

# Northwood All-Hazard Mitigation Plan Update 2014



**Prepared for New Hampshire Homeland  
Security & Emergency Management**

**By  
Strafford Regional Planning Commission  
Rochester, NH 03867**

**July 22, 2014  
Final**

**All-Hazard Mitigation Plan**

# Northwood, NH All-Hazard Mitigation Plan Update 2014

## Acknowledgements

This plan was updated through a grant from New Hampshire Homeland Security Emergency Management (HSEM).

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

The 2007 Northwood Hazard Mitigation Committee  
New Hampshire Homeland Security Emergency Management (HSEM)  
Town of Northwood

## The 2014 Town of Northwood All-Hazard Mitigation Planning Team

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

- Bob Young                      Emergency Management Director, Northwood
- Jim Wilson                      Road Agent, Northwood
- Brent Lemire                      Town Administrator, Northwood
- Jim Lindquist                      Fire Chief, Northwood
- Bob Strobel                      Planning Board Chair, Northwood
- Steve Roy                      Conservation Commission Chair, Northwood
- Linda Smith                      Board Administrator, Northwood
- Julia Chase                      NH HSEM Field Representative
- Elizabeth Peck                      State Hazard Mitigation Officer
- Kyle Pimental                      SRPC Regional Planner

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Photo Credit: Linda Smith, Board Administrator

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## Executive Summary

This Plan was revised and updated to meet statutory requirements and to assist the Town of Northwood in reducing and mitigating future losses from natural and man-made hazardous events. It was developed by Strafford Regional Planning Commission (SRPC) and participants from the Town of Northwood Hazard Mitigation Team, which was made up by the Emergency Management Director, Road Agent, Town Administrator, Fire Chief, Board Administrator, and members of the Conservation Commission and Planning Board. The Plan contains the tools necessary to identify specific hazards, critical infrastructure and key resources, and address existing and future mitigation efforts.

This plan addresses the following hazards that affect the Town:

- Flooding
- Hurricanes and Tropical Storms
- Tornado/Microburst
- Nor'easter
- Severe Thunderstorms
- Wildfire
- Ice and Snow Events
- Earthquake/Landslide
- Extreme Heat
- Drought
- Radon
- Public Health Threats
- Hazardous Material Threat/Human Induced Events
- Extended Power Outages

This plan also provides an updated list of Critical Infrastructure and Key Resources (CI/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, the State Hazard Mitigation Plan, research data, and other available mitigation documents from multiple sources. Combining elements from these sources, the Team was able to produce this integrated all-hazards plan and recognizes that such a plan must be considered a work in progress. In addition to periodic reviews there are three specific situations, which require a formal review of the plan. The plan will be reviewed:

- ***Annually*** to assess whether the existing and suggested mitigation strategies have been successful and remain current in light of any changes in federal state and local regulations and statutes. This review will address the Plan's effectiveness, accuracy and completeness in regard to the implementation strategy. The review will address any recommended improvements to the Plan, and address any weaknesses identified that the Plan did not adequately address. This report will be filed with the Board of Selectmen.

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- ***Every Five Years*** the Plan will be thoroughly reviewed, revised and updated using the same criteria outlined above. At that time it is expected to be thoroughly reviewed and updated as necessary. The public will be allowed and encouraged to participate in that five year revision process.
- ***After any declared emergency event***, the EMD using the same criteria outlined above.
- *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 is 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 meeting 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 invited to participate in all future reviews and updates to this plan. 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, on the SRPC website and noticed to the County commission. There will also be a public meeting before each formal review and before any change/update is sent to FEMA.

Once final approval by FEMA has been received, copies of the Plan will be distributed to the relevant Town Departments and personnel, HSEM, and FEMA and other state and local governmental entities; the Plan will then be distributed by these entities per requirements. Copies of the Plan will remain on file at the Strafford Regional Planning Commission (SRPC) in both digital and paper format.



Patriot's Day Flood – Old Turnpike Road

## Chapter 1: All-Hazard Planning Process

### A. Authority and Funding

Northwood's original Multi-Hazard Mitigation Plan was prepared in accordance with the Disaster Mitigation Act of 2000 (DMA), Section 322. This revised all-hazard plan will be referred to as the "Plan". Northwood's current All-Hazard Mitigation Plan has been prepared by the Northwood 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 (10-1-2010 Edition). This plan is 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 are 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."<sup>1</sup>

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."<sup>2</sup>*

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

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<sup>1</sup> Disaster Mitigation Act (DMA) of 2000, Section 1, b1 & b2

<sup>2</sup> Disaster Mitigation Act (DMA) of 2000, Section 322a

## Northwood, NH All-Hazard Mitigation Plan Update 2014

Northwood's All-Hazard Mitigation Plan is a planning tool for reducing future losses from natural and man-made disasters as required by the Disaster Mitigation Act of 2000; this plan will be adopted but kept separate from the town's master plan. The All-Hazard Mitigation planning process results 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 for receiving Hazard Mitigation Grant Program (HMPG) project grants. Local governments must review the plan yearly and update their plans every five years to continue program eligibility.

### C. Jurisdiction

This plan addresses only one jurisdiction – the Town of Northwood, NH. Once approved by the Planning Team, the Plan will be forwarded to HSEM and FEMA for Conditional Approval. Upon review and conditional approval by HSEM and FEMA, the Board of Selectmen will hold a public meeting, to consider public comments and must promulgate a signed Resolution to Adopt the Plan.

### D. Scope of the Plan

A community's all-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 Infrastructure and Key Resources (CI/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. All-Hazard Planning Process

The planning process consists of ten specific steps. Many factors affect the ultimate sequence of the planning process: length of meetings, community preparation and attendance, and other community needs. All steps are included but not necessarily in the numerical sequence listed. The steps are:

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

**F: Involvement**

The Public, Neighboring Communities, Agencies, Non-profits and other interested parties

Public involvement has been and continues to be stressed starting with the initial meeting; community officials were given a list of potential team members before the first review meetings were held. These included the board of selectmen, the conservation commission, the planning board, the police department, the recreation department, the land use department, the fire department, and the highway department. Local business owners, interested organizations, and residents of Northwood were also invited to participate. 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 sent to area newspapers. The notice was also published and hung up in municipal offices and posted on the Town website. While the Committee aimed at targeting input from the public, there was no response from residents. This is most likely due to the fact scheduled meeting times were in conflict with community members getting home from work. An option for future meetings to be held during scheduled planning board meetings (viewed on local public television) was discussed. All feedback from participants of the planning committee was incorporated into the Plan.

<p style="text-align: center;">Public Announcement Town of Northwood Hazard Mitigation Planning Committee</p> <p>Strafford Regional Planning Commission has begun the update process for Northwood’s Local Hazard Mitigation Plan and the first meeting of the Northwood Hazard Mitigation Planning Committee has been scheduled for Wednesday, January 23<sup>rd</sup> at 6:00PM in the main hall of the Town Hall. The first meeting will include: a brief background of the Hazard Mitigation Planning process, necessary updates for the current 2007 Northwood Hazard Mitigation Plan, and first steps for reviewing recent natural hazard events, such as the 2007 flood event. 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, (603) 994-3500 or <a href="mailto:kpimental@strafford.org">kpimental@strafford.org</a> or to Bob Young, Emergency Management Director at <a href="mailto:ryoung@coebrown.org">ryoung@coebrown.org</a>. This update of the 2006 Northwood Hazard Mitigation Plan is funded by FEMA under contract to Strafford Regional Planning Commission, and is a collaborative planning process with the Town of Northwood.</p>
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**G: Narrative Description of the Process and Methodology**

The Plan is being developed with substantial local, state and federal coordination; completion of this new all-hazard plan required significant planning preparation. All meetings are geared to accommodate brainstorming, open discussion and an increased awareness of potential threats to the Town.

### Meeting 1: January 23, 2013

Members present: Bob Young (Emergency Management Director), Jim Lindquist (Fire Chief), Jim Wilson (Road Agent), Brent Lemire (Town Administrator), Bob Strobel (Planning Board Chair) Steve Roy (Conservation Commission Chair), Linda Smith (Board Administrator) and Kyle Pimental (SRPC Senior Regional Planner).

Kyle Pimental of Strafford Regional Planning Commission explained the reason for this meeting and provided an outline of what he hopes to accomplish at tonight's meeting. He had provided a draft version of the updated chapters prior to today's meeting. The object of this effort is to update the Northwood All-Hazard Mitigation Plan that was adopted in 2006. All municipalities are required to update their mitigation plans in order to be eligible for FEMA funds in the event of a natural or man-made hazardous event.

Kyle explained that the updated plan will have a different format in order to make all plans similar and easier to understand. There have been three items added to the list of hazards that may affect the Town.

- Public Health Threats; which may occur or be more apt to occur from individuals that regularly travel out of the country or to other regions of the state and this country. It was discussed that Northwood is an active member of the Capital Public Health Network (CAPHN): which is a coalition of municipalities and health and human service agencies in the Concord Hospital service area working together to improve local emergency preparedness. The Public Health Emergency Preparedness and Response Plan identified the Coe Brown Academy as the Point of Dispensing (POD) site that administers vaccine or antibiotics as part of the response to infectious disease outbreaks of any magnitude. Previously, the New Hampshire Department of Safety and Health and Human Services conducted a Cities Readiness Full-Scale Strategic National Stockpile Exercise, using the Northwood POD as the point for the CAPHN. The exercise focused on medical supplies management and distribution, mass prophylaxis, emergency public information and warning, and emergency operations center capabilities.
- Hazardous Material Threats or Human Induced Events; large trucks carrying fuel (oil, gas, propane) are a concern as accidents along the Route 4 corridor and the have the potential to contaminate important water supplies.
- Extended Power Outages; have occurred in Northwood as a result of local line damage from vehicle accidents and natural events such as 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, as well as, a loss of emergency communication notifications, and fuel for generators. It was discussed that the six community water agreement supplies has adequate water.

It is suggested that these plans be reviewed annually if possible. Every five years the plan should be reviewed, revised, and updated as necessary. Also, after any declared emergency event or if the Town adopts any modifications to its land use planning documents.

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The committee updated the community profile chapter. Most recent trends in past and future development will be provided by the members of the Planning Board and referenced from the 2004 Master Plan Update. Currently, the Town is in the middle of updating their Master Plan, which will be completed at the end of the year, and any information generated during that update will be included in the hazard mitigation plan. The team also updated a number of statistics of interest, but will be reviewed again by Kyle and Bob at a later date in the interest of time.

The hazard rankings were all discussed and changes were made as follows:

- Flooding moved from HIGH to MEDIUM
- Radon moved from HIGH to MEDIUM
- Wildfire moved from MEDIUM to HIGH
- Earthquakes/Landslides moved from MEDIUM to LOW
- Tornadoes/Microbursts moved from LOW to HIGH

It was also discussed the floodplain acreage needed to be recalculated removing all the surface water features (lakes, ponds, etc.).

The Committee went through the critical infrastructure and key resources to determine where additions, changes, and updates needed to be made. There were a number of facilities and populations to protect added as well as all the cisterns, dry hydrants, and fire ponds would be added and mapped. The Committee next identified vulnerable structures and would reference the 2006 build out and building permit data for identifying future structures.

Lastly, the Committee calculated the potential loss for each of the hazards within the Town of Northwood.

The next meeting date would be determined in the next few weeks using a doodle email.



Old Turnpike Road – Northwood, NH

### Meeting 2: May 22, 2013

Members present: Bob Young (Emergency Management Director), Jim Lindquist (Fire Chief), Jim Wilson (Road Agent), Brent Lemire (Town Administrator), Bob Strobel (Planning Board Chair), Linda Smith (Board Administrator) and Kyle Pimental (SRPC Senior Regional Planner).

The committee reviewed summary notes from the January meeting and held a discussion to see if there were edits or changes that needed to be made in those chapters. After a thorough review and a few minor changes, the consensus was that all relative information was provided and no further edits were needed.

Next, the group reviewed all mitigation strategies currently underway in Northwood and all gaps in existing measures. A listing of recommended improvements was completed and the committee updated the existing protection matrix table. All proposed improvements were discussed and included into the Plan.

Afterwards, the committee reviewed all accomplishments completed since the prior plans approval. Each proposed mitigation action item from the original plan was reviewed and there was consensus on whether it was completed or not.

Lastly, the group reviewed the STAPLEE method and began brainstorming potential new mitigation action items. Each strategy was discussed, ranked, and prioritized. After the group finished the list an implementation plan was discussed. Responsibilities, funding, time frame, and cost effectiveness were all elements that were reviewed.

### Meeting 3: July 12, 2013

Members present: Bob Young (Emergency Management Director), Jim Lindquist (Fire Chief), Linda Smith (Board Administrator) and Kyle Pimental (SRPC Senior Regional Planner).

This final meeting was to ensure there were no more major additions or changes that needed to be made before submittal to FEMA for conditional approval. The committee went through the chapters discussed at the May meeting and were given a chance to make any last suggestions. The committee also reviewed the past and potential hazards map and discussed potential large scale printing options.

Afterwards, it was agreed that the Plan needed a few small edits and the committee would receive a final copy of the Plan before sending down to FEMA for conditional approval. Following conditional approval, Northwood will formally adopt the plan at a board of selectmen meeting before final approval from FEMA.

