Town of Amherst, New Hampshire

Hazard Mitigation Plan Update 2015

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Table of Contents

CHAPTER 1. PLANNING PROCESS

Section 1.1 ~ Overview of Planning Process

The Amherst Hazard Mitigation Plan Update 2015 was prepared by the Nashua Regional Planning Commission (NRPC) for the Town of Amherst, NH. NRPC staff worked closely with the Amherst Hazard Mitigation Team to write this plan. The Amherst Hazard Mitigation Team included:

- Bruce Berry, Director, Department of Public Works, Town of Amherst, NH
- Mark Boynton, Fire Chief/EMD, Fire Department, Town of Amherst, NH
- Matt Conley, Deputy Fire Chief, Fire Department, Town of Amherst, NH
- Brian Gleason, Emergency Medical Services Director, Town of Amherst, NH
- Sarah Marchant, Director, Community Development Department, Town of Amherst, NH
- James O'Mara, Town Administrator, Town of Amherst, NH
- Mark Reams, Police Chief, Police Department, Town of Amherst, NH

NRPC staff met with the Amherst Hazard Mitigation Team for a series of 3 meetings in order to prepare the Amherst Hazard Mitigation Plan Update 2015. Agendas from these meetings appear in the Appendix to this Plan. In between meetings, NRPC worked directly with Amherst Hazard Mitigation Team members to obtain additional information needed to write the Plan.

The primary differences between the 2015 Plan and the 2007 Plan are 1) preparedness actions are not included in the 2015 Plan, 2) man-made hazards are not included in the 2015 Plan, and 3) Fluvial Erosion is included as a hazard in the 2015 Plan.

Section 1.2 ~ Involvement of Neighboring Communities and Local/Regional Agencies

At the first Hazard Mitigation Team meeting, held on November 14, 2013, the group discussed who should be invited to participate on the planning team that was not currently represented. It was determined that the current Team provided adequate representation and no additional members were necessary. The Team also discussed who should be informed about the Plan, such as neighboring communities, local and regional agencies involved in hazard mitigation, agencies with authority to regulate development, and others. It was concluded that the following entities should be informed of the Plan update:

- Dwight Brew, Chair, Amherst Board of Selectmen, Town of Amherst, NH
- Peter Warburton, Superintendent, School Administrative Unit 39, Amherst, NH

- Gary Daniels, Chair, Board of Selectmen, Town of Milford, NH
- James Whipple, Chair, Mont Vernon Board of Selectmen, Town of Mont Vernon, NH
- Mark LeDoux, Chair, Hollis Board of Selectmen, Town of Hollis, NH
- Nancy Harrington, Chair, Merrimack Town Council, Town of Merrimack, NH
- Homeland Security and Emergency Management, Danielle Morse, Field Representative, Concord, NH

A copy of the letter that was sent to these entities appears in the Appendix to this Plan. No comments were received.

The update of this Plan included the incorporation of Fluvial Erosion Hazard data, which had not previously been available. As a result, additional efforts were made to involve neighboring communities and local and regional agencies involved in hazard mitigation. NRPC staff met with the Souhegan River Local Advisory Committee on January 17, 2013 to discuss the fluvial erosion hazard study and how the results would be incorporated into local hazard mitigation plan updates. NRPC staff held a second meeting with the Souhegan River Local Advisory Committee on November 20, 2014 to present the final results of the fluvial erosion hazard study and draft hazard mitigation plans. Agendas from these meetings appear in the Appendix to this Plan.

At the outset of this project, NRPC staff met with the Amherst Board of Selectmen on June 24, 2013 to present on the hazard mitigation plan update process and discuss how the fluvial erosion hazard data would be incorporated into the plan update. NRPC staff made a second presentation to the Amherst Board of Selectmen on October 27, 2014 to discuss the results of the fluvial erosion hazard study and the options available to community officials to use the fluvial erosion hazard zones as a public safety tool. Agendas and handouts from these meetings appear in the Appendix to this Plan. The Amherst Planning Board was given opportunity to provide input on this Plan through the participation of Sarah Marchant, Amherst Community Development Director, who served on the Hazard Mitigation Team and was a liaison to the Planning Board.

Section 1.3 ~ Public Participation

During the first Hazard Mitigation Team meeting, held on November 14, 2013, the Team brainstormed all the methods currently employed to notify the public of Town meetings and news. These methods include the Town's website (http://amherstnh.gov/) and Amherst Community Access Television (http://amherstnh.gov/community-t-v/). The Team determined that these methods should also be used to encourage public participation in the Hazard Mitigation Plan update process. In addition, announcements were made at various televised Board of Selectmen meetings regarding the update process. There was no public response to provide input to the Amherst Hazard Mitigation Plan Update 2015 process.

NRPC staff also developed a webpage for the Amherst Hazard Mitigation Plan Update 2015

(http://www.nashuarpc.org/energy-environmental-planning/hazard-mitigation-planning/), which allows members of the public to participate in the update process even if they cannot attend meetings. The webpage was updated throughout the planning process and includes the 2007 Amherst Hazard Mitigation Plan, 2015 Hazard Mitigation Plan Outline, and Hazard Mitigation Plan Review Checklist. It also provides meeting times, locations, agendas, and homework assignments. The Town of Amherst's website links to this webpage. The Nashua Regional Planning Commission will keep the website active and will add information about ongoing updates over the next 5 years. A screen shot of the website appears in the Appendix to this Plan.

