's and guests of the Town of Raymond.
11. To identify, introduce, and implement cost-effective hazard mitigation measures so as to accomplish the Town's Goals and Objectives and to raise awareness of, and acceptance of Hazard Mitigation opportunities generally.
12. To work in conjunction and cooperation with local communities in New Hampshire through Mutual Aid Compacts.
13. To address the challenges posed by climate change as they pertain to increasing risks in the State's infrastructure and natural environment

Since completion of the Town of Raymond's 2002 Master Plan, the Town of Raymond has added over a thousand people and the total number of occupied housing units has risen steadily from 3,617 in 2002 to 4,014 housing units in 2006. Currently, 25.2 percent of Raymond's total land area is developed with roughly 71 percent of the town vacant or undeveloped.<sup>97</sup> In addition, as a result of increased housing and commercial growth, the

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<sup>97</sup> See Existing Land Use chapter of this Master Plan

total amount of impervious surfaces in the community has increased from 5.3 percent in 1990 to nearly 10 percent in 2005.<sup>98</sup> All of these factors and demographic changes has the potentially to lead to more intense flooding events, property damage and property loss in the future.

Within undeveloped areas and forested wetlands, a significant portion of rainfall is absorbed into soils (infiltration), stored as ground water, and is slowly discharged to streams through seeps and springs. Generally, flooding is less significant in these conditions because some of the runoff during a storm is absorbed into the ground, thus lessening the amount of runoff into a stream during the storm.

However, as watersheds are urbanized, much of the vegetation is replaced by impervious surfaces, thus reducing the area where infiltration to ground water can occur. Thus, more stormwater runoff occurs – runoff that must be collected by extensive drainage systems that combine curbs, storm sewers, and ditches to carry stormwater runoff directly to streams. Put simply, in a developed watershed, much more water arrives into a stream much more quickly, resulting in an increased likelihood of more frequent and more severe flooding.

### C. Local Emergency Operations Plans

Emergency Operations Plans (EOPs) are developed to help public agencies more effectively respond to emergencies.

All EOPs must comply with the National Incident Management System (NIMS) as developed by the Department of Homeland Security. All municipalities in New Hampshire, in addition to the State itself, are required to have in effect a NIMS compliant EOP.



Picture from Terrie Dolan at Old Manchester Road as seen in the “Union Leader” 2006

EOPs identify local municipal departmental responsibilities in the event of an emergency; highlight community resources and shelters; and establish a chain of command and response plans.

<sup>98</sup> New Hampshire Estuaries Project, Impervious Cover Map

Guidelines for developing EOPs are provided by the New Hampshire Bureau of Emergency Management.

The Town of Raymond participates in the Interstate Emergency Unit, a group of more than 50 towns from Candia to Wells, Maine to Amesbury, Massachusetts, to assist and receive assistance when additional emergency response resources are needed. The City of Manchester, approximately 17 miles southwest of the Town of Raymond, completed its most recent EOP in May 2007. The City of Manchester, for example, lists the Raymond Fire Department as a mutual aid community available to provide ambulance services that are available in a 15-30 minute response.

The Town of Raymond's existing EOP was prepared on November 23, 1999. While this plan was adopted, it is now almost ten years old. Raymond officials have expressed an interest in updating this EOP to reflect the most current techniques in emergency management, to be "forward looking" when it comes to future issues that may arise, and to be NIMS compliant

#### **D. FEMA Mitigation Grant Programs<sup>99</sup>**

FEMA currently has three mitigation grant programs: the Pre-Disaster Mitigation (PDM) Program, the Flood Mitigation Assistance (FMA) Program, and the Hazards Mitigation Grant Program (HMGP). Generally, the PDM and FMA grant programs are useful when making improvements before disaster events occur. The HMGP grant programs are generally available after a major disaster declaration is made. Each program is described in detail below.

##### Pre-Disaster Mitigation Program

The PDM Program was authorized by § 203 of the Stafford Act. Funding for the program is provided through the National Pre-Disaster Mitigation Fund to assist states, local governments, and Indian tribal governments in implementing cost-effective hazard mitigation activities that complement a comprehensive mitigation program. FEMA's aim in funding these plans and projects is supposed to reduce overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations. PDM grants are awarded on a competitive basis and without reference to state allocations, quotas, or other formula-based allocation of funds.

All applicants must be participating in the National Flood Insurance Program (NFIP) if they have been identified through NFIP as having a special Flood Hazard Area (A Flood Hazard Boundary Map [FHBM] or Flood Insurance Rate Map [FIRM] has been issued). In addition, the community must not be suspended or on probation from the NFIP.

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<sup>99</sup> Portions of this section on FEMA mitigation grant programs were taken from Introduction to Homeland Security: Second Edition, Jane Bullock et al. 2006.

After November, 1 2003, local governments and Indian tribal governments applying for PDM funds through the states will have to have an approved local mitigation plan prior to the approval of local mitigation project grants. States will also be required to have an approved standard state mitigation plan in order to receive PDM funds for state or local mitigation projects after November 1, 2004. Therefore, the development of state and local multiple-hazard mitigation plans is key to maintaining eligibility for future PDM funding. The President's FY 2006 budget included a total of \$178 million for the Pre-Disaster Mitigation Fund and National Flood Mitigation Fund combined. Guidance for PDM grants is located at <http://www.fema.gov/government/grant/pdm/index.shtm>.