### Final Meeting with EMD: January 10, 2014

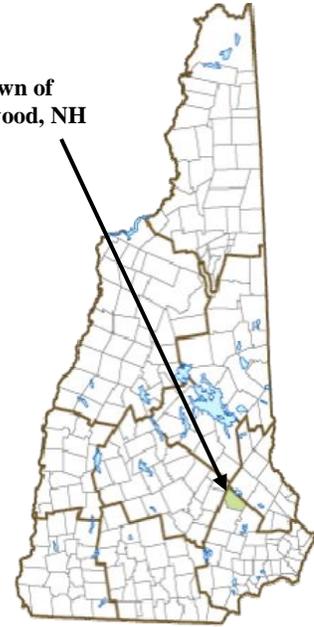
A final meeting was held between Kyle Pimental (SRPC Senior Regional Planner) and Bob Young (EMD) to review FEMA revisions and fill out multi-threat analysis.

## Chapter II: Community Profile

### A. Introduction

Northwood, a small town in southeastern New Hampshire, was founded in 1773 when its first settlers successfully petitioned the Governor's Council requesting separation from Nottingham. Since this section of Nottingham had been known as the great north woods, the newly formed town was called Northwood. The Town of Northwood is located in southeastern NH within Rockingham County. The towns bordering Northwood are: Strafford to the north, Deerfield to the south, Nottingham to the east, Epsom and Pittsfield to the west. Northwood contains 28.1 square miles of land area and 2.1 square miles of inland water.

The Town of  
Northwood, NH



Northwood 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 Northwood, as well as wildfires since Northwood contains a large amount of forest area.

**Incorporated:** 1773

**Origin:** This territory was first settled in 1763, and known as the North Woods, a parish of Nottingham. It was incorporated as a separate town upon agreement with Nottingham in 1773. In 1791, the General Court of New Hampshire authorized a committee to survey and lay out a road between Durham and Concord, which became the First New Hampshire Turnpike. The road runs the length of Northwood, and the town's many taverns accommodated travelers. At one time, there were some 12 sawmills in the town, five of which were replaced by shoe factories.

**Villages and Place Names:** Northwood Center, Northwood Narrows, Northwood Ridge

**Population, Year of the First Census Taken:** 744 residents in 1790

**Population Trends:** Population change for Northwood totaled 3,207 over 50 years, from 1,034 in 1960 to 4,241 in 2010. The largest decennial percent change was 47 percent between 1960 to 1970, followed by increases of 43 and 44 percent over the next two decades. The 2010 Census estimate for Northwood was 4,241 residents, which ranked 90<sup>th</sup> among New Hampshire's incorporated cities and towns.

**Population Density and Land Area, 2008** (*NH Office of Energy & Planning*): 151.2 persons per square mile of land area. Northwood contains 28.1 square miles of land area and 2.0 square miles of inland water area.

Source: Economic & Labor Market Bureau, NH Employment Security, 2012.

<http://www.nhes.nh.gov/elmi/products/cp/profiles-pdf/northwood.pdf>

## B. Northwood's History & Past Development Trends

### A Brief History of Northwood

*Written by the Northwood Cookbook Committee*

Northwood, a small town in southeastern New Hampshire, was founded in 1773 when its first settlers successfully petitioned the Governor's Council requesting separation from Nottingham. Since this section of Nottingham had been known as the great north woods, the newly formed town was called Northwood.

The First New Hampshire Turnpike was built about 1800 to connect Portsmouth, New Hampshire's only seaport, with the state capitol, Concord; it runs the length of Northwood. Also called Route Four, the highway has been a major influence on the town since it was constructed. Throughout the nineteenth century, our many early taverns accommodated sledge and stage passengers. In this century travelers with speedier vehicles have enjoyed our summer boarding houses, overnight cabins, motels and restaurants. Other visitors, not seeking food or sleep, go antiquing in the dozens of shops along the road.

Though thousands of motorists each day see our town only as they hurry along our eight-mile "main street," some call it home. About 3,200 persons are full-time residents and about twice as many have second homes here. Though Northwood is sometimes called a bedroom community, there are more than one hundred small businesses in town, employing from one to twenty-five workers each.

Northwood is proud of its nine lakes and ponds, its mountain views, miles of country roads, and its many lovely old homes and public buildings.

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Northwood comprises 19,356 total acres (30.24 square miles), including 17,978 acres of land (28.09 square miles) and 1,378 acres of water (2.1 square miles) (NH GRANIT System; NH OEP and Complex Systems Research Ctr., UNH). Northwood is lightly developed. Most of the developed land is of residential nature, with only scattered commercial and public uses. The residential uses are predominantly single-family detached homes. In general, the pattern of developed uses is so dispersed that it requires driving to get around, except perhaps for the relatively few people living in the Town center. Commuting out of town to work is also clearly a necessity for the majority of people given the relatively small number of commercial land uses in Northwood. Town Hall is at the center with Police at western extreme. The Elementary School is at the Ridge, two miles to the East. Coe-Brown is at the Center as is the Town Recycling and Public Work as well as Northwood Meadow State Park. The Library is at the East end of town. The remainder of Town is not densely settled, and maintains a comfortable rural scale. Remaining development naturally follows along the road network. The dispersed nature of roads, however, has kept density low. There is no municipal water or sewer, and the Town controls density based on the ability of soils to provide for sanitary water supply and sewage disposal. A ring of homes and camps surrounds Northwood and Harvey

## Northwood, NH All-Hazard Mitigation Plan Update 2014

Lakes. Similar, though somewhat less extensive, development has occurred at most of the other larger ponds in Northwood.

Northwood contains many wetland areas. Major wetlands in Northwood include Betty Meadows, Northwood Narrows area, and Northwood Center. Many of the wetlands in Northwood are also floodplains. Major floodplains are located along Kelsey Brook, Narrows Brook, Tucker Brook and North Lucas Pond.

Northwood updated its Master Plan in 2004, which includes future land use planning based on the principles of smart growth, suggested enacting zoning controls which encouraged new housing units and community oriented businesses to be located in or near the villages of East Northwood, the Ridge and Northwood Narrows. A land build out analysis was completed in 2006 to assist the Town in planning. The Planning Board continues to consider implementation strategies for future land use to achieve those planning principles.

It might also be indicated that most of the aforementioned potential development areas are not significantly inclusive of 100-yr floodplain. The location of future development at least as envisioned in the master planning process, is currently under discussion and may change considerably from that described above.

Currently, the Town is in the middle of updating their Master Plan, which will be completed at the end of the year, and any applicable information generated during that update will be included in the hazard mitigation plan.



Flooding Event – Northwood, NH

**C. Existing & Future Development Trends**

Excerpts taken from the 2004 Master Plan: Northwood, NH.

At the 2004 Master Plan Visioning Workshop four concerns with regard to future land use emerged as most important to Northwood residents:

1. Maintain rural character;
2. Protect and preserve natural resources;
3. Provide recreational opportunities; and
4. Achieve a balance between residential development and economic development.

The major issue surrounding future land use is achieving a reasonable balance between Northwood's traditional rural character and future development, while understanding the need to allow for growth of the community.

According to the Smart Growth New Hampshire Steering Committee, there are eight principles that summarize the land use issues facing rural New Hampshire Towns.

1. Maintain traditional compact settlement patterns to efficiently use land resources and investment in infrastructure.
2. Foster the traditional character of New Hampshire downtowns, villages, and neighborhoods by encouraging development that is comfortable for pedestrians and conducive to community life.
3. Incorporate a mix of uses to provide a variety of housing, employment, shopping, services, and social opportunities for all members of the community.
4. Provide choices and safety in transportation to create livable, walkable communities that increase accessibility for people of all ages.
5. Preserve New Hampshire's working landscape by sustaining farm and forestland and other rural land to maintain contiguous tracts of open land and minimize land use conflicts.
6. Protect environmental quality by minimizing impact from people and maintaining natural areas that contribute to the health and quality of life in New Hampshire.
7. Involve the community in planning and implementing to ensure that the development retains and enhances sense of place, traditions, goals, and values of the local community.
8. Manage growth locally, but work with neighboring towns to address common goal and common problems more effectively.

Based on the input received from citizens at the Visioning Workshop, it is fair to say that these eight principles represent the concerns of the citizens of Northwood.

**Table 2.1 Statistics of Interest to All-Hazard Mitigation Planning**

Table 2.1: Statistics of Interest to All-Hazard Planning					
Town of Northwood	Phone	(603) 942-5586			
Brent T. Lemire, Town Administrator	Fax	(603) 942-9107			
818 First NH Turnpike	Email	<a href="mailto:blemire@northwoodnh.org">blemire@northwoodnh.org</a>			
Northwood, NH 03261	Website	<a href="http://www.northwoodnh.org">www.northwoodnh.org</a>			
<b>Population</b>	2010	2000	1990	1980	1970
Town of Northwood	4,241	3,656	3,127	2,175	1,525
Rockingham County	295,223	278,748	246,744	190,345	138,951
Elderly Population (% over 65)	Approximately 11% (estimated population of 468)				
Median Age	40.8 years				
<b>Regional Coordination</b>					
County	Rockingham				
Regional Planning Commission	Strafford Regional Planning Commission				
Watershed Planning Region(s)	Lamprey River				
Tourism Region	Merrimack Valley				
<b>Municipal Services &amp; Government</b>					
Type of Government	Selectmen				
Select Board	Yes; Elected				
Planning Board	Yes; Elected				
Budget Committee	Yes; Elected				
Library Trustees	Yes; Elected				
Conservation Commission	Yes; Appointed				
Recreation	Yes; Appointed				
Building Inspector/Health Officer	Yes				
Master Plan	Yes; Updated 2004				
Capital Improvement Plan	Yes; Updated 2004 (spreadsheet was updated in 2011)				
Emergency Operation Plan (EOP)	Yes; Updated 2011				
Zoning & Land Use Ordinances	Yes; Updated 2011				
Subdivision Regulations	Yes				
Building Permits Required	Yes				
Flood Ordinance	Yes				
<b>Percent of Local Assessed Valuation by Property Type, 2011</b>					
Residential Buildings	90.2%				
Commercial Land & Buildings	8.8%				
Public Utilities, Current Use, and Other	1.0%				

**Northwood, NH All-Hazard Mitigation Plan Update 2014**

<b>Table 2.1: Statistics of Interest to All-Hazard Planning</b>	
<b>Emergency Services</b>	
Emergency Warning System(s)	Reverse 911; Northwood School and Coe-Brown Alert Network
Police Department	Full-time
Fire Department	Full & part-time
Fire Stations	Two stations (Narrows & Ridge) and one garage (East end)
Town Fire Insurance Rating	9/10 (9 being most of town and 10 being Gulf Road)
Emergency Medical Services	Full & part-time
Established EMD	Yes
Nearest Hospital(s)	Frisbie Memorial, Rochester (17 miles; 82 staffed beds), Concord Hospital, Concord (20 miles; 211 staffed beds)
<b>Utilities</b>	
Public Works Director	Elected Road Agent
Water Supplier	Northwood Ridge Water District; Private Wells
Electric Supplier	PSNH; NH Electric Coop
Natural Gas Supplier	None
Cellular Telephone Access	Yes
High Speed Internet	Yes (both business and residential)
Telephone Company	Fairpoint
Public Access Television Station	Yes
Pipeline(s)	No
<b>Transportation (distances are estimated from Town Hall)</b>	
Evacuation Routes	US4 & 202 (E/W), NH43, 9 & 107 and US202 & 202A (N/S)
Nearest Interstate	I-93, Exit 15 (18 miles); I-95, Exit 5 (26 miles)
Railroad	No
Public Transportation	No
Nearest Airport Scheduled Service	Manchester-Boston Regional (30 miles)
Nearest Public Use Airport, General Aviation	Concord Municipal
<b>Housing Statistics (American Community Survey 2006-2010)</b>	
Total Households	2,139
Single-Family Units, Detached or Attached	1,805
Units in Multiple-Family Structures:	
Two to Four Units in Structure	99
Five or More Units in Structure	64
Mobile Homes and Other Housing Units	171

**Table 2.1: Statistics of Interest to All-Hazard Planning**

<b>Other</b>	
Web site	<a href="http://www.northwoodnh.org">www.northwoodnh.org</a>
Local Newspapers	Fosters, Suncook Valley Sun, Concord Monitor
State (E) 911 GIS data available	Yes
Assessed structure value 2011	\$224,913,575
National Flood Insurance Program	1/02/1987
Repetitive Losses	None
<i>Information found in Table 2.1 was derived from local input, the 2010 Census or the Economic &amp; Labor Market Information Bureau, NH Employment Security, 2011.</i>	

## Chapter III: Hazard Identification

### A. Hazard Rankings

The nature of each hazard type and the quality and availability of corresponding data made the evaluation of hazard potential difficult. The Northwood Hazard Mitigation Committee considered what data was at hand and used its collective experience to formulate statements of impact or potential. Each hazard type is assigned a general ranking of high (H), medium (M), or low (L). These hazards were ranked using the multi-threat analysis found on the next page. High hazards were considered to have a relative threat (risk severity x probability) of 6.00 and above; medium hazards had a relative threat between 3.33 – 4.00; and low hazards had a relative threat between 1.33 – 3.00. Refer to the table on the next page for more information.

The Team determined that the hazards are distributed as follows:

- 6 hazards ranked as being **high** in Northwood are: Wildfire, Ice/Snow Events, Tornado/Microburst, Nor'easters, Severe Thunderstorms, and Public Health Threats
- 4 hazards ranked as being **medium** in Northwood are: Extended Power Outages, Drought, Hazardous Material Threat/Human Induced Events, and Extreme Heat
- 4 hazards ranked as being **low** in Northwood are: Radon, Hurricanes and Tropical Storms, Earthquake and Landslides, and Flooding

Table 3.1 provides estimates of the level of impact each listed hazard could have on humans, property and business and averages them to establish an index of “severity”. The estimate of “probability” for each hazard is multiplied by its severity to establish an overall “relative threat” factor. This matrix also shows the frequency of future occurrence (based on a 25-year window).