In addition, NRPC staff organized and facilitated two watershed wide public workshops in the Souhegan River Watershed in order to provide information to residents about the fluvial erosion hazard study and the hazard mitigation plan updates. The Souhegan River Watershed includes the New Hampshire towns of Merrimack, Bedford, Goffstown, New Boston, Amherst, Mont Vernon, Lyndeborough, Milford, Brookline, Wilton, Greenfield, Temple, Mason, Greenville, and New Ipswich. These workshops were advertised through a variety of media, including announcements in NRPC's electronic newsletter, fliers in the communities, ads in the Milford Cabinet and Merrimack Journal, and emails to Conservation Commission members in the watershed. The first workshop was held on May 22, 2013 just prior to the start of the fluvial erosion field assessments. The second workshop was held on September 11, 2014 after the data collection was complete. Staff members from NH Dept. of Environmental Services and Field Geology Services were present at both workshops to answer questions from the public. Both meetings were well attended; 22 members of the public attended the May 22, 2013 workshop and 26 members of the public attended the September 11, 2014 workshop. Advertisements from both workshops can be found in the Appendix to this Plan.

Section 1.4 ~ Existing and Potential Authorities, Policies, Programs, and Resources

At the first Hazard Mitigation Team meeting, held on November 14, 2013, the Team discussed Amherst's existing authorities, policies, programs, and resources related to hazard mitigation and its ability to expand and improve on these. The purpose of this discussion was to determine the ability of the Town to implement its hazard mitigation strategies and to identify potential opportunities to enhance specific policies, programs, or projects. The evaluation of Amherst's existing authorities, policies, programs, and resources includes planning and regulatory capabilities, emergency management capabilities, floodplain management capabilities, administrative and technical capabilities, and fiscal capabilities. Each of these areas provides an opportunity to integrate hazard mitigation principles and practices into the local decision making process.

Planning and Regulatory Capabilities

Planning and regulatory capability is based on the implementation of plans, ordinances, and programs that demonstrate Amherst's commitment to guiding and managing growth in a responsible manner. The following is a summary of the relevant local plans, ordinances, and programs already in place in the

Town of Amherst. Each one should be considered as an available mechanism for incorporating the recommendations of the Amherst Hazard Mitigation Plan Update 2015.

- Strategic Planning/Budget Process FY2015—strategic plans for the Police Department, EMS Department, Fire Department, Community Development, and DPW
- Floodplain Conservation District—the purpose of this district is to prevent the development of buildings and uses in areas that are hazardous due to the threat of flooding and to protect natural flow and drainage.
- Wetland and Watershed Conservation District—the purpose of this district is to protect the health, safety, and general welfare of the public by promoting both the most appropriate use of land and by protecting wetland and surface water ecosystems and water quality.
- Aquifer Conservation and Wellhead Protection District—the purpose of this district is to protect quality and quantity of groundwater resources available to be used as current and/or future drinking water supplies.
- Capital Improvement Plan FY2015-2020—this annually evolving document links local infrastructure investments with long-term planning.
- Town of Amherst Subdivision Regulations
- Town of Amherst Non-Residential Site Plan Review Regulations
- Amherst Stormwater Regulation—the purpose of this regulation is to control runoff and soil erosion and sedimentation resulting from site construction and development and to comply with US EPA stormwater management legislation.
- International Building Code and International Residential Code
- Amherst Master Plan—2010
- National Flood Insurance Program

Emergency Management Capabilities

Hazard mitigation is a key component of emergency management, along with preparedness, response, and recovery. Opportunities to reduce potential losses through mitigation practices are typically implemented before a hazard event occurs, such as enforcement of policies to regulate development that is vulnerable to hazards due to its location or design. Existing emergency management capabilities for the Town of Amherst include:

Emergency Management Plans

- Amherst Hazard Mitigation Plan 2007—this document provides a guide for the community to reduce the impact of natural hazards on its residents and the built environment.
- Amherst Emergency Operations Plan—this document outlines responsibilities and the means by which resources are deployed during and following an emergency or disaster.
- Amherst Fire Department Strategic Plan 2013—this document evaluates the department's operations, examines future needs, and identifies strategic goals.
- Town of Amherst Police Department Strategic Plan for 2013-2017
- Amherst EMS Department Strategic Plan 2013

Emergency Management Departments, Facilities, Personnel, and Volunteers

- Amherst Emergency Medical Services, Amherst Fire Department, Amherst Police Department—these departments provide policies, programs, and resources related to hazard mitigation and emergency preparedness.
- Souhegan Valley Mutual Aid—provides fire, police, ambulance, and highway assistance to municipalities in southwest Hillsborough County
- CERT Team—28 active members, web EOS trained; includes Amherst, Mont Vernon, Milford, and Lyndeborough; 3 HAM radio operators
- Emergency Operations Center—located at the Emergency Services Complex
- Fire Chief serves as Emergency Management Director