#### Flood Mitigation Assistance Program

The Flood Mitigation Assistance (FMA) Program provides funding to assist states and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the National Flood Insurance Program (NFIP). Three types of grants are available under FMA: planning, project, and technical assistance grants. FMA planning grants are available to states and communities to prepare flood mitigation plans. NFIP-participating communities with approved flood mitigation plans can apply for FMA project grants. FMA project grants are available to states and NFIP-participating communities to implement measures to reduce flood losses. Ten percent of the project grant is made available to states as a technical assistance grant. These funds may be used by the state to help administer the program. Communities receiving FMA planning and project grants must be participating in the NFIP. An example of eligible FMA projects includes the elevation, acquisition, and relocation of NFIP- insured structures.

Funding for the program is provided through the National Flood Insurance Fund, and FMA is funded at \$20 million nationally on average. States are encouraged to prioritize FMA project grant applications that include repetitive loss properties. The FY 2001 FMA emphasis encouraged states and communities to address target repetitive loss properties identified in the agency's repetitive loss strategy. These include structures with four or more losses and structures with two or more losses in which cumulative payments have exceeded the property value. State and communities are also encouraged to develop plans that address the mitigation of these target repetitive loss properties. Guidance for PDM grants is located at <http://www.fema.gov/government/grant/fma/index.shtm>.

#### Hazard Mitigation Grant Program

Authorized under section 404 of the Stafford Act, 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. The purpose of the program is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster declaration. Hazard Mitigation Grant Program funding is only available in states following a presidential disaster declaration.

Eligible applicants are as follows:

- State and local governments
- Indian tribes or other tribal organizations
- Certain private nonprofit organizations

Individual homeowners and businesses may not apply directly to the program; however, a community may apply on their behalf. HMGP funds may be used to fund projects that may reduce or eliminate the losses from future disasters. Projects must provide a long-term solution to a problem – for example, elevation of a home to reduce the risk of flood damages as opposed to buying sandbags and pumps to fight the flood. In addition, a project's potential savings must be more than the cost of implementing the project. Funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage. Guidance for PDM grants is located at <http://www.fema.gov/government/grant/hmgp/>.

## **FEMA Flood Claims Program**

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).

Some eligible mitigation activities include: acquisition of properties, and either demolition or relocation of flood-prone structures, where the property is deed restricted for open space uses in perpetuity; elevations; dry floodproofing of non-residential structures; and minor localized flood control projects.

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 can not be funded under the Flood Mitigation Assistance (FMA) program due to the lack of State or local capacity, which includes either inability to manage the grant or lack of 25 percent match. Sub-grants are available to local communities through the Bureau of Emergency Management, NH Department of Safety.

A report of the number of insured properties in Raymond which have experienced repetitive flood insurance claims is provided in Table 75. This report indicates that there are two insured buildings which have had 4 or more losses in Raymond due to flooding events.

**Table 75  
Community Repetitive Loss  
Town of Raymond, NH**

|                               | AE, A1-30,<br>AO, AH, A | VE, V1-30, V | B,C,X        | Total        |
|-------------------------------|-------------------------|--------------|--------------|--------------|
| <b>RL Buildings (Total)</b>   | 4                       | 0            | 8            | 12           |
| <b>RL Buildings (Insured)</b> | 3                       | 0            | 7            | 10           |
| <b>RL Losses (Total)</b>      | 11                      | 0            | 21           | 32           |
| <b>RL Losses (Insured)</b>    | 99                      | 0            |              | 28           |
| <b>RL Payments (Total)</b>    | \$192,250.00            | \$0.00       | \$443,291.15 | \$635,541.15 |
| <b>Building</b>               | \$167,639.33            | \$0.00       | \$415,213.49 | \$582,852.82 |
| <b>Contents</b>               | \$24,610.67             | \$0.00       | \$28,077.66  | \$52,688.33  |
| <b>RL Payments (Insured)</b>  | \$168,168.74            | \$0.00       | \$389,528.92 | \$557,697.66 |
| <b>Building</b>               | \$146,544.47            | \$0.00       | \$367,459.69 | \$514,014.16 |
| <b>Contents</b>               | \$21,614.27             | \$0.00       | \$22,069.23  | \$43,683.50  |

|   |   |
|---|---|
| Post - FIRM SFHA RL Buildings                       | 1 |
| Insured Buildings with 4 or More Losses:            | 2 |
| Insured Buildings with 2-3 Losses > Building Value: | 0 |
| Total Target RL Buildings:                          | 2 |

Source: FEMA website, April 2008

## **E. Local Hazard Mitigation Reports**

The Public Works Director has researched the following prior hazard mitigation efforts made by the Town of Raymond as a result of documented storm and flood related events within the community.

| <b><u>Event</u></b> | <b><u>Date</u></b> | <b><u>Cost</u></b>         |
|---------------------|--------------------|----------------------------|
| Flood               | April 2, 1987      | \$23,055.00                |
| Blizzard            | March 13, 1993     | \$ 3,810.00                |
| Flood               | October 21, 1996   | \$12,168.00                |
| Snow Removal        | March 5, 2001      | \$21,392.71                |
| Snow Removal        | February 17, 2003  | \$28,900.18                |
| Flood               | May 12, 2006       | \$21,654.84                |
| Flood               | April 16, 2007     | \$197,088.10               |
| Severe Winter Storm | December 11, 2008  | \$30,472.73                |
|                     | <b>Total</b>       | <b><u>\$338,541.56</u></b> |