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**Table 3.1: Multi-Hazard Threat Analysis**

Hazards that are most likely to significantly affect Northwood						
Hazards that may affect Northwood						
Hazards that are less likely to affect Northwood						
Column	A	B	C	D	E	F
Scoring	Probability of death or injury	Physical losses and damages	Interruption of service	Likelihood of this occurring within 25 years	Average of Human, Property & Business Impact	Relative Threat
1 = Low						
2 = Moderate						
3 = High					[A + B + C]/3	D x E
Hazard	Human Impact	Property Impact	Business Impact	Probability	Severity	Risk Severity x Probability
Wildfire	2	3	2	3	2.33	7.00
Ice/Snow Events	2	2	3	3	2.33	7.00
Tornado/Microburst	2	2	2	3	2.00	6.00
Nor'easter	2	2	2	3	2.00	6.00
Severe Thunderstorms	2	2	2	3	2.00	6.00
Public Health Threat	3	1	2	3	2.00	6.00
Extended Power Outages	2	2	2	2	2.00	4.00
Drought	1	2	2	2	1.67	3.33
Hazardous Material Threat/Human Induced Events	2	1	2	2	1.67	3.33
Extreme Heat	2	1	2	2	1.67	3.33
Radon	1	1	1	3	1.00	3.00
Hurricanes and Tropical Storms	2	2	2	1	2.00	2.00
Earthquake & Landslides	1	2	2	1	1.67	1.67
Flooding	1	2	1	1	1.33	1.33

## B. Description of Hazards

This section describes the location and extent of hazards that could impact the Town of Northwood, presents past hazard events in Northwood or elsewhere in New Hampshire that have had effects in Northwood, and discusses their rank order placement. The Hazard Mitigation Committee investigated past and potential hazards using a variety of sources and techniques, including but not necessarily limited to interviewing Town historians and other citizens; researching historical records archived at the Town Library; scanning old newspapers; reading published Town histories; consulting various hazard experts; and extracting data from the NH Hazard Mitigation Plan and other state and federal databases. With spatial data available, past and potential hazards were mapped.

### 1) Wildfire (High)

Northwood 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. Wildfires in New Hampshire historically have tended to run in 50-yr cycles, which can be observed starting from the 1800s. This 50-year cycle is partially based upon human activities and, therefore, may not prove to be accurate into the future.<sup>3</sup> According to the National Wildfire Coordinating Group (NWCG), size of wildfire can be defined as:

Class A - one-fourth acre or less; Class B - more than one-fourth acre, but less than 10 acres; Class C - 10 acres or more, but less than 100 acres; Class D - 100 acres or more, but less than 300 acres; Class E - 300 acres or more, but less than 1,000 acres; Class F - 1,000 acres or more, but less than 5,000 acres; Class G - 5,000 acres or more.
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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, 60 years later, New Hampshire officials are again concerned about the high fuel load created by the 1998 and 2008 ice storm that hit New Hampshire. In Northwood, the Northwood Meadows State Park (674.5 acres) is most vulnerable to wildfire and could see a potential Class E wildfire if conditions were right. 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.

### 2) Ice and Snow Events (High)

Winter snow and ice events are common in New Hampshire. The NCDC Storm Events database (NCDC 2012) reports 29 Heavy Snow events, 2 Ice Storms, and 3 Winter Storms (nor'easters) among large winter weather events from October 2006 to September 2012. Heavy snows typically bring significant snow removal costs and costly delays in transportation schedules. Heavy, wet snows can also result in significant damage from

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<sup>3</sup> New Hampshire Department of Safety. State of NH Natural Hazard Mitigation Plan 2010. Homeland Security and Emergency Management.

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high snow loads. The most severe damage, though, often comes from ice storms and winter nor'easters.

The Sperry–Piltz Ice Accumulation Index, or SPIA Index, is a forward-looking, ice accumulation and ice damage prediction index that uses an algorithm of researched parameters that, when combined with National Weather Service forecast data, predicts the projected footprint, total ice accumulation, and resulting potential damage from approaching ice storms. It is a tool to be used for risk management and/or winter weather preparedness.

**The Sperry-Piltz Ice Accumulation Index, or “SPIA Index” – Copyright, February, 2009**

ICE DAMAGE INDEX	* AVERAGE NWS ICE AMOUNT (in inches) <small>*Revised-October, 2011</small>	WIND (mph)	DAMAGE AND IMPACT DESCRIPTIONS
<b>0</b>	< 0.25	< 15	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
<b>1</b>	0.10 – 0.25	15 - 25	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
	0.25 – 0.50	< 15	
<b>2</b>	0.10 – 0.25	25 - 35	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
	0.25 – 0.50	15 - 25	
	0.50 – 0.75	< 15	
<b>3</b>	0.10 – 0.25	> = 35	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1 – 5 days.
	0.25 – 0.50	25 - 35	
	0.50 – 0.75	15 - 25	
	0.75 – 1.00	< 15	
<b>4</b>	0.25 – 0.50	> = 35	Prolonged & widespread utility interruptions with extensive damage to main distribution feeder lines & some high voltage transmission lines/structures. Outages lasting 5 – 10 days.
	0.50 – 0.75	25 - 35	
	0.75 – 1.00	15 - 25	
	1.00 – 1.50	< 15	
<b>5</b>	0.50 – 0.75	> = 35	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.
	0.75 – 1.00	> = 25	
	1.00 – 1.50	> = 15	
	> 1.50	Any	

(Categories of damage are based upon combinations of precipitation totals, temperatures and wind speeds/directions.)

Four events of those listed in the NCDC database are of particular note for their severity:

1. **The Nor'easter of 1996** (December 7<sup>th</sup>) 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.
2. **The Ice Storm of 1998** (January 7th - 9th) had near statewide impact and resulted in a FEMA emergency declaration (#1199) for all but Rockingham County. The 1998 ice storm probably surpassed the Nor'easter 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 (Cold Regions Research and Engineering Laboratory, 1998).

3. **The Ice Storm of 2008** (December 11<sup>th</sup> – 12<sup>th</sup>) was a major winter storm that brought a mixture of snow, sleet, and freezing rain. The greatest impact in the state was in southern and central New Hampshire where a significant ice storm occurred. Following the ice storm, recovery and restoration efforts were negatively impacted by additional winter weather events that passed through the state. The freezing rain and sleet ranged from 1 to 3 inches, ice accretion to trees and wires in these areas generally ranged from about a half inch to about an inch. The weight of the ice caused branches to snap, and trees to either snap or uproot, and brought down power lines and poles across the region. About 400 thousand utility customers lost power during the event, with some customers without power for two weeks. Property damage across northern, central and southeastern NH was estimated at over \$5 million; the interior of Rockingham County saw approximately \$1.62 million in damages.
4. **The Blizzard of 2013 – NEMO** (February 8<sup>th</sup>-9<sup>th</sup>) was an area of low pressure developed rapidly off the Carolina coast late on the 7th and early on the 8th. The storm moved very slowly northeast during the 8th and 9th as it continued to intensify. By the morning of the 10th, the storm was located just to the east of Nova Scotia. The storm brought heavy snow, high winds, and blizzard conditions to the southeastern part of the state. Snowfall amounts were generally 18 inches or more in the southeast where blizzard conditions caused considerable blowing and drifting snow. In western and northern sections, snowfall amounts were in the 4 to 18 inch range. Southeastern New Hampshire had blizzard conditions for about 3 to 10 hours.

Northwood 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.

**3) Tornado/Microburst (High)**

Though the frequency of tornado events in New Hampshire is not great, the state has experienced large tornados throughout its history. An early example is the tornado that struck the state in September 1821. This tornado was reported to have tracked from the Connecticut River, near Cornish, and terminating near Boscawen. When the skies cleared, 6 people were dead, hundreds injured and thousands homeless.

**Tornado Fujita Scale**

F Number	Wind	Damage
<b>f 0</b>	45 - 78	little damage
<b>f 1</b>	79 - 117	minor damage
<b>f 2</b>	118 - 161	roof gone
<b>f 3</b>	162 - 209	walls collapse
<b>f 4</b>	210 - 261	blown down
<b>f 5</b>	262 - 317	blown away

In 1998 a F2<sup>4</sup> tornado in Antrim, N.H. blew down a 45-foot by 12-foot section of the Great Brook Middle School. Witnesses reported seeing a funnel cloud, and the weather service, after an inspection, confirmed it was a tornado. According to the June 2, 1998 edition of the Eagle Tribune, John Jensenius from the National Weather Service in Gray, Maine estimated that the twister cut a path half a mile long, up to 100 yards wide, and was on the ground for several minutes.

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<sup>4</sup> The [Fujita scale \(F-Scale\)](#), is a scale for rating tornado intensity, based primarily on the damage tornados inflict on human-built structures and vegetation.

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In July 2008, an F2 tornado and high winds created a path of destruction through five New Hampshire counties that destroyed homes, displaced families, downed trees and forest lands and closed major state roadways. The impact to residents was extensive, with over 100 homes rendered uninhabitable. Phone and electric service was cut off to over 12,500 customers. One fatality is attributed to a building collapse, and local hospitals reported numerous physical injuries associated with this severe storm.<sup>5</sup>

Downburst activity is very prevalent throughout the State. However, the majority of them go mostly unrecognized unless a large amount of damage has occurred. Several of the more significant and recent events are highlighted below:

- Central, NH – July 6, 1999 – Damages: Two roofs blown off structures, downed trees, widespread power outages, and damaged utility poles and wires; two fatalities.
- Stratham, NH – August 18, 1991 – Damages: \$2,498,974 worth of damages; five fatalities.
- Moultonborough, NH – July 26, 1994 – Damages: Downed trees, utility poles and wires. Approximately 1,800 homes without power and 50-60 homes damages.
- Bow, NH – September, 6, 2011 – Damages: City Auto in Bow had 15 campers damaged and estimated \$200,000 in damage.

While the probability for Northwood should be low, there was discussion on the potential for an increase of tornado events given new information on pressure systems colliding over Northwood due to the natural contour of the Town. The Committee felt as though with the increase in frequency of high intensity storms tornados are now a high hazard.

#### 4) **Nor'easter (High)**

A Nor'easter is a large weather system traveling from south to north, passing along the coast. As the storm's intensity increases, the resulting counterclockwise winds that impact the coast and inland areas in a Northeasterly direction. Winds from a Nor'easter can meet or exceed hurricane force winds.<sup>6</sup> 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.

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<sup>5</sup> New Hampshire Department of Safety. State of NH Natural Hazard Mitigation Plan 2010. Homeland Security and Emergency Management.

<sup>6</sup> New Hampshire Department of Safety. State of NH Natural Hazard Mitigation Plan 2010. Homeland Security and Emergency Management.

The probability of Northwood experiencing at least one nor'easter in any given year is very high. Nor'easters do not occur every year but in most years.

### 5) **Severe Thunderstorms/Lightning (High)**

Thunderstorm related hazards that could impact the Town of Northwood 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. The National Climatic Data Center Storm Events database (NCDC 2012) lists 39 reports of severe thunderstorm winds in Rockingham County from October 2006 to September 2012, none of which reported any deaths or injuries.

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. According to the State of NH Natural Hazard Mitigation Plan 2012, Lightning kills an average of 87 people per year in the United States, and New Hampshire has the 16<sup>th</sup> highest casualty rate in the nation (Maine is 8<sup>th</sup>).

Despite the relatively low incidence of lightning in New Hampshire and Maine, these States have relatively high casualty rates (combined injury/death rate) due to lightning. Residents and visitors to Northern New England are likely to be more vulnerable to being struck by lightning because of the activities with which they are involved, particularly on those warm summer days when lightning is most likely to occur. Often, many people are outside enjoying the variety of recreational activities during the summer when the vulnerability to lightning strike is highest.<sup>7</sup>

Finally, hail is a 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. The NCDC Storm Events database lists 88 reported hailstorms in Rockingham County from October 2006 to September 2012. The data in those entries indicate hailstone size as large as 1.75 inches (5 occasions: Windham-1; West Windham-1; Derry-2; Westville-1).

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

### 6) **Public Health Threat (High)**

The CDC's official definition of an epidemic is: "The occurrence of more cases of disease than expected in a given area or among a specific group of people over a particular period

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<sup>7</sup> New Hampshire Department of Safety. State of NH Natural Hazard Mitigation Plan 2010. Homeland Security and Emergency Management.

of time."<sup>8</sup> Such a threat may occur or be more apt to occur from individuals that regularly travel out of the country or to other regions of the state and this country.

It was discussed that Northwood is an active member of the Capital Public Health Network (CAPHN): which is a coalition of municipalities and health and human service agencies in the Concord Hospital service area working together to improve local emergency preparedness. The Public Health Emergency Preparedness and Response Plan identified the Coe Brown Academy as the Point of Dispensing (POD) site that administers vaccine or antibiotics as part of the response to infectious disease outbreaks of any magnitude. Previously, the New Hampshire Department of Safety and Health and Human Services conducted a Cities Readiness Full-Scale Strategic National Stockpile Exercise, using the Northwood POD as the point for the CAPHN. The exercise focused on medical supplies management and distribution, mass prophylaxis, emergency public information and warning, and emergency operations center capabilities.

### 1) **Extended Power Outages (Medium)**

Extended power outages have occurred in Northwood, both as a result of local line damage from vehicle accidents, 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, as well as, a loss of emergency communication notifications, and fuel for generators. It was discussed that the six community water supplies would be available and will have adequate water.

### 2) **Drought (Medium)**

Droughts have been recurring through the past centuries, and New Hampshire experienced its most recent drought during 2001 and 2002. This drought was the 3<sup>rd</sup> worst on record. There have been five droughts of significant extent and duration as evident over the course of the last 80 years.