Emergency Management Communications

- Amherst Public Safety Communications Center—provides dispatching services for Police, Fire, Emergency Medical Services, and DPW. Open 24 hours/day, 365 days/year. Backup dispatch provided by Milford Area Communications Center.
- Code Red emergency alert system
- Amherst Community Access Television—emergency management announcements
- Amherst Town website—emergency management announcements and education

Floodplain Management Capabilities

The Town of Amherst participates in the National Flood Insurance Program (NFIP). This provides full insurance coverage based on risk as shown on detailed Flood Insurance Rate Maps (FIRMs). Amherst joined the NFIP on July 2, 1979. As a participant in the NFIP, communities must agree to adopt a floodplain management ordinance and enforce the regulations found in the ordinance. Amherst has adopted the "Floodplain Conservation District," found in Section 4.10 of the Town of Amherst, NH Zoning Ordinance. The Floodplain Conservation District is enacted to prevent the development of buildings and uses in areas that are unsatisfactory and hazardous due to the threat of flooding, protect natural flows and drainage, and comply with the requirements of the National Flood Insurance Act of 1968 (P.L. 90-488, as amended). Additional information on the Floodplain Conservation District and Amherst's participation in the NFIP can be found in Section 3.7 of this Plan.

Administrative and Technical Capabilities

Amherst's ability to develop and implement mitigation projects, policies, and programs is closely related to the staff time and resources it allocates to that purpose. Administrative capability can be improved by coordinating across departments and integrating mitigation planning into existing Town procedures. The following departments, boards, and personnel are critical to Amherst's hazard mitigation administrative and technical capabilities:

- Planning Department—GIS and mapping capabilities
- Fire Department—mapping capabilities, Fire Chief serves as EMD
- Police Department
- Department of Public Works

- Town Administrator
- Building Inspector
- Public Health Officer
- Board of Selectmen
- Planning Board
- Ways and Means Committee
- CIP Committee

Fiscal Capabilities

In addition to administrative and technical capabilities, the ability of the Town of Amherst to implement mitigation actions is closely associated with the amount of money available for these projects. Mitigation actions identified in this Plan, including those in Table 12—Implementation and Administration, may utilize the following funding sources.

- Congestion Mitigation and Air Quality (CMAQ) Program—this program is administered by the Federal Highway Administration and was implemented to support surface transportation projects and related efforts that contribute to air quality improvements and provide congestion relief.
- FEMA Hazard Mitigation Grant Program—the Hazard Mitigation Grant Program provides grants to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the Program is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster.
- FEMA Pre-Disaster Mitigation Program—the Pre-Disaster Mitigation Program provides funds for hazard mitigation planning and the implementation of mitigation projects prior to a disaster.
- Community Development Block Grant Program—the Community Development Block Grant (CDBG) program, administered through the US Department of Housing and Urban Development, provides communities with resources to address a wide range of unique community development needs, including Disaster Recovery Assistance. HUD provides flexible grants to help cities, counties, and States recover from Presidentially declared disasters, especially in low-income areas, subject to availability of supplemental appropriations.
- Capital Improvements Plan— the Amherst Capital Improvements Plan (CIP) links local infrastructure investments with long-term planning. As authorized by RSA 674:5-8 the CIP is the responsibility of the Planning Board or a formally appointed capital improvements program committee, to prepare and amend a recommended program of municipal capital improvements projected over a period of at least six years.
- 1-Year Appropriation—most commonly used financing option and refers to those projects that are to be funded by property tax revenues within a single fiscal year. Funds for projects that are financed using this method are most often included in the Town's operating budget, but can appear as warrant articles to be voted on individually. The Amherst CIP Committee utilizes this funding mechanism for projects with a life expectancy of at least 3 years and an initial cost of up to $200,000.
- Capital Reserve—a capital reserve account is a non-lapsing savings account, separate from the General Fund. Voters can deposit funds into with approval of a warrant article, with the intent

of withdrawing the funds to use for the specific purpose or purchase for which the account was established. The Amherst CIP Committee utilizes this funding mechanism for projects with a life expectancy of at least 5 years and an initial cost of approximately $25,000 to $300,000.

- Lease Purchase—lease purchasing an item allows a municipality to spread the cost over a period of years, generally no more than 7. A municipal lease typically allows for Town ownership at the end of the lease term and usually enjoys lower tax-exempt interest rates. Unlike a bond or loan, a municipal lease has a "non-appropriation clause" that allows the town to cancel the lease if the annual payment is not appropriated. The town then loses the equipment that was financed. The Amherst CIP Committee utilizes this funding mechanism for projects with a life expectancy of 3 to 10 years and an initial cost of $50,000 to $175,000.
- Bonding—bonding allows the municipality to negotiate the purchase of goods or services at a set price and then pay for that item or service over a period of time. Bonds, unlike capital reserve accounts, allow the town to utilize the item being purchased or constructed while payments are being made. The most important part of a bond transaction is the promise of the town to repay the debt with interest. There are two major types of bond: general obligation and special revenue. General Obligation Bonds typically have lower interest rates than other types of long-term debt. Revenue Bonds rely on a set revenue source or sources as security for the bond. Local governments most often issue revenue bonds for self-supporting local projects. The Amherst CIP Committee does not generally utilize bonds unless the purchase has a life expectancy of at least 20 years and a minimum initial cost of $200,000.

Summary and Analysis of Amherst's Existing Authorities, Policies, Programs, and Resources

Measures of Effectiveness are defined as follows:

- Excellent—the existing program works as intended and is exceeding its goals
- Good—the existing program works as intended and meets its goals
- Average—the existing program works as intended but could be improved to meet higher standards
- Poor—the existing program does not work as intended, often falls short of its goals, and/or may present unintended consequences

Capability	Description	Area of Town Covered	Responsible Entities	Effectiveness	Changes or Improvements Needed
Planning and Regulatory	Strategic Planning/Budget Process FY2015, Floodplain Conservation District, Wetland and Watershed Conservation District, Aquifer Conservation and	Entire jurisdiction	Planning Board, Zoning Board, Community Development Office	Good	Ordinances should be reviewed on a regular basis to ensure they are consistent with goals outlined in the Master Plan and Hazard Mitigation Plan.

	Wellhead Protection District, CIP, Subdivision Regulations, Non-Residential Site Plan Review Regulations, IBC, IRC, Amherst Master Plan, NFIP				
Emergency Management	Plans; Departments, Facilities, Personnel, and Volunteers; Communications	Entire jurisdiction	Amherst Fire Dept., Amherst Police Dept., Amherst Emergency Medical Services, Souhegan Valley Mutual Aid, CERT Team	Good	Utilize a variety of communications methods to ensure all residents are educated about emergency preparedness and hazard mitigation measures they can take.
Floodplain Management	Floodplain Conservation District, NFIP	Designated Flood Hazard Areas in Amherst	Amherst Planning Board	Excellent	No changes or improvements needed.
Administrative and Technical	Planning Dept., Fire Dept., Police Dept., DPW, Town Administrator, Building Inspector, Health Officer, Board of Selectmen, Planning Board, Zoning Board, Ways and Means Committee, CIP Committee	Entire jurisdiction	Entities listed in Description	Good	Promote communication across all departments to ensure Hazard Mitigation Plan goals and actions are implemented.
Fiscal	Grant funding, Capital Improvements Program (CIP)	Entire jurisdiction	Board of Selectmen, Planning Board	Good	Hazard mitigation actions should be considered for inclusion in the CIP and departmental budgets. Amherst's Hazard Mitigation Plan should be

					updated at least every 5 years in order to maintain eligibility for FEMA grants.

Section 1.5 ~ Review and Incorporation of Existing Documents

A number of existing documents were reviewed and incorporated into the Amherst Hazard Mitigation Plan Update 2015. The Amherst Zoning Ordinance was used to provide information on where and how the Town builds. This was particularly helpful when mapping critical facilities corridors (Section 3.4). The Amherst Capital Improvements Plan and 2013 Strategic Departmental Plans were used to help document the Town's fiscal capabilities (Section 1.4). The Amherst Master Plan and 2013 Strategic Departmental Plans provided insight on future development patterns (Section 2.1) and helped to inform the analysis and prioritization of mitigation actions (Section 4.3). The Amherst Emergency Management Plan was also used to inform the analysis and prioritization of mitigation actions. The State of New Hampshire Multi-Hazard Mitigation Plan Update 2013 provided insight when developing the description of natural hazards (Section 3.1), description of previous hazards (Section 3.2), probability of future hazards (Section 3.3), vulnerability by hazard (Section 3.5), and goals to reduce vulnerabilities (Section 4.1). Finally, the City of Nashua's Comprehensive Emergency Management Plan was referenced to write the hazard descriptions used to determine Amherst's vulnerability by hazard (Section 3.5).

Section 1.6 ~ Updating the Plan

The Town of Amherst is required to update its Hazard Mitigation Plan at least every five years. In order to monitor, evaluate, and update the Mitigation Strategies identified in Table 12—Implementation and Administration, the Amherst Hazard Mitigation Team will meet annually. The Amherst Fire Chief is responsible for initiating this review and will consult with members of the Amherst Hazard Mitigation Team and the community. During this meeting, the Team will identify mitigation actions that can be conducted in the current year as well as mitigation actions that will require budget requests for the following year. These mitigation actions will be monitored throughout the year by the Team.

Changes should be made to the Plan to accommodate projects that have failed or are not considered feasible after an evaluation and review for their consistency with the benefit cost analysis, STAPLEE analysis, timeframe, community's priorities, and funding resources. Mitigation strategies that were not ranked as priorities during the 2015 update should be reviewed as well during the monitoring, evaluation, and update of this Plan to determine feasibility of future implementation. New mitigation actions or plans proposed upon adoption of this Plan should follow the benefit cost and STAPLEE analysis methods utilized in this Plan to ensure consistency with the adopted Plan and to help the Hazard Mitigation Team evaluate overall potential for success.

In addition to this annual meeting, the Hazard Mitigation Team will meet after any hazard occurrence as part of the Town's debriefing exercise. The Hazard Mitigation Plan will be updated following this meeting to reflect changes in priorities and mitigation strategies that have resulted from the hazard event. It is especially important to incorporate updates within one year after a Presidential Disaster Declaration.

The Town of Amherst will utilize its website and local cable channel to notify members of the public about the annual Hazard Mitigation Plan Update meeting and to involve them in the update process. Any public input that is received will be incorporated into the Plan update. In addition, following its annual meeting, the Hazard Mitigation Team will report the results of its update process to the Amherst Board of Selectmen. The Board of Selectmen's meetings are open to the public and are also broadcast on Amherst Community Access TV.