1. 1929 – 1936; Statewide; Regional drought
2. 1939 – 1944; Statewide; Severe in southeast and moderate elsewhere
3. 1947 – 1950; Statewide; Regional longest recorded continuous spell of less than normal participation
4. 2001 – 2002; Statewide; Third worst drought on record, exceeded only by the drought of 1956-1966 and 1941-1942.

The drought of 1929-1936 coincided with severe drought conditions in large areas of the central and eastern United States. The most severe drought recorded in New Hampshire occurred from 1960 to 1969. This drought encompassed most of the northeastern United States.

Historically, droughts in New Hampshire have had limited effect because of the plentiful water resources and sparse population. Since 1960, the population has more than doubled, which has increased demand for the State's water resources. Further droughts

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<sup>8</sup> [Outbreaks vs. Epidemics](#). Koerner, Brendan. December, 2003.

may have considerable effect on the State's densely populated areas along the seacoast and in the south-central area.<sup>9</sup>

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.

### 3) **Hazardous Material Threat/Human Induced Events (Medium)**

Hazardous materials in various forms can cause death, serious injury, long-lasting health effects, and damage to buildings, homes, and other property. Many products containing hazardous chemicals are used and stored in homes routinely. These products are also shipped daily on the nation's highways, railroads, waterways, and pipelines. Chemical manufacturers are one source of hazardous materials, but there are many others, including service stations, hospitals, and hazardous materials waste sites.

The hazard team recognized that in Northwood, there are a large number of trucks carrying fuel (oil, gas, propane) traveling along the Route 4 corridor. These vehicles are a concern, as any accident involving trucks carrying hazardous materials could have the potential to contaminate important water supplies.

### 4) **Extreme Heat (Medium)**

According to the NOAA National Climatic Data Center's Storm Events database (NCDC 2012) there are no reports of extreme heat in Rockingham County, although heat waves certainly have occurred regularly in the past. No records of deaths due to extreme heat were found for Northwood 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.

### 1) **Radon (Low)**

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.

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<sup>9</sup> New Hampshire Department of Safety. State of NH Natural Hazard Mitigation Plan 2010. Homeland Security and Emergency Management.

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 Rockingham Co. exceeded the 4.0 pCi/L action level and 13.0% even exceeded 12.0 pCi/L. The probability of significant radon exposure is apparently quite high.

**2) Hurricanes and Tropical Storms (Low)**

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 Northwood, most notably in 1938 and 1954. Quite a few other hurricanes have impacted the Town with high winds but relatively little damage. The NOAA National Climatic Data Center's Storm Events database (NCDC 2012) does not list any Hurricanes as directly affecting Rockingham County. The database does report one tropical storm event, which is detailed as follows:

**Saffir-Simpson Scale**

Category	Wind (mph)	Pressure (inches)	Surge (feet)
1	74-95	> 28.94	4 - 5
2	96-110	28.50-28.93	6 - 8
3	111-130	27.91-28.49	9 - 12
4	131-155	27.17-27.90	13 - 18
5	> 155	< 27.16	> 18

1. **Tropical Storm Irene** (August 28, 2011) - brought a prolonged period of strong and gusty winds and heavy rain to the state. The high winds snapped or uprooted numerous trees throughout the state causing more than 160,000 customers to lose electrical and/or communication services. The heavy rains caused rivers and streams throughout the state to flood causing damage to bridges, roads, and property. The strongest winds across the state began Sunday morning in southern areas and spread northward during the day. Winds continued to be gusty overnight as the storm moved away from the area. Observed maximum wind gusts included 63 mph at Portsmouth, 52 mph at Concord, and 51 mph at Manchester. On the top of Mt. Washington, winds gusted to 104 mph as the storm approached and 120 mph as it moved away. The combination of wet soil and the prolonged period of strong and gusty winds brought down numerous trees throughout the state. One person was killed and three people were injured across the state due to falling trees or branches. Rainfall amounts across the state ranged from 1.5 to 3 inches across southeastern New Hampshire.

The last hurricane to hit the region was Hurricane Sandy during the period of October 26 to November 8, 2012. Declaration FEMA-4095 requested funds for debris removal and emergency protective measures. While Rockingham County was not included in the public assistance or direct federal assistance declaration, Northwood did experience some damage due to heavy rain and sustained wind speeds, which needed emergency repair.

Other analyses show that Northwood has between a 5% and a 12% probability of being impacted by a named tropical storm sometime in any June to November storm season (Atlantic Oceanographic and Meteorological Laboratory-AOML, 2004). Because Northwood 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 Northwood is, therefore, moderate. Hurricanes and tropical storms will continue to affect the Town of Northwood. As many as 10 significant Hurricanes have impacted Northwood and the surrounding region. It is likely that the region will be impacted by a significant storm of tropical origin within the foreseeable future.

#### 4) **Flooding (Low)**

Second only to winter storms, riverine flooding is the most common natural disaster to impact New Hampshire.

New Hampshire usually has a climate of abundant precipitation. Weather ranges from moderate coastal to severe continental, with annual precipitation ranging from about 35 inches in the Connecticut and Merrimack River valleys, to about 90 inches on top of Mount Washington. Localized street flooding occasionally results from severe thundershowers, or over larger areas, from more general rain such as tropical cyclones and coastal “nor’easters.” More general and disastrous floods are rare, but some occur in the spring from large rainfall quantities combined with warm, humid winds that rapidly release water from the snowpack.<sup>10</sup>

Flooding can be better described by:

### **The “100-year flood” Term:**

The “100-year flood” is a term often used to describe a flood that has a 1% chance of occurring in any year. But the phrase is misleading, and often causes people to believe these floods happen every 100 years on average. The truth is, these floods can happen quite close together, or not for long stretches of time, but the risk of such a flood remains constant from year to year. The 100-year-flood term was originated to delineate areas on a map to determine what properties are subject to the National Flood Insurance Program. Properties within the 100-year-floodplain, as defined by the Federal Emergency Management Agency, have special requirements and mortgage holders will require owners to carry flood insurance on these properties.

[Source: The Nurture Nature Center: Focus on Floods]

Based on extent of the floodplain, Northwood does have some flooding potential along Kelsey Brook, Narrows Brook, Tucker Brook and North of Lucas Pond. Northwood has approximately 358.2 acres of its area in 100-yr. floodplain. Although flooding of the full extent of this floodplain by definition would require a 100-yr. storm, smaller storms with a higher annual probability of occurrence could still flood significant portions of that floodplain. Some of the structures that would be impacted by a 100-yr. storm could also be affected by smaller, more frequent flooding.

<sup>10</sup> New Hampshire Department of Safety. Hazard Mitigation State Hazard Mitigation. 2010. Homeland Security and Emergency Management.

Northwood has areas where development is particularly susceptible to 100-year flooding includes the areas immediately around Harvey Lake.

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 Northwood. 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. Rapid snow melt in spring is always a significant potential flooding source, given the northern, relatively cold location and climate of Northwood, 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 Northwood, 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.

Finally, the potential for catastrophic flooding from dam breach or failure exists in Northwood. According to the New Hampshire Department of Environmental Services, the only dam required to have an emergency action plan is a Conservation Pond-Gulch Mountain Pond. The plan is not complete but the dam, however, has never breached. The probability of this particular flooding hazard occurring is quite small. Overall, flooding potential in Northwood is medium.

### 1) Earthquake/Landslide (Low)

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 2007) and documents that New Hampshire is an area of high earthquake probability. Three hundred and sixty (360) earthquakes occurred in New Hampshire from 1638 to 2007. Only four of significant magnitude (Richter Magnitude<sup>11</sup> 4.2 or more), however have occurred.

- Ossipee, NH – December 20, 1940 – Magnitude 5.5
- Ossipee, NH – December 24, 1940 – Magnitude 5.5
- Near NH & Quebec Border – June 15, 1973 Magnitude 4.8
- West of Laconia – January 19, 1982 – Magnitude 4.5

This data would suggest, then, that earthquakes are on average an annual occurrence but that significant quakes (Richter Magnitude of 2.4 or more) have an annual probability of occurrence (based on the 1638 to 2007 period) of about 1.1%.

Landslides would occur in Northwood 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

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<sup>11</sup> The [Richter magnitude scale](#) was developed to assign a single number to quantify the energy released during an earthquake

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heavy precipitation events. Given seismic or precipitation events that could initiate landslide, landslide hazard is likely quite high in steep slope areas. Consideration must be given to the vulnerability of structures in these areas to seismicity and/or soils saturation induced landslide activity. This is especially the case, given the proximity of these landslide vulnerable areas to the areas of relatively high seismicity originating from north in the St. Lawrence River Basin, as well as those events originating in the Ossipee Mountain Range, coupled with the relatively high incidence of flooding in these areas, with associated saturated soil conditions.<sup>12</sup>

The local probability in Northwood, 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.



Hail from July 26, 2009 Storm Event – Northwood, NH

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<sup>12</sup> New Hampshire Department of Safety. State of NH Natural Hazard Mitigation Plan 2010. Homeland Security and Emergency Management.

**C. Northwood Flood Insurance Program (NFIP) Status**

Northwood has been a member of the National Flood Insurance Program (NFIP) since 01/02/1987. The Town does have a limited portion of land in the 100-year floodplain along Northwood and Harvey Lakes, as well as the outskirts of Bow Lake on the eastern part of town; Narrows, Kelsey, and Tucker Brooks, as well as Lucas Pond and the perennial stream that feeds it. There are limited structures within this floodplain according to available GIS Flood Insurance Rate Map (FIRM) data and aerial imagery (2010). As reported in FEMA’s Community Information System (as of 10/31/2012) Northwood is listed as having a total of 30 policies in force, one paid loss (\$10,869.93), and 0 repetitive loss claims<sup>13</sup>.

**Table 3.2: Insurance Zone Policies**

	<b>Policies in Force</b>	<b>Premium</b>	<b>Insurance in Force</b>	<b>Number of Closed Paid Losses</b>	<b>\$ of Closed Paid Losses</b>	<b>Adjustment Expense</b>
<b>*A Zones</b>	18	\$23,678	\$2,657,900	0	\$0.00	\$0.00
<b>**B, C, &amp; X Zone</b>						
Standard	1	\$1,395	\$250,000	0	\$0.00	\$0,.00
Preferred	11	\$3,883	\$3,010,000	1	\$10,869.93	\$750.00
<b>Total</b>	30	\$28,957	\$5,917,900	1	\$10,869.93	\$750.00

\* **High Risk Areas** with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage.

\*\* **Moderate to Low Risk Areas**, usually the area between the limits of the 100-year and 500-year floods; area of minimal flood hazard, usually depicted on FIRMs as above the 500-year flood level.

As noted in the Northwood Development Ordinance: **Floodplain Management (3/03)**<sup>14</sup>:

This ordinance, adopted pursuant to the authority of RSA 674:16, shall be known as the Town of Northwood Floodplain Management Ordinance. The regulations in this ordinance shall overlay and supplement the regulations in the Town of Northwood Zoning Ordinance, and shall be considered part of the Zoning Ordinance for purposes of administration and appeals under state law. If any provision of this ordinance differs or appears to conflict with any provision of the Zoning Ordinance or other ordinance or regulation, the provision imposing the greater restriction or more stringent standard shall be controlling.

The following regulations in this ordinance shall apply to all lands designated as special flood hazard areas by the Federal Emergency Management Agency (FEMA) in its Flood Insurance Study for the County of Rockingham, NH”, so titled as, and dated May 17, 2005 or as amended, together with the associated Flood Insurance Rate Maps, so titled as, and dated May 17, 2005 or as amended, which are declared to be a part of this ordinance and are hereby incorporated by reference. (Rev. 3/05)

<sup>13</sup> FEMA Community Information System; from December 4, 2012 email, Jennifer Gilbert, NH Office of Energy & Planning

<sup>14</sup> Northwood Development Ordinance. Town of Northwood, New Hampshire. Adopted March 9, 1999. Amended through March 13, 2012.

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### Permits

All proposed development in any special flood hazard areas shall require a permit.

### Construction Requirements

The building inspector shall review all building permit applications for new construction or substantial improvements to determine whether proposed building sites will be reasonably safe from flooding. If a proposed building site is located in a special flood hazard area, all new construction or substantial improvements shall:

- be designed (or modified) and adequately anchored to prevent floatation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy,
- be constructed with materials resistant to flood damage,
- be constructed by methods and practices that minimize flood damages,
- be constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment, and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

To read the full ordinance, visit: [Northwood Development Ordinance 2012](#).

The Town has worked with elected officials and FEMA to correct existing compliance issues. Northwood has continued communication with FEMA to discuss NFIP compliance issues and continues to monitor designated flood areas throughout the town. The Town continues to evaluate their floodplain management ordinance and will look to improve floodplain management in the community as needed.



Old Turnpike Road – Northwood, NH

**D. Probability of Future Potential Disasters**

Geographically, because Northwood is in New Hampshire, it will always be highly susceptible to severe snow and ice storms. Further, because of the large surface water area in Northwood and hazard event history, one can see that Northwood is also susceptible to flooding and should take appropriate precautions. Lastly, hurricanes, tornadoes, and forest fires are less common in Northwood, however could recur in the future.

Table 3.1 provides more information on past and potential hazards in Northwood.

**Table 3.3: Historic Hazard Identification**

**Blue = Past Events**

**Red = Recent & Potential Hazards**

Hazard	Date	Location	Remarks	Source
<b>Past or Potential Flooding Hazards:</b> 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	NH – Statewide	Worst flooding in New Hampshire history.	“Raging Rivers and the WPA” by William P. Fahey. New Hampshire Administrator. October 1936.
Flooding	July 1973	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan Counties	Severe storms, flooding.	FEMA Disaster Declaration #399
Flooding	March 1987	Carroll, Cheshire, Grafton, Hillsborough, Merrimack, Rockingham, Strafford, Sullivan Counties	Severe storms, flooding.	FEMA Disaster Declaration #789
Flooding	October 1996	Grafton, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan Counties, NH.	Severe storms, flooding.	FEMA Disaster Declaration #1144
Flooding	July 1998	Belknap, Carroll, Grafton, Merrimack and Rockingham counties.	Severe storms and flooding.	FEMA Disaster Declaration #1231

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<b>Hazard</b>	<b>Date</b>	<b>Location</b>	<b>Remarks</b>	<b>Source</b>
<b>Flooding</b>	<b>May 2006</b>	<b>Belknap, Carroll, Hillsborough, Merrimack, Rockingham, and Strafford Counties.</b>	<b>Severe storm causing massive flooding, road closures, dams breaching, Evacuations.</b>	<b>FEMA Disaster Declaration #1643 (Individual Assistance) &amp; Local Knowledge</b>
<b>Flooding</b>	<b>April 2007</b>	<b>Grafton, Hillsborough, Merrimack, Rockingham, and Strafford Counties.</b>	<b>Severe storm causing road washouts on Turnpike Road and Bennett Bridge.</b>	<b>FEMA Disaster Declaration #1695 (Individual and Public Assistance) &amp; Local Knowledge</b>
<b>Past or Potential Wildfire Hazards:</b> 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.				
<b>None</b>				
<b>Past or Potential Tornado, Downburst (Wind Shear) &amp; Hurricane Hazards:</b> Tornadoes 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.				
<b>Hurricane '38</b>	<b>September 1938</b>	<b>NH – Statewide</b>	<b>Winds blow down trees closing roads, loss of electricity.</b>	<b>News clipping Sept. 19, 1998. Rochester Times, Historical Record.</b>
<b>Hurricane Carol</b>	<b>November 1954</b>	<b>NH – Statewide</b>	<b>Evacuations.</b>	<b>Local Knowledge</b>
<b>Hurricane Bob</b>	<b>August 1991</b>	<b>NH – Statewide</b>	<b>Severe storm and wind; no power, trees knocked down.</b>	<b>FEMA Disaster Declaration #917</b>
<b>Hurricane Katrina Evacuation</b>	<b>September 19, 2005</b>	<b>NH – Statewide</b>	<b>Assistance for Hurricane Katrina evacuation.</b>	<b>FEMA Emergency Declaration #3258</b>
<b>Severe Storm Event</b>	<b>July 2008</b>	<b>Belknap, Carroll, Merrimack, Rockingham, and Strafford Counties</b>	<b>High winds; numerous trees and other debris down along Route 4.</b>	<b>FEMA Disaster Declaration #1782</b>

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<b>Hazard</b>	<b>Date</b>	<b>Location</b>	<b>Remarks</b>	<b>Source</b>
<b>Wind Storm</b>	<b>February 2010</b>	<b>Grafton, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan Counties</b>	<b>High winds that caused trees to come down; power outages; and a significant amount of tree clean up.</b>	<b>FEMA Disaster Declaration #1892 (Public Assistance) &amp; Local Knowledge</b>
<b>Tropical Storm Irene</b>	<b>August 2011</b>	<b>Belknap County, Carroll, Coos, Grafton, Merrimack, Strafford, and Sullivan Counties</b>	<b>Some rain and wind; minor damage.</b>	<b>FEMA Disaster Declaration #4026</b>
<b>Hurricane Sandy</b>	<b>October – November 2012</b>	<b>Belknap, Carroll, Coos, Grafton, and Sullivan Counties.</b>	<b>Some rain and wind; minor damage</b>	<b>FEMA Disaster Declaration #4095</b>
<b>Past and Potential Severe Winter Weather Hazards:</b> 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.				
<b>Ice Storm</b>	<b>January 1998</b>	<b>NH – Statewide</b>	<b>Major tree damage, electric power interrupted for many days. Schools were closed.</b>	<b>Committee and FEMA Disaster Declaration #1199</b>
<b>Snowstorm</b>	<b>March 1993</b>	<b>New England</b>	<b>Snow removal, high winds.</b>	<b>FEMA Emergency Declaration #3101</b>
<b>Snowstorm</b>	<b>March 2001</b>	<b>Cheshire, Coos, Grafton, Hillsborough, Merrimack, Rockingham, and Strafford Counties, NH.</b>	<b>Snow removal</b>	<b>FEMA Emergency Declaration #3166.</b>
<b>Snow storm</b>	<b>March 2003</b>	<b>Cheshire, Hillsborough, Merrimack, Rockingham, and Strafford Counties, NH.</b>	<b>Snow removal</b>	<b>FEMA Emergency Declaration #3177.</b>
<b>Snowstorm</b>	<b>January 2005</b>	<b>Belknap, Carroll, Cheshire, Grafton, Hillsborough, Merrimack, Rockingham, Strafford and Sullivan counties.</b>	<b>Snow removal</b>	<b>FEMA Emergency Declaration #3207</b>

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<b>Hazard</b>	<b>Date</b>	<b>Location</b>	<b>Remarks</b>	<b>Source</b>
<b>Snowstorm</b>	<b>April 2005</b>	<b>Carroll, Cheshire, Hillsborough, Rockingham and Sullivan counties.</b>	<b>Snow removal</b>	<b>FEMA Emergency Declaration #3211</b>
<b>Ice Storm</b>	<b>December 2008</b>	<b>Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan</b>	<b>Prolonged power outages; a number of trees and telephone poles came down; school closures for a few days.</b>	<b>FEMA Disaster Declaration #1812 (Public Assistance) &amp; Local Knowledge</b>
<b>Snowstorm</b>	<b>March 2005</b>	<b>Belknap, Carroll, Cheshire, Grafton, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan</b>	<b>Snow removal</b>	<b>FEMA Emergency Declaration #3207</b>
<b>Snowstorm</b>	<b>December 2008</b>	<b>Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan</b>	<b>Snow removal</b>	<b>FEMA Emergency Declaration #3297</b>
<b>Snowstorm</b>	<b>October 2011</b>	<b>Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan</b>	<b>Known as the "Halloween Storm" brought heavy, wet snow that caused power outages and school closures.</b>	<b>FEMA Emergency Declaration #3344</b>
<b>Snowstorm</b>	<b>February 2013</b>	<b>Belknap, Carroll, Cheshire, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan Counties.</b>	<b>Known as blizzard "Nemo" brought over a foot of snow to the region.</b>	<b>FEMA Disaster Declaration #4105</b>

**New Hampshire Homeland Security & Emergency Management**  
*Summary of Preliminary Damage Assessment for Public Assistance (2007-2011)*

- Flooding Event (April, 2007)
  - Debris Clearance
    - Road Agent and Public Works: 36 hours estimated
  - Protective Measures
    - Police: Coverage for 911 dispatching, added patrol and welfare checks, and traffic controls and road blocks: \$2,600.00
    - Town Hall staffing: \$1,000.00
    - Fire: 250 man hours for on call; 28 hours for paid staff
  - Road System

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- Twenty one roads were washed out and are in need of some form of reconstruction
  - Two major washouts requiring extensive repair work including new culverts and extensive fill
  - Water Control Facilities
    - Water District curb stop damaged by debris (Bow Street): Estimated cost \$600.00 to \$1,000.00
  - Building and Equipment
    - Lost Town Beach and Recreation Shed at Bow Lake
    - Ceiling damage at Police State and wind damage at Narrows Fire Station: \$1,500.00
- Severe Rain Event (March 14, 2010)
  - Road System
    - Road Repair (wash out) and Culvert Replacement
    - Contracted Services: \$21,500.00
    - Culvert Purchase: \$4,000.00
    - DPW Overtime: \$1,500.00
- Severe Rain Event (March 20, 2010)
  - Protective Measures
    - Gravel and sandbag stockpiled, but cost would apply to prevention, future flooding, or washouts
  - Road System
    - Some gravel used and site work done, but may have been covered under routine maintenance.
  - Water Control Facilities
    - There were several culverts cleared, but may not be been overtime hours
- Tropical Storm Irene (August, 2011)
  - Debris Clearance
    - Contracted Services: \$2,700.00
    - Highway Department Labor: \$ 1,580.00
    - Fuel: \$140.00
  - Protective Measures
    - Fire: \$2,058
    - Police \$1,500
    - EM Operations: \$500
    - Fuel: \$330



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

With team discussion and brainstorming, Critical Infrastructure and Key Resources (CI/KR) within Northwood were identified and mapped for the all-hazards plan. Facilities located in adjacent towns were not mapped.

<b>Emergency Response Facilities (ERF)</b>				
ERF's are primary facilities and resources that may be needed during an emergency response				
ID	Facility	Type of Facility	Address	Phone
	Ridge Fire Station (EOC)	Emergency Operations Center	499 First NH Turnpike,	(603) 942-9103
	Town Hall	Back-up EOC/Warming Station	818 First NH Turnpike	(603) 942-5586
	Police Station	Back-up EOC	1020 First NH Turnpike	(603) 942-9101
	Narrow's Fire Station	Back-up EOC & Fuel Source	85 Main Street, Northwood, NH	(603) 942-9103
	Coe Brown Academy	Point of Dispensing (POD)	907 First NH Turnpike	(603) 942-5531
	Elementary School	Emergency Shelter	511 First NH Turnpike	(603) 942-5488
	Highway Department	Emergency Fuel	23 Town Works Way	(603) 942-9108
<b>Telephone Facilities</b>				
	Verizon control house	Communications Function	Route 107/Jenness Pond Road	N/a
	Booster box	Communications Function	Jenness Pond Road	N/a
	Booster box	Communications Function	Lucas Pond Road/Mountain Ave	N/a
	Cell Tower	Communications Function	Ridge Water District area	N/a
	Cell Tower	Communications Function	UNH on Saddleback Mountain, Deerfield, NH	N/a
	Cell Tower	Communication Function	Bean Road	N/a
	Cell Tower	Communication Function	Route 107/Route 4 intersection	N/a
<b>Bridges</b>				
	#043/096	Transportation	US4, US202, NH9 over Narrows Brook	N/a
	#045/099	Transportation	NH107 over Narrows Brook	N/a
	#045/100 (15 Tons)	Transportation	Old Canterbury Road over Narrows Brook	N/a
	#086/090	Transportation	US4, US202, NH9 over Pedestrian Underpass	N/a
	#095/113	Transportation	Bow Lake Road over Sherburne Brook	N/a
	#102/081	Transportation	US4, US202, NH9 over Tucker Brook	N/a
	#142/046	Transportation	NH43 over Trout Brook	N/a
	#153/061	Transportation	US202, NH9 over Brook	N/a

<b>Non-Emergency Response Facilities (NERF)</b>				
NERF's are facilities considered essential for the everyday operation of Northwood, that although critical, not necessary for the immediate emergency response effort.				
ID	Facility	Type of Facility	Address	Phone
	Power Substation	Power Station	Route 107/Jenness Pond Rd	N/a
	Power Substation	Power Station	Routes 202/202A	N/a
	East End Fire Station	Storage Facility	197 First NH Turnpike,	(603) 942-9103
	Transfer Station	Recycling/Disposal of Waste	1 Town Works Way	(603) 942-9105

## Northwood, NH All-Hazard Mitigation Plan Update 2014

### 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, Licensed Child Care Programs, Licensed Home Providers, & Assisted Living

ID	Facility Name	Type of Facility	Address	Phone
	Northwood Elementary	School	511 First NH Turnpike	(603) 942-5488
	Coe Brown Academy	School	907 First NH Turnpike	(603) 942-5531
	Alternate Route for Kids	School	511 First NH Turnpike	(603) 356-5213
	Northwood Parent Cooperative Preschool	School	840 First NH Turnpike	(603) 942-7686
	Oz Land Early Learning	School	336 First NH Turnpike	(603) 942-7404
	First Baptist Church	Religious Facility (Closed)	166 First NH Turnpike	(603) 942-8321
	Free Will Baptist Church	Religious Facility (Closed)	First NH Turnpike	N/a
	St. Joseph's Catholic Church	Religious Facility	First NH Turnpike	(603) 942-8716
	Advent Christian Church	Religious Facility	113 School Street	(603) 942-7725
	Northwood Congregational Church	Religious Facility	881 First NH Turnpike	(603) 942-7116
	Alternate Route for Kids	Licensed Child Care Programs	569 First NH Turnpike	(603) 856-6925
	Magical Moments Daycare	Licensed Child Care Programs	97 Ridge Road	(603) 942-8645
	Northwood Parent Cooperative Preschool	Licensed Child Care Programs	840 First NH Turnpike	(603) 942-7686
	Oz Land Early Learning Center	Licensed Child Care Programs	336 First NH Turnpike	(603)942-7404
	Path of Discovery Child Care	Licensed Child Care Programs	142 Mountain Avenue	(603) 942-9290
	There are three licensed home providers located in Northwood.	Licensed Home Providers	150 Long Pond Road	(603) 502-0441
		Licensed Home Providers	16 Birch Street	(603) 775-0195
		Licensed Home Providers	357 First NH Turnpike	(603) 988-8533
	Southern NH Services Elderly Housing complex	Assisted Living	Upper Bow Road	(603) 668-8010
<b>Historic Facilities</b>				
	Brookside School	Historic Facility	Northwood Narrows	N/a
	Old Turnpike Bridge	Historic Facility	Old Turnpike Road,	N/a
	Bennetts Bridge	Historic Facility	Bennett Bridge Road	N/a
	Town Hall Complex	Historic Facility	818 First NH Turnpike	N/a
	Historical Museum	Historic Facility	School Street	N/a
	Community Center	Historic Facility	Main Street	N/a
	Old Post Office	Historic Facility	School Street	N/a
	Masonic Hall	Historic Facility	158 First NH Turnpike	(603) 942-5708
<b>Manufactured Housing</b>				
	Mountain View Mobile Home	Manufactured Housing	Mountain View Lane	N/a
	Tower View Mobile Home	Manufactured Housing	17 Gary Road	N/a
	Loon Cove Mobile Home	Manufactured Housing	Loon Cove Road	N/a
<b>Commercial/Economic Impact Area</b>				
	Route 4 Corridor	Economic Impact Area	Route 4 (First NH Turnpike)	N/a
<b>Recreational Facilities</b>				
	Mary Waldron Beach	Recreational Facility	416 Bow Lake Road	N/a