CHAPTER 2. CHANGES FROM PREVIOUS PLAN

Section 2.1 ~ Changes in Development

There have been no significant changes in development patterns in Amherst since the 2007 Hazard Mitigation Plan. Most of the Town's commercial and industrial development continues to be located along Route 101 and Route 101A. Likewise, there have been no significant changes in development that have occurred in hazard prone areas that have increased Amherst's vulnerability to hazards. This is largely the result of a slowing economy and less new development coming into Amherst.

One change that should be noted is that in December 2012 the bridge at the junction of Mack Hill and Manchester Road was closed to vehicular traffic due to "no remaining safe live load carrying capacity" following a NH DOT inspection. The bridge is not scheduled to be replaced until 2018 when the Town can receive an anticipated 80% reimbursement from the NH DOT. Until then, vehicular traffic, including emergency services, must seek alternate routes.

In addition, in March 2013 the Town of Amherst and the Planning Board were awarded a grant of $29,300 to combine and update the water resource ordinances with current Best Management Practices for the Watershed Conservation, Wetlands Protection, and Aquifer Conservation Districts in order to protect the high quality of drinking water and watershed in the Town and region. The revision of these ordinances is an important contribution to protecting the Town's and region's natural resources, while providing clear guidance for land use management and future development of the community.

Section 2.2 ~ Progress on Local Mitigation Efforts

The mitigation actions and implementation framework identified in the Amherst Hazard Mitigation Plan Update 2015 have been revised to reflect progress in local mitigation efforts. Progress has been made on a number of local mitigation efforts, including culvert improvements at Horace Greeley Road,

elevating Walnut Road out of the floodplain, completing the Amherst EOC, formalizing an evacuation plan, establishing a back-up central fueling station for emergency vehicles, and providing emergency responders with mobile computers equipped with aerial photography and diagramming software.

In order to assess progress on local mitigation efforts, the Hazard Mitigation Team reviewed the actions originally presented in the Amherst Hazard Mitigation Plan 2007 and determined if they had been completed, deleted, or deferred. Progress on each action and its current priority level were also evaluated to determine if it should continue to be included in the mitigation actions identified in this Plan update.

Table 1—Status of Previous Actions

2007 Mitigation Action	Description	Status	Explanation
Culvert and bridge capacity improvements at the following locations: • Boston Post Road between Simeon Wilson & Thornton Ferry Road II • Stearns Road between Veterans Road and Route 122 • Merrimack Road between Holt Road and Souhegan Ave • Horace Greeley Road between Brook Road and Schoolhouse Road • Horace Greeley Road by Huckabee Lane • Walnut Hill Road @ Embankment Road	There are several areas that experience restricted flow capacity due to undersized culverts or low road beds. Each area will require individual strategies such as culvert replacement or grade improvements.	Deferred—Boston Post Road; road is located in floodplain and as result there are issues related to improvements and their possible environmental impacts Deferred—Stearns Road; on road bond list, road needs to be raised out of floodplain but there are possible environmental impacts to consider Deferred—Merrimack Road; road is located in floodplain and as result there are issues related to improvements and their possible environmental impacts Completed—Horace Greeley Rd; added culverts Completed—Walnut Road; raised road out of floodplain	<u>This is a mitigation action (Structural).</u> Deferred components of this action will continue to be tracked in the Hazard Mitigation Plan Update 2015.

2007 Mitigation Action	Description	Status	Explanation
Traffic control devices at intersection of Boston Post Road and Davis Witty Road	Install traffic control devices (turning lane and traffic signals) at the intersection of Boston Post Road and Davis Witty Road.	Deleted	This action was deleted due to lack of public support. Because this is not a natural hazard mitigation action, it will not be tracked in future natural hazard mitigation plans.
Training for additional Highway Safety Committee members	Send other members of the Amherst Highway Safety Committee to Road Safety Audit training.	Completed	Because this is not a natural hazard mitigation action, it will not be tracked in future natural hazard mitigation plans.
Develop Public Education Program for Emergency Preparedness	Develop an educational piece that describes the emergency management actions that they should take and where to get timely information.	Completed	Public education programs have been completed for use with Code Red, Community Access TV, and the Emergency Response Plan. Because this is a preparedness action and not a mitigation action, it will not be tracked in future natural hazard mitigation plans.
Volunteer Program	Recruit and educate community volunteers in the roles and responses in certain emergencies (ex. health workers in a medical incident).	Completed	Amherst participates in a regional CERT. Because this is a preparedness action and not a mitigation action, it will not be tracked in future natural hazard mitigation plans.
Town ordinance describing emergency roles	Develop a town ordinance that describes the roles and responsibilities of Town officials during an emergency.	Completed	A description of emergency roles is found in the Emergency Response Plan. Because this is a preparedness action and not a mitigation action, it will not be tracked in future natural hazard mitigation plans.