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Facilities and Populations to Protect (FPP)				
	Northwood Beach	Recreational Facility	Lake Shore Drive	N/a
	Bennetts Beach	Recreational Facility	Bennett Bridge Road	N/a
	Camp Yavneh	Recreational Facility	18 Lucas Pond Road	(603) 942-5593
	Camp Wahtutca	Recreational Facility	Blakes Hill Road	N/a
	Northwood Meadows Park	Recreational Facility	First NH Turnpike	N/a
	Town Fields	Recreational Facility	Route 4	N/a
Hazardous Material Facility				
	Harding Metals	Hazardous Materials Facility	Harding Drive	(603) 942-5574

Potential Resources (PR)	
PRs are potential resources that could be helpful for emergency response in case of a hazardous event	
Airport/Helipad	
<p>The Town currently has no airports but does have designated fire and rescue landing zones, which are used during emergency response operations:</p>	<ul style="list-style-type: none"> <li>Coe Brown Academy</li> <li>Wallmans Field</li> <li>Northwood Elementary School</li> <li>Camp Yevneh</li> <li>Briggs Field</li> <li>Grants Field</li> </ul>

\*Dams – As identified by the NHDES, Water Division

	Wildlife Pond Dam	Non-Menacing Structure	Unnamed Stream	N/a
	Jeness Pond Dam	Non-Menacing Structure	Jeness Brook	N/a
	Sherburne Brook Dam	Non-Menacing Structure	Sherburne Brook	N/a
	Durgin Pond Outlet Dam	Non-Menacing Structure	Narrows Brook	N/a
	Fish and Game Dam	Non-Menacing Structure	Northwood Lake	N/a
	Potrepka Dam Wildlife Pond	Non-Menacing Structure	Unnamed Stream	N/a
	Harvey Lake Dam	Non-Menacing Structure	Kelsey Brook	N/a
	Tudor Wildlife Pond Dam	Non-Menacing Structure	TR North River	N/a
	Spaulding Dam	Non-Menacing Structure	Unnamed Stream	N/a
	Newman Recreation Pond Dam	Non-Menacing Structure	Unnamed Stream	N/a
	Hannaford Detention Pond	Non-Menacing Structure	Runoff	N/a
	Lucas Pond Dam	Low Hazard Structure	North River	N/a
	Sauls Pond	Low Hazard Structure	Unnamed Stream	N/a
	Dole Marsh Dam	Low Hazard Structure	Unnamed Stream	N/a
	Woodman Marsh Dam	Low Hazard Structure	Woodman Marsh	N/a
	Meadow Lake Dam	Low Hazard Structure	Lamprey River	N/a
	Conservation Pond Dam	Significant Hazard Structure	TR Northwood Lake	N/a

\* A **Non-Menace Structure** means a dam that is not a menace because it is in a location and of a size that failure or misoperation of the dam would not result in probable loss of life or loss to property.

\* A **Low Hazard Structure** means a dam that has a low hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in no possible loss of life and low economic loss to structures/property.

\* A **Significant Hazard Structure** means a dam that has a significant hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in no probable loss of lives but major economic loss to structures or property.

Water Resources (WR)				
ID	Facility Name	Type of Facility	Address	Phone
	Fire Hydrant	Fire Hydrant	180 1 <sup>st</sup> NH Turnpike (Hannaford)	N/a
	Dry Hydrant	Dry Hydrant	30 Old Mountain Road	N/a
	Dry Hydrant	Dry Hydrant	100 Green Street	N/a
	Dry Hydrant	Dry Hydrant	50 Temperance Hill Drive	N/a
	Dry Hydrant	Dry Hydrant	59 Bennett Bridge Road	N/a

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Water Resources (WR)				
	Dry Hydrant	Dry Hydrant	430 Bow Lake Road	N/a
	Dry Hydrant	Dry Hydrant	35 Bow Lake Road	N/a
	Dry Hydrant	Dry Hydrant	893 1st NH Turnpike	N/a
	Dry Hydrant	Dry Hydrant	280 Jenness Pond Road	N/a
	Dry Hydrant	Dry Hydrant	100 Catamount Road	N/a
	Dry Hydrant	Dry Hydrant	160 Old Pittsfield Road	N/a
	Dry Hydrant	Dry Hydrant	School Street	N/a
	Dry Hydrant	Dry Hydrant	171 Lake Shore Drive	N/a
	Dry Hydrant	Dry Hydrant	53 Cole Road	N/a
	Dry Hydrant	Dry Hydrant	26 Blakes Hill Road	N/a
	Dry Hydrant	Dry Hydrant	740 1 <sup>st</sup> NH Turnpike	N/a
	Dry Hydrant	Dry Hydrant	27 Angela Drive	N/a
	Cistern	Cistern	19 Davlynn Drive	N/a
	Cistern	Cistern	49 Knowles Way	N/a
	Cistern	Cistern	79 Oakwood Drive	N/a
	Cistern	Cistern	5 Meadow Lane	N/a
	Cistern	Cistern	617 1 <sup>st</sup> NH Turnpike	N/a

### Northwood Community Water Systems

Name	No. of Service Connections*	Total Served Population	Backup Power?	Available Storage Vol.	Comment
Village of Northwood Water District	55 + School FST	138	Yes - Propane	40,000 gal	
Village at Mead Field	13	20	No**	6,000 gal	
The Meadow at Northwood	1	31	No	6,000 gal	Emergency Connection with Ridge System
Tower View Coop	22	55	Yes - Propane	6,000 gal	
Loon Estates	29	74	No	0 gal	No ability to receive bulk water delivery during emergency
Mountain View	59	148	No	14,000 gal	Emergency Connection with Ridge System

\* Current as of 2012; the number of approved (future) connections may be greater

\*\* Mead field has power transfer switch (generator ready)

## Chapter V. All-Hazard Effects in Northwood

### 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 Northwood, there were 21 CI/KR within the potential and past flood areas (PPFA) that were identified in the risk assessment for a potential loss value estimate of **\$10,963,014.00** at 100%.

#### Critical Infrastructure & Key Resources

100 % of Structure Value

<b>Facility</b>	<b>Type of Hazard</b>	<b>100% of Structure Value</b>	
<b>Dams</b>			
Conservation Pond Dam Sauls Pond	Flooding	The Dam Bureau at NHDES has looked into assessing values for state-owned dams with marginal success. They considered bond ratings, market value, and construction costs. They also developed a formula that calculated the cubic feet of water impounded as a monetary value. Because dams serve different purposes (recreational, hydro-power), assessed values are hard to estimate and cannot be determined accurately.	
<b>Bridges<sup>15</sup></b>			
NH 43 over Trout Brook	Flooding	\$570,000.00	19' x 30' x \$1,000
US4, 202, NH 9 over Tucker Brook		\$560,000.00	14' x 40' x \$1,000
US4, 202 NH 9 over Narrows Brook		\$400,000.00	10' x 40' x \$1,000
NH 107 over Narrows Brook		\$475,000.00	19' x 25' x \$1,000
Old Canterbury Road over Narrows Brook		\$285,000.00	19' x 15' x \$1,000
Bow Lake Road over Sherburne Brook		\$252,000.00	14' x 18' x \$1,000
<b>Other Critical Infrastructure</b>			
Bennetts Bridge (Causeway)	Flooding	Structure value could not be determined	
Substation(s) Narrows East Northwood	Flooding	Listed on tax cards as transformer station(s) \$5,800.00 \$11,200.00	
The Ridge Water District Pump House	Forest Fire	\$10,962.00	
Cell Tower at Ridge Water District Utility Building	Forest Fire	\$225,000.00 \$20,376.00	
Cell Tower at Route 107/Route 4 intersection Utility Building	Forest Fire	\$250,000.00 \$20,376.00	
Elderly Housing on Bow Street	Forest Fire	\$1,397,200.00	
<b>Recreational Facilities</b>			
Northwood Beach	Flooding	\$423,600.00	
Camp Wahtutca	Forest Fire	\$2,877,600.00	
Camp Yavneh	Forest Fire	\$2,735,100.00	
Northwood Meadows State Park	Forest Fire	\$443,800.00	
		<b>Total</b>	<b><u>\$10,963,014.00</u></b>

<sup>15</sup> 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.

**B. Identifying Future Vulnerable Structures**

Since 2005, Northwood has constructed 148 new buildings, 135 of which were residential, 4 were commercial, 7 manufactured/mobile homes, and 2 were deemed recreational (multi-purpose buildings for Camp Yavneh). During 2009, construction was somewhat widespread throughout the Town, but there were a higher number of constructed buildings on Pender Road and Trillium Lane. Unlike the year before, 2009 showed an increase in all new building construction with double the amount of development. Even with this increase in building structures Northwood has still seen a 49% drop in growth from 2007.

New Buildings 2011								
	2005	2006	2007	2008	2009	2010	2011	Total
<b>Single Family Detached</b>	34	28	35	10	18	-	10	135
<b>Manufactured</b>	1	0	0	0	0	-	0	1
<b>Mobile Home</b>	3	1	2	0	0	-	0	6
<b>Recreational</b>	-	-	-	-	2	-	0	2
<b>Commercial</b>	1	1	2	0	0	-	0	4
<b>Total</b>	<b>39</b>	<b>30</b>	<b>39</b>	<b>10</b>	<b>20</b>	<b>-</b>	<b>10</b>	<b>148</b>

\*Northwood’s building permit data was not obtainable for calendar year 2010.

By looking at these past development trends the Town recognizes that it will continue to grow 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. While there are no major subdivisions in the near future, Northwood has a Flood Management Ordinance for all subdivisions and proposals for other developments to reduce or eliminate flood damage.

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**

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 **0-1%**, **1-5%**, or **5-10%**

Assessed Value of All Structures (only)				
Economic Loss		Low	Medium	High
2011		1% damage	5% damage	10% damage
*Residential	\$185,324,825	\$1,853,248	\$9,266,241	\$18,532,482
Manufactured	\$11,639,600	\$116,396	\$581,980	\$1,163,960
*Commercial	\$22,410,900	\$224,109	\$1,120,545	\$2,241,090
*Tax Exempt	\$5,538,250	\$55,382	\$276,912	\$553,825
<b>Total</b>	<b>\$224,913,575</b>	<b>\$2,249,135</b>	<b>\$11,245,678</b>	<b>\$22,491,357</b>

Source: Department of Revenue Administration; 2011 Property Tax  
 \*Total assessed value takes into account land and property value, except for Manufactured.

of Northwood’s structures, depending on the nature of the hazard, whether or not the hazard is localized, and its economic impact.

Based on this assumption, the potential loss from any of the identified hazards would range from **\$0 to \$2,249,135** or **\$2,243,125 to \$11,245,678** or **\$11,245,378 to \$22,491,357** based on the 2011 Northwood Town valuation, which lists the assessed value of all structures in Northwood to be **\$224,913,575** (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**

**Flooding (Heavy Rains).....\$0 to \$2,249,135**

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 Northwood has limited structures within the 100-year floodplain zone, it was discussed that there are areas in town that have experienced flooding with minor damage to both residential properties and critical infrastructure.

**Severe Winter Storms (Ice Storms & Nor’easters).....\$11,245,378 to \$22,491,357**

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 Northwood 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 Northwood’s Highway Department 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 Northwood 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, which would allow for at least some rough estimation of damage assuming a storm of a particular magnitude.

**Severe Thunderstorms & Lightning.....\$2,243,125 to \$11,245,678**

Severe lightning as a result of summer storms or as a residual effect from hurricanes have occurred in Northwood. Due to the possibility of trees being toppled by lightning onto power lines and creating sparks and the fact that many of the buildings in Northwood 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. Northwood 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.

**Wildfire.....\$2,243,125 to \$11,245,678**

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. Between the storm events experienced since 2006, land use changes, and population growth, fire load conditions are similar to the conditions seen right before the 1947 forest fire (Rochester, NH) and thus a potential high threat.

Currently, there is an abundance of limbs and branches on the forest floor and the Town may be susceptible to wildfire during drought; causes include but aren’t limited to arson, lightning, and the burning of debris.

The possibility of extensive wildfire is perhaps higher for the area of Town around Northwood Meadow State Park, because that area is far less accessible for firefighting than other areas; however, it is also more sparsely settled, so damages might not be much different than in other areas.

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.

**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 to arrive at a reasonable estimate of risk.

**Hurricanes and Tropical Storms.....\$0 to \$2,249,135**

The Town of Northwood 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 Northwood 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 Northwood 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. Hurricanes are rare in New Hampshire, but they should not be ruled out as a potential hazard.

**Earthquake/Landslides.....\$0 to \$2,249,135**

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<sup>16</sup>. 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 Northwood is slightly higher. Approximately 18.1% (3,505 acres) of the land area of Northwood has steep slopes greater or equal to 25%. Sufficient data was not available to determine what structures are in the steep slope areas, but the number is certainly quite small. 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.