2007 Mitigation Action	Description	Status	Explanation
Shelter-in-Place Plan	Plan for the supplying of food, water, medicines, and other supplies to residents who are "sheltering-in-place"	Deleted	This action was deleted because it was not considered to be necessary. The Red Cross would take the lead on planning for residents to shelter in place. Because this is a preparedness action and not a mitigation action, it will not be tracked in future natural hazard mitigation plans.
ICS Training for staff	Incident Command System (ICS) training for emergency staff personnel.	Completed	Because this is not a natural hazard mitigation action, it will not be tracked in future natural hazard mitigation plans.
Complete the Town EOC	The current EOC located in the training room of the EMS Department needs to be updated/completed so it can function effectively over a long period	Completed	This is a mitigation action (Emergency Services Protection). Because it has been completed it will not be tracked in future hazard mitigation plans.
Pavement Improvement	Improve conditions of roads before they deteriorate and become dangerous to drivers.	Completed	In 2010 the Town passed $15 million road bond to improve pavement, with $2 million of work per year. Because this is not a natural hazard mitigation action, it will not be tracked in future natural hazard mitigation plans.
Complete Improvements to Amherst Public Safety Communications Center.	There is a need to have all Town emergency departments able to communicate to each other throughout the Town to improve interoperability	Completed	Because this is a preparedness action it will not be tracked in future hazard mitigation plans.

2007 Mitigation Action	Description	Status	Explanation
Formalize Evacuation Plan	Formalize a plan to evacuate certain areas of Town or specific facilities during a hazardous event.	Completed	This is a mitigation action (Emergency Services Protection). It will be formalized in the Town's Emergency Operation Plan and future updates will occur through this process. Therefore will not be tracked in future hazard mitigation plans.
Digital Voter radio system installed on water tower (Walnut Hill Area) APD	Upgrade PSCC to include Rx/Tx capabilities for North End of Town	Completed	Because this is a preparedness action it will not be tracked in future hazard mitigation plans.
Digital Voter radio antenna system and tower EMS/Fire/ DPW	Upgrade PSCC to include Rx/Tx capabilities for North End of Town	Completed	Because this is a preparedness action it will not be tracked in future hazard mitigation plans.
Town Hall flooding mitigation (basement flooding) preservation of records	Plan for catastrophic water damage event in order to protect important Town records.	Completed	A small amount of runoff from Town Hall roof went into basement during Mother's Day flood. Flooding is not usually an issue at Town Hall because of well-drained soil. Additional mitigation is not anticipated.
Upgrade Safety Complex with replacement generator.	Remove and replace existing generator as per electrical consultant proposal	Completed	Because this is a preparedness action and not a mitigation action, it will not be tracked in future natural hazard mitigation plans.

2007 Mitigation Action	Description	Status	Explanation
Back-up generators for AFD South Station	Install generator at AFD South	Completed	Because this is a preparedness action and not a mitigation action, it will not be tracked in future natural hazard mitigation plans.
Portable Generator	Obtain a portable generator unit that can be transported to field events for extended power/lighting operations.	Completed	Because this is a preparedness action and not a mitigation action, it will not be tracked in future natural hazard mitigation plans.
Portable Culvert Flushing Unit Conversion of AFD Tanker	Develop a portable all-wheel drive culvert flushing unit to assist during catastrophic flooding events and preventative maintenance.	Deleted	Regular maintenance is not considered a mitigation action. In addition, it is no longer a priority because the Town can work with the Fire Dept. as needed, and therefore will not be tracked in future natural hazard mitigation plans.
Upgrade Highway Garage w/ VHF Rx/Tx capabilities	Upgrade PSCC to include Rx/Tx capabilities for Town wide VHF coverage.	Completed	Because this is a preparedness action it will not be tracked in future hazard mitigation plans.

2007 Mitigation Action	Description	Status	Explanation
Back-up Central Fueling Station for emergency vehicles	Utilize Rt 101A Mobil for any catastrophic DPW fueling interruptions.	Completed	This is a mitigation action (Emergency Services Protection). A backup generator is located at DPW and Mobil stations serve as a 2nd backup. Because it has been completed it will not be tracked in future hazard mitigation plans.
Reverse 911	Acquire reverse 911 capabilities (purchase licensing). Develop protocols for implementation of Reverse 911 in the event of an emergency.	Completed	The Town uses Code Red. Because this is a preparedness action and not a mitigation action, it will not be tracked in future natural hazard mitigation plans.
High capacity "trash" pumps (flooding) local resident assistance i.e. Conifer Lane	Plan for the supplying of rental equipment to residents in need of emergency basement water pumping	Deleted	The town owns a low capacity pump and can rent high capacity pump. Because this is a preparedness action and not a mitigation action, it will not be tracked in future natural hazard mitigation plans.
Evaluate need for Town participation in CERT (Citizen Emergency Response Team)	Evaluate need for Town participation in CERT (Citizen Emergency Response Team). Recruit and educate community volunteers	Completed	Because this is a preparedness action it will not be tracked in future hazard mitigation plans.
Review of permitting procedures for hazardous materials	A town ordinance that describes the storage, transport and location of hazardous materials for commercial and residential	Completed	Planning Board recently completed an update to its aquifer protection ordinances and the Fire ordinance requires permit for hazardous materials. Because this addresses manmade hazards and not natural hazards, it will not be tracked in future natural hazard mitigation plans.