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<sup>16</sup> USGS: Earthquakes; [http://earthquake.usgs.gov/earthquakes/states/events/1940\\_12\\_20.php](http://earthquake.usgs.gov/earthquakes/states/events/1940_12_20.php)

**Drought.....\$0 to \$2,249,135**

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 Northwood specifically, drought apparently has not had significant impact. No records of losses in Northwood 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.

**Tornadoes/Downburst.....\$2,243,125 to \$11,245,678**

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.

While the recurrence probability is low; the probability that any highly valuable asset in particular would be hit is moderate; and the general magnitude of a tornado in Northwood would likely be F2 or less, damages could be expected to range from thousands to millions, with several assets of significant value impacted.

**Extreme Heat.....\$0 to \$2,249,135**

In New England, temperature extremes are quite common. 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. 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 Northwood were found during preparation of this plan. Extreme heat hazard is in general a particular problem in cities and for older residents. 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, the Hazard Mitigation Committee feels, in general, that the expected risk from this hazard should be low.

**Public Health Threats.....Structure Loss Value Cannot Be Estimated**

The unique geography in and around the Town of Northwood provides its citizens and tourists alike the opportunity for summer and winter recreation activities, which often brings outdoor enthusiasts into the Town. It is also important to note that the majority of Northwood's residents commute outside the Town in order to get to and from work, thus

increasing the threat of enabling infection and viruses to be transmitted from other parts of the State.

Because of these factors, an epidemic or pandemic could present a possible threat to Northwood. With the occurrence of worldwide pandemics such as SARS, H1N1 and Avian Flu, Northwood could be susceptible to an epidemic and subsequent quarantine.

**Hazardous Material Threats.....\$0 to \$2,249,135**

The possibility of vehicular accidents involving hazardous materials is identified as a threat in Northwood. The Team identified Route 4 as a corridor that often has trucks carrying bio-diesel fuel and other harmful chemicals through town. The Team agreed that there are a number of important water resources including Northwood Lake and other stream crossings that are all vulnerable to hazardous spills in the future. 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 \$2,249,135**

Extended power outages have occurred in Northwood, 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: All-Hazard Goals and Existing Mitigation Strategies

### A. All-Hazard Mitigation Goals

Before identifying new mitigation actions to be implemented, the Team reviewed and adopted the following all-hazard goals. These goals were based on the State of New Hampshire Natural Hazards Mitigation Plan 2010 that was prepared and is maintained by HSEM.

1. *Minimize the loss of life and property due to natural hazards.*
2. *Protect vulnerable populations, e.g. young, elderly, mobility challenged and population with special needs.*
3. *Improve communication between emergency response personnel and general populace. Increase public awareness on important information during natural hazard events, such as evacuation routes, location of shelters, and the radio station that provides emergency information, etc.*
4. *Update and modernize the Emergency Operations Center(s) to be prepared for natural hazards.*
5. *Provide operational shelters for Town residents and transients.*
6. *Continue the effort on flood prevention. Address roads that may have limited access during flooding levels.*
7. *Approve emergency services to the Gulf area of Town.*

### B. Mitigation Strategies Currently Underway in Northwood

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 Existing Measures

Gaps in the existing mitigation measures relate to flooding or general preparedness for natural hazards. The drainage systems in Town, especially in the area of Northwood Narrows, Harvey Lake and Bennetts Bridge Road are on-going efforts to prevent flooding. Some technical aspects were identified as gaps, such as radio conversion for the Highway Department to have good communication and coordination efforts between members during a natural disaster. Further, communications in general should be improved. Lastly, certain critical facilities that are used, such as shelters, need to have back-up generators installed.

## Summary of Recommended Improvements

### 1) Improvements to Drainage Systems in Town

*2014 Update:* Major drainage improvements have been completed:

- Turnpike Road improvements – 3-foot and 6-foot culvert replacements
- High Street Improvements
- Harmony Hill Improvements
- Bennett Bridge Improvements
- Old Canterbury Improvements
- West Street Improvements

*All projects were completed using post storm FEMA public assistance funding.*

### 2) Radio Conversion for Highway Department

*2014 Update:* New digital radio have been purchased and will be installed in 2014.

### 3) Other Communication Improvements

*2014 Update:* Northwood is currently applying through EMPG funding to purchase a town-wide repeater, which would be located on the top of the Town Hall. The EMD has also received a free portable radio from Homeland Security and Emergency Management.

### 4) Back-up Generators Installed at Shelters

*2014 Update:* There have been significant generator upgrades:

- Town Hall – Generator runs everything
- Elementary School – Portable generator, which provides back-up (no heat).
- Narrows and Ridge Fire Stations – Two fixed units
- Coe Brown – Northwood is seeking EMPG funding to purchase another generator for the Science and Main Buildings (The current generator only services Smith Hall).

## Existing Protection Matrix

The Northwood Hazard Mitigation Planning Committee has developed the following table of existing programs, regulations, laws, etc. that are currently in place and either directly or indirectly provide loss prevention from natural hazards. 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 type of hazard (Column 3), type of activity (Column 4), the area of town affected (Column 5), the effectiveness and or enforcement of the strategy (Column 6), and the 2014 Update (Column7).

**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	2014 update
Building Code / Permits	Requires builder to obtain all permits prior to action.	Multi-Hazard	Prevention	Town-wide	Building Inspector/ Code Enforcement	The Town is now using the 2009 International Building/Industrial Code.
Elevation Certificates	Individual required on case by case from bank.	Multi-Hazard	Prevention	Potential Flood Areas	Building Inspector/ Code Enforcement	This program continues to be administered and maintained by the code enforcement officer to ensure that elevation certificates are properly filed, certified, and implemented.
Emergency Operations Plan	Last adopted in 2012.	Multi-Hazard	Prevention	Town-wide	Emergency Management Director	This plan was recently updated in 2012.
Storm Drain Maintenance	Open channel/culvert as needed.	Flooding	Town Planning	Town-wide, culverts not mandated.	Building Inspector, Road Agent, Planning and Zoning Board. Zoning to permit driveway variances granted, exiting of drainage wetland.	There continues to be problematic areas around Northwood Narrows and Harvey Lake, but major improvements have been made to fix area around Bennetts Bridge Road. Other improvements include: Turnpike Road, High Street, Harmony Hill, Old Canterbury, & West Street.
Road Design Standards	State minimum regulations.	Multi-Hazard	Prevention	Town-wide	Planning Board or Road Agent; Board of Selectmen for existing roads.	Meet NHDOT standards. Will continue to monitor standards and make any updates as needed.
Tree maintenance	PSNH, Highway Dept. to remove dead trees as needed.	Multi-Hazard	Prevention	Town-wide	PSNH, Highway Department after event	Citizens and community officials are concerned with managing areas around the State Park. The Northwood Area Land Management Collaborative to create a forest management plan.
Evacuation and Notification	Radio station, TV notification, reverse 911, privately owned vehicles, fire apparatus and loud speakers	Multi-Hazard	Emergency Preparedness	Town-wide	Emergency Management Director, Board of Selectmen	Improvements have been made to cell phone service and website notification. Looking into new website design, Facebook, twitter, and other social media for notifications.

**Northwood, NH All-Hazard Mitigation Plan Update 2014**

Existing Program/Activity	Description	Type of Hazard	Type of Activity	Area of Town Covered	Effectiveness/ Enforcement	2014 update
Emergency Back-up Power	Generator at Town Hall and Police Station	Multi-Hazard	Emergency Preparedness	Town- wide	Road Agent, Fire Chief	The generator provides back-up power (no heat) at the elementary school. Needs improvements.
Shoreland Protection Act	Referenced in ordinances	Multi-Hazard	Prevention	Town-wide	Planning Board & Code Enforcement Officer	New updates to the regulations from the State. Will continue to monitor for more changes.
Best Management Practices	Required by State	Multi-Hazard	Town Planning	Town-wide	Planning Board & Code Enforcement Officer	Northwood will continue to pursue best management practices.
State Dam Program	Inspected by State	Flooding	Prevention	A (Town dam), B, and C	Public Works	Will continue to work with the State in making sure all Dam assessments and reporting is done on a consistent basis.
Hazardous Materials Response Team	Mutual response system with Capital Area for action.	Hazardous Materials	Emergency Preparedness	Town-wide	Fire Department and EMD	Will continue to work with HazMat Team and pursue training for response team as needed.
Mutual Aid	Mutual Aid System with Police	Multi-Hazard	Emergency Preparedness	Northern Rockingham County and neighboring communities in Strafford & Merrimack counties	Police Departments	Mutual Aid System is in place. Will be monitored as needed.
Mutual Aid	Mutual Aid System with Fire.	Multi-Hazard	Emergency Preparedness	Agreements with Capital Area, Seacoast and Lakes Regions	Fire Departments	Mutual Aid System is in place. Will be monitored as needed.
Mutual Aid	Mutual Aid System with Highway Dept.	Multi-Hazard	Emergency Preparedness	State-wide	Highway Departments	Mutual Aid System is in place. Will be monitored as needed.
Floodplain Management Ordinance	FEMA maps and enforcement of limiting new building in 100-year floodplain	Flooding	Town Planning	Town-wide	Planning Board and Board of Selectmen	The Planning Board will continue to monitor and make updates to this ordinance as necessary.

## Chapter VII: Prior Mitigation Plan(s)

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

Northwood participated in a prior mitigation plan that was developed by the Northwood Hazard Mitigation Planning Committee and adopted by the Board of Selectmen in 2006. This Plan, the “All-Hazard Mitigation Plan, Northwood, 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 2014
1	Establish a permanent EOC with adequate equipment, such as adequate phone lines and supplies.	The Ridge Fire Station currently acts as the EOC. Improvements have been made to this building, but the second floor is not handicap accessible. There is still a need for a new emergency facility or safety complex.
2	Highway Dept. radio system needs to be able to communicate with other Highway Departments, fire, and police in an emergency situation for Mutual Aid. Work with vendor to standardize cell phones	Radio systems have been improved. The purchase of standardized cell phones has been completed.
3	Install equipment at the Highway Department to be an adequate backup EOC.	A computer, generator, and phone system has been installed at the Highway Department. It is adequate and has the capacity to be used as a backup EOC if needed.
4	Install back-up generator in the School.	There is a generator at the school, but is inadequate as a whole. It does provide backup power in emergency situations, but does not provide enough to be considered a shelter. There is a hope to get a standalone soon.
5	Install permanent back-up generator to be used for the Highway Department	This has yet to be completed, but remains an action item the Town wished to pursue.
6	Install new dry hydrants throughout Town.	There have not been any new dry hydrants installed since the adoption of the previous plan. There is one scheduled to be installed in FY2014. The maintenance and scheduling of new dry hydrants will continue to be monitored as needed.
7	Construct new cisterns throughout Town.	There has been one new cistern constructed on Knowles and Pender Way. The maintenance and scheduling of new cisterns will continue to be monitored as needed.
8	Upgrade drainage system, culverts, retention ponds and swales.	All new developments that have 12-lots per subdivision require retention ponds. Improvements have been made at Coe Brown Academy, the new athletic fields, the mobile station, and the Hannaford’s stormwater system.

## Northwood, NH All-Hazard Mitigation Plan Update 2014

Rank	Proposed Mitigation Action	Update 2014
9	Evaluate and install variable message boards or other programs used to disseminate information during emergency and educate community on those emergency messages.	A new message board has been installed at Coe Brown Academy, which is has multi-color function, changes easily, and can be controlled by the headmaster or secretary at the academy. The Town wishes to purchase a portable message board, similar to the ones used by NHDOT.
10	Update Contractor/Operator List once per year. Establish a pre-bidders list and a list for equipment.	This is completed once a year by municipal staff.
11	LEOP needs to be formatted to address emergency state operations plan.	This was completed in 2012 and now is in accordance with the state plan.
12	Create pamphlet and posters with information on shelters, evacuation routes, contacts, etc. during an emergency. Posters would be displayed in library, post office, etc. and information posted on website.	This action item has yet to be completed, but the Town wishes to pursue more public outreach strategies with the new design of the website.
13	Develop list of things people should have in their home in case of an emergency.	The Town guides residents to existing resources such as the Red Cross and Homeland Security and Emergency Management. There are available iPad/iPhone applications to download, which are useful during emergencies, direct residents to outside sources (FEMA and Red Cross).
14	Consolidated library of emergency information located in Town Hall. Information would include maps, evacuation routes, and contacts. Key points would also be located in fire, police and highway departments.	While this action item has yet to be completed, it remains a goal in which to accomplish in the next year or two.
15	Develop list of critical items needed for special needs population in their homes and in shelters.	Staff at Health and Human Services maintains a listing of special needs populations using tax forms, which are used in emergency events. Residents in search of social services are directed to use the 2-1-1 system.
16	Limits of access on Route 4 if there is an emergency at Coe Brown or in vicinity of Harvey Lake.	This remains a major problem for the Town. With no other east/west connection being planned for the future, this will continue to be a major bottleneck issue.

## 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 Social, Technical, Aministrative, Political, Legal, Economic and Environmental 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 all-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.

When brainstorming mitigation strategies for the Town of Northwood, the Hazard Planning Committee reviewed and considered all hazards identified in this Plan. Due to the infrequency and relative low risks of some of the hazards (lighting, radon, etc.) effecting Northwood, the Planning Committee came up with strategies that would address the most relevant needs and vulnerabilities. While not every hazard has a mitigation strategy, they were all considered and play a vital role as an identified potential hazard for the future and should not be removed from the plan. But in order to remain efficient and mindful of local resources, the strategies and mitigation actions were designed to address the greatest weaknesses in Northwood.