2007 Mitigation Action	Description	Status	Explanation
County-wide Law Enforcement Mutual Aid Agreement.	There is an insufficient amount of law enforcement personnel in times of emergency. A county wide mutual aid agreement, adding many other towns to the agreement in addition to only those bordering Amherst is needed. Written mutual aid agreements with Nashua PD and NHSP are needed to ensure timely tactical response to active shooters, barricaded subjects, hostage situations and other high risk/entry situations.	Completed	Because this addresses manmade hazards and not natural hazards, it will not be tracked in future natural hazard mitigation plans.
Install security cameras in schools	Installation and/or addition of security cameras within schools with link back to police department to assist with response to emergency within the building.	Completed	Because this addresses manmade hazards and not natural hazards, it will not be tracked in future natural hazard mitigation plans.
Incorporate vehicle GPS tracking systems into mobile data terminals	Incorporating this technology will improve dispatch and response of emergency police units.	Completed	Because this addresses manmade hazards and not natural hazards, it will not be tracked in future natural hazard mitigation plans.
Direct alarm link to APSCC from critical facilities	Provide direct link to APSCC from specific, high priority sites such as banks, and municipal buildings. This will improve dispatch and response services to burglary and robbery alarms.	Completed	This action has been completed for the Town's schools. Because this addresses manmade hazards and not natural hazards, it will not be tracked in future natural hazard mitigation plans.
Mobile computers equipped with aerial photography and diagramming software	Aerial photography on mobile computers with diagramming software will assist in the planning, identification, and implementation of evacuation strategies and determination of which buildings need evacuation.	Completed	<u>This is a mitigation action (Emergency Services Protection).</u> The Fire and Police have Google mapping on their iPads. Because it has been completed it will not be tracked in future hazard mitigation plans.
Water main extensions in the following locations: • to South Fire Station • connect the loop on Amherst St by Lyndeborough Rd • Spring Rd to Taconic Dr.	Extend the water lines to high density residential areas as well as to South Fire Station. This would provide for better water supply and increased gallons per minute during times of fire.	Completed—Amherst Street by Lyndeborough Road Deleted—remaining sections	Deleted sections are not considered necessary at the present because development levels do not justify taking action. Because this is a preparedness action

2007 Mitigation Action	Description	Status	Explanation
• Route 122 by the Hollis line to Old Nashua Rd • Thorton Ferry Rd II from Deerwood Dr. to County Rd			and not a mitigation action, it will not be tracked in future natural hazard mitigation plans.
Underground water cisterns at the following locations: • Chestnut Hill Rd at The Flume • Horace Greeley Rd at Chestnut Hill Rd • Pond Parrish Rd • Mack Hill Rd at High Meadow Ln. • Christian Hill Rd at Eaton Rd	Develop strategic water supply points in the rural areas of town, obtain deed access points to install 15,000 gallon cisterns, install the cisterns for better water supply and increased gallons per minute during times of fire.	Deferred	The Water Resource Plan discusses where to expand water for fire protection. Because this is a preparedness action and not a mitigation action, it will not be tracked in future natural hazard mitigation plans.
Purchase portable electronic signs	Purchase portable electronic signs for public notification of events and changed traffic patterns	Completed	Because this is a preparedness action and not a mitigation action, it will not be tracked in future natural hazard mitigation plans.
Video monitoring at the following major intersections: • Boston Post Rd at Amherst St • Route 101A at Route 122 • Route 101A at Northern Blvd • Route 101A at Caldwell Dr	Install video monitoring at major intersections that are monitored in the communications center that allow for identification of traffic hazards/problems	Deleted	This action is no longer considered a priority. Because this addresses manmade hazards and not natural hazards, it will not be tracked in future natural hazard mitigation plans.
Town-wide Radon Study	Perform a Town-wide study to better understand the locations and potential of dangerous radon issues.	Deleted	This action is no longer considered a priority. Because FEMA does not consider Radon to be a natural hazard, it will not be tracked in future natural hazard mitigation plans.

Section 2.3 ~ Changes in Priorities

Many of the "mitigation" actions identified in Amherst's 2007 Hazard Mitigation Plan were actually preparedness actions. While preparedness actions are important, the Amherst Hazard Mitigation Plan Update 2015 will focus exclusively on mitigation actions. Therefore, only true mitigation actions from the 2007 Plan will be addressed here.

The STAPLEE scoring system in the 2007 Amherst Hazard Mitigation Plan was different from the STAPLEE scoring system used in the 2015 update. This makes it difficult to analyze changes in mitigation action priority levels by comparing STAPLEE scores. As such, Table 2 also notes whether the action falls within the top 50% or bottom 50% of all mitigations actions identified in the plan.

The following mitigation actions remained at the same priority level from the 2007 Plan to the 2015 Plan: culvert and bridge capacity improvements.

No mitigation action rose in priority level from the 2007 Plan to the 2015 Plan. The remaining mitigation actions dropped in priority level from the 2007 Plan to the 2015 Plan.

Table 2—Changes in Mitigation Priorities

2007 Mitigation Action	Current Status	Priority Level in 2007 Plan	Priority Level in 2015 Plan
Culvert and bridge capacity improvements at the following locations: • Boston Post Road between Simeon Wilson & Thornton Ferry Road II • Stearns Road between Veterans Road and Route 122 • Merrimack Road between Holt Road and Souhegan Ave • Horace Greeley Road between Brook Road and Schoolhouse Road • Horace Greeley Road by Huckabee Lane • Walnut Hill Road @ Embankment Road	Deferred—Boston Post Road Deferred—Stearns Road Deferred—Merrimack Road Completed—Horace Greeley Rd Completed—Walnut Road	STAPLEE Score = 18 Rank = 4 out of 8 Top 50% of all preparedness and mitigation actions.	STAPLEE Score = 9 Rank = 3 out of 6 Top 50% of all preparedness and mitigation actions.

2007 Mitigation Action	Current Status	Priority Level in 2007 Plan	Priority Level in 2015 Plan
Complete the Town EOC	Completed	STAPLEE Score = 21 Rank = 1 out of 8 Top 50% of all preparedness and mitigation actions.	This action has been completed and is no longer considered a priority. A similar action was not identified in the 2015 Plan update.
Formalize Evacuation Plan	Deferred	STAPLEE Score = 20 Rank = 2 out of 8 Top 50% of all preparedness and mitigation actions.	This action is being addressed through the Town's Emergency Operations Plan and is no longer considered a priority for the Hazard Mitigation Plan. A similar action was not identified in the 2015 Plan update.
Back-up Central Fueling Station for emergency vehicles	Completed	STAPLEE Score = 16 Rank = 6 out of 8 Bottom 50% of all preparedness and mitigation actions.	This action has been completed and is no longer considered a priority. A similar action was not identified in the 2015 Plan update.
Mobile computers equipped with aerial photography and diagramming software	Completed	STAPLEE Score = 20 Rank = 2 out of 8 Top 50% of all preparedness and mitigation actions.	This action has been completed and is no longer considered a priority. A similar action was not identified in the 2015 Plan update.

CHAPTER 3. HAZARD IDENTIFICATION AND RISK ASSESSMENT

Section 3.1 ~ Description of Natural Hazards

The Town of Amherst is susceptible to a variety of natural hazards, which are outlined in Table 3. For each hazard type, the hazard location within the Town, extent, and impact are also noted. Extent refers to how bad the hazard can be; it is not the same as location. Examples of extent include potential wind

speed, depth of flooding, and existing scientific scales (ex. Fujita Tornado Damage Scale). Impact refers to damages or consequences resulting from the hazard.

Table 3—Natural Hazards in Jurisdiction

Hazard Type	Hazard Location within Jurisdiction	Hazard Extent	Impact
Drought	Entire jurisdiction.	NH DES Drought Management Plan: • Level 1—Alert, 4 month cumulative precipitation less than 65% of normal for the period • Level 2—Warning, 6 month cumulative precipitation less than 65% of normal for the period • Level 3—Emergency, 12 month cumulative precipitation less than 75% of normal for the period • Level 4—Disaster, not quantified	Loss of crops. Inadequate quantity of drinking water. Loss of water for fire protection. Increased risk of fire. Loss of natural resources.
Earthquake	Entire jurisdiction.	Richter Scale: • <3.4—detected only by seismometers • >8—total damage, surface waves seen, objects thrown in air For full definitions of Richter Scale, see Section 3.5 Vulnerability by Hazard	Structural damage or collapse of buildings. Damage or loss of infrastructure, including roads, bridges, railroads, power and phone lines, municipal communications, 911 communications, radio system. Loss of water for fire protection. Increased risk of fire (gas break). Risk to life, medical

Hazard Type	Hazard Location within Jurisdiction	Hazard Extent	Impact
			surge.
Extreme Temperatures	Entire jurisdiction.	Extreme heat—period of 3 consecutive days when air temperature reaches 90°F or higher on each day. Extreme cold—extended exposure to typical NH winter weather without heat or shelter; period of 3 consecutive days when air temperature is 0°F or lower on each day.	Overburdened power systems may experience failures due to extreme heat. Shortages of heating fuel in extreme cold due to high demand. Medical surge. Loss of municipal water supply for drinking water and fire protection due to freezing temperatures.
Flooding	Floodplains cover approximately 15% of Amherst—11.4% of Amherst is located in 1% Floodplain and 3.6% of Amherst is located in the 0.2% Floodplain. Roadways susceptible to flooding include Boston Post Road at Souhegan River, Sterns Road, and Route 122.	FEMA flood probabilities: • 1% possibility per year • 0.2% possibility per year State of NH Dam Hazard Potential Classification system (for flooding resulting from dam/levee failure): • Class S—significant hazard • Class H—high hazard • Class L—low hazard • Class NM—non-menace For full definitions of Dam Hazard Classes, see Section 3.5 Vulnerability by Hazard	Water damage to structures and their contents. Damage or loss of infrastructure, including roads, bridges, railroads, power and phone lines, municipal communications, 911 communications, radio system. Environmental hazards resulting from damage. Isolation of neighborhoods resulting from flooding.
Fluvial Erosion	The largest Fluvial Erosion Hazard zone exists along the Souhegan River across the entire width of	Stream Sensitivity Rating: • Low • Moderate • High	Physical loss of land. Damage or loss of infrastructure, including roads, bridges,

Hazard Type	Hazard Location within Jurisdiction	Hazard Extent	Impact
	Amherst. Fluvial Erosion