**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
With the Route 4 Corridor Study slated a potential project in the Ten Year Plan, there will be a need for continued planning on design including: added center turning lanes, drainage improvements, and culvert upgrades.	Multi-Hazard & Public Safety	Route 4	Planning	3	3	3	3	3	3	3	21
There is a need for secondary access to residents living on Gulf Road. Currently, the emergency response time is not sufficient.	Multi Hazard & Public Safety	Gulf Road	Planning & Emergency Preparedness	3	3	3	3	3	1	2	18
									Major costs to creating secondary access	Minor environmental impacts during construction	
Purchase of portable message boards to display emergency notifications.	Multi-Hazard	Town-wide	Emergency Equipment Purchase	3	3	3	3	3	1	3	19
									Large cost associated with boards		
A new public safety complex needs to be built.	Multi-Hazard	Town-wide	Construction	3	3	3	3	3	1	2	18
									Large cost	Minor environmental impacts	
Promote conservation of open space to separate areas from high-hazard wildfire areas.	Wildfire	Town-wide	Planning	2	3	3	3	3	3	3	20
				May lower tax base							

Northwood, NH All-Hazard Mitigation Plan Update 2014

New Mitigation Project	Type of Hazard	Affected Location	Type of Activity	S	T	A	P	L	E	E	Total
With the increase in fire load from past storms there is a need for a town-wide management plan for tree resources and track community vulnerability.	Wildfire	Town-wide	Planning	3	3	3	3	3	2	3	20
									May have small costs during the plan development		
Using local fire departments to conduct education programs in schools.	Wildfire	Town-side	Education & Outreach	3	3	3	3	3	3	3	21
Identify specific at-risk populations that may be vulnerable in the event of long-term power outages.	Severe Winter Storms	Town-wide	Education & Outreach	3	3	3	3	3	3	3	21
To deal with a flooding issue an undersized culvert replacement is needed on Old Turnpike Highway (Route 4). This project needs coordination with state NHDOT due to the road being a state road.	Flooding	Route 4	Construction	3	3	2	2	2	1	2	15
						This road is not under the Town's jurisdiction, so there may be challenges beyond their control to fix this flooding issue.			Large cost	Minor environmental impacts during construction	
Encourage wind engineering measures and construction techniques to better mitigate against high winds.	Tornado & Downburst	Town-wide	Local Planning & Regulations	3	3		3		3	3	21

Northwood, NH All-Hazard Mitigation Plan Update 2014

New Mitigation Project	Type of Hazard	Affected Location	Type of Activity	S	T	A	P	L	E	E	Total
Have more emergency information that deal with natural/manmade disasters as well as links to existing resources on website, once the new design is completed.	Multi-Hazard	Town-wide	Public Education & Awareness	3	3	3	3	3	3	3	21
Continue to develop the use of social media including facebook, twitter, eblast alerts for emergency notification and distribution of information during emergencies.	Multi-Hazard	Town-wide	Public Education & Awareness	3	3	3	3	3	2	3	20
									Small cost associated with website maintenance and upkeep.		
Maintain transportation infrastructure by identifying and assessing potential areas (road/culverts) of concern and using the culvert inventory report produced by the Strafford Regional Planning Commission to prioritize replacement, repair, and upgrade schedules to mitigate future flooding.	Flooding	Town-wide	Planning & Prevention	3	3	3	3	3	3	3	21

## 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 = \$1,000 - \$5,000 High Cost = > \$5,000	Timeframe	STAPLEE Score (21 being the highest)
0 – 1	Continue to develop the use of social media including facebook, twitter, eblast alerts for emergency notification and distribution of information during emergencies.	EMD	No charge	Using more social media would make having notifications and documents readily available for the public and coincide with other outreach strategies at little to no cost.	FY2014	20
1 – 1	Have more emergency information that deal with natural/manmade disasters as well as links to existing resources on website, once the new design is completed.	EMD & Town Administrator	Town Funding & Volunteer Time	Municipal staff time to update and maintain the website and other social media would be a minimal cost. This action item would be a low cost of less than \$1,000.	FY2014	21
1 – 2	Maintain transportation infrastructure by identifying and assessing potential areas (road/culverts) of concern and using the culvert inventory report produced by the Strafford Regional Planning Commission to prioritize replacement, repair, and upgrade schedules to mitigate future flooding.	Road Agent & Planning Board	No charge	This report has been put together by the Strafford Regional Planning Commission and is a tool for communities to use in maintaining their transportation infrastructure and when applying for grants. There isn't a cost associated with using the report as a planning mechanism.	FY2014	21
1 – 2	Promote conservation of open space to separate areas from high-hazard wildfire areas.	Conservation Commission	No charge	While the promotion of conservation of open space has no charge, if the community decides to purchase property through land acquisition there would be a relatively high cost.	FY2014	20
1 – 3	Using local fire departments to conduct education programs in schools.	Fire Chief	No charge	Building off existing educational effort that are taking place, this activity would be a high benefit with a relatively low cost.	FY2014	21

**Northwood, NH All-Hazard Mitigation Plan Update 2014**

<b>Rank</b>	<b>New Mitigation Project</b>	<b>Responsibility and/or Oversight</b>	<b>Funding and/or Support</b>	<b>Cost Effectiveness</b> Low Cost = <\$1,000 Medium = \$1,000 - \$5,000 High Cost = > \$5,000	<b>Timeframe</b>	<b>STAPLEE Score (21 being the highest)</b>
2 - 1	To deal with a flooding issue an undersized culvert replacement is needed on Old Turnpike Highway (Route 4). This project needs coordination with state NHDOT due to the road being a state road.	NHDOT	State Funding	This particular project relies heavily on state funding and NHDOT. The culvert replacement would be a large project and would have a fairly high cost, much more than \$5,000.	FY2015-FY2016	15
2 - 2	Purchase of portable message boards to display emergency notifications.	Fire Chief	Town Funding & EMPG Funding	The estimated price range varies depending on size and technology, but it was determined that it would be a high cost to purchase this kind of equipment.	FY2015-FY2016	19
2 - 3	With the increase in fire load from past storms there is a need for a town-wide management plan for tree resources and track community vulnerability.	Northwood Area Land Management Collaborative	Town Funding & Grants	A planning document of this type would rely heavily on volunteer time and would have an estimated cost in between \$1,000-\$5,000 making it a medium cost.	FY2015-FY2016	20
2 - 4	A new public safety complex needs to be built.	Police & Fire Departments	Town Funding & Grants	To plan, design, and construct an entire new public safety complex would have an estimated high cost.	FY2015-FY2016	18
2 - 5	Identify specific at-risk populations that may be vulnerable in the event of long-term power outages.	EMD & Town Planning	Town Funding	A GIS analysis may be necessary and the Town may need to seek outside resources, which would have an estimated medium cost of \$1,000 - \$5,000.	FY2015-2016	21

Northwood, NH All-Hazard Mitigation Plan Update 2014

Rank	New Mitigation Project	Responsibility and/or Oversight	Funding and/or Support	Cost Effectiveness Low Cost = <\$1,000 Medium = \$1,000 - \$5,000 High Cost = > \$5,000	Timeframe	STAPLEE Score (21 being the highest)
3 – 1	Encourage wind engineering measures and construction techniques to better mitigate against high winds.	Town Planning	No charge	While there is no charge to encourage wind engineering measure, if the Town decides to upgrade their regulations there would be an associated cost that could be high.	FY2017	21
*3 - 2	With the Route 4 Corridor Study slated a potential project in the Ten Year Plan, there will be a need for continued planning on design including: added center turning lanes, drainage improvements, and culvert replacements.	Planning Board & Highway Department	NHDOT & Local Funding	While the overall cost for completion of this project would be high, the planning discussions and design would be a relative low cost.	FY2018	21
*3 - 3	There is a need for secondary access to residents living on Gulf Road. Currently, the emergency response time is not sufficient.	Board of Selectmen	CIP & Impact Fees	The design and construction of a secondary access route to Gulf Road residents would be a high cost, over \$5,000.	FY2018	18

Note: While the timeframe for these mitigation actions does not exceed the life of the plan (2018), there is a strong possibility they may take longer to complete.

## 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. All-Hazard Plan Monitoring, Evaluation and Updates

To track programs and update the mitigation strategies identified through this process, the Town will review the all-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 all-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 meeting 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 all-hazard mitigation plan, a public meeting 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 Northwood to use once a conditional approval is received from FEMA.

### C. Integration with Other Plans

The original hazard mitigation plan, which was adopted in 2007, was used during the Northwood Master Plan update. Input on impacts to roads and other critical infrastructure from hazards was included in relevant master plan sections.

This all-hazard plan will only enhance mitigation if balanced with all other town plans. Northwood 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 Northwood, when appropriate. The local government will refer to this Plan and the

## **Northwood, NH All-Hazard Mitigation Plan Update 2014**

strategies identified when updating the Town's Master Plan, Capital Improvements Program, Zoning Ordinances and Regulations, and Emergency Action 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 April 14, 2014

Congratulations!

FEMA Region I has completed its review of the Northwood, 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 Word or PDF files and must be submitted to us via email at [fema-ri-mitigationplans@fema.dhs.gov](mailto:fema-ri-mitigationplans@fema.dhs.gov). Upon FEMA's receipt of these documents, a formal letter of approval will be issued, along with the final FEMA Checklist and Assessment.

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](mailto:marilyn.hilliard@fema.gov) or 617-956-7536.

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

Northwood, NH All-Hazard Mitigation Plan Update 2014

B. Signed Certificate of Adoption

VI - 6c



JUL 17 2014

RECEIVED

Town of Northwood, New Hampshire 2014

818 First New Hampshire Turnpike, Northwood NH 03261  
(603)942-5586 Facsimile: (603)942-9107

CERTIFICATE OF ADOPTION  
Northwood, NH Board of Selectmen

RECEIVED

A Resolution Adopting the Northwood, NH All-Hazard Mitigation Plan Update 2014

Plan Dated: 6-14-14

JUL 8 2014

Conditionally Approved: 4-14-14

WHEREAS, the Town of Northwood 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 Northwood, NH All-Hazard Mitigation Plan Update 2014; and

WHEREAS, several public planning meetings were held between January 23<sup>rd</sup>, 2013 and January 10<sup>th</sup>, 2014 regarding the development and review of the Northwood, NH All-Hazard Mitigation Plan Update 2014; and

WHEREAS, the Northwood, NH All-Hazard Mitigation Plan Update 2014 contains several potential future projects to mitigate hazard damage in the Town of Northwood; and

WHEREAS, a duly-noticed public meeting was held by the Northwood Board of Selectmen on June 24, 2014 to formally approve and adopt the Northwood, NH All-Hazard Mitigation Plan Update 2014.

NOW, THEREFORE BE IT RESOLVED that the Northwood Board of Selectmen adopts the Northwood, NH All-Hazard Mitigation Plan Update 2014.

ADOPTED AND SIGNED this 24<sup>th</sup> day of June, 2014

Robert W. Holden,  
Chairman, Northwood Board of Selectmen

Notary

Date 6-24-14



# Northwood, NH All-Hazard Mitigation Plan Update 2014

## C. Final Approval Letter from FEMA

U.S. Department of Homeland Security  
FEMA Region I  
99 High Street, Sixth Floor  
Boston, MA 02110-2132



# FEMA

AUG 08 2014

Robert W. Holden, Chairman  
Northwood Board of Selectmen  
Town of Northwood  
818 First New Hampshire Turnpike  
Northwood, NH 03261

Dear Mr. Holden:

Thank you for the opportunity to review the Northwood All-Hazard Mitigation Plan Update 2014. The Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA) Region I has evaluated the plan for compliance with 44 C.F.R. Pt. 201. The plan satisfactorily meets all of the mandatory requirements set forth by the regulations.

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

Approved mitigation plans are eligible for points under the National Flood Insurance Program's Community Rating System (CRS). Complete information regarding the CRS can be found at [www.fema.gov/business/nfip/crs.shtm](http://www.fema.gov/business/nfip/crs.shtm), or through your local floodplain administrator.

The Northwood All-Hazard Mitigation Plan Update 2014 must be reviewed, revised as appropriate, and resubmitted to FEMA for approval within **five years of the plan approval date of July 22, 2014** in order to maintain eligibility for mitigation grant funding. We encourage the Town to continually update the plan's assessment of vulnerability, adhere to its maintenance schedule, and implement, when possible, the mitigation actions proposed in the plan.

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,

A handwritten signature in black ink, appearing to read "Paul F. Ford".

Paul F. Ford  
Acting Regional Administrator

PFF:mh

cc: Beth Peck, New Hampshire State Hazard Mitigation Officer  
Jennifer Gilbert, Asst. New Hampshire State NFIP Coordinator  
Parker Moore, New Hampshire Hazard Mitigation Program Assistant  
Bob Young, EMD, Town of Northwood  
Kyle Pimental, Regional Planner, SRPC

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 Mitigation Plan Review Guide, FEMA, October 1, 2011
- Multi-Hazard Mitigation Plans
  - Town of Albany, 2010
  - Town of Goffstown, 2009
  - Newmarket Hazard Mitigation Plan 2012
  - Durham Hazard Mitigation Plan 2012
- Natural Hazard Mitigation Plan, 2010, State Hazard Mitigation Goals
- 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 2010 and Revenue Information
- NCDC [National Climatic Data Center, National Oceanic and Atmospheric Administration]. 2012. *Storm Events*

### Photos

- Linda Smith, Board Administrator – Town of Northwood

## 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 refuges. 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](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<sup>17</sup>:

- 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](http://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.

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<sup>17</sup> 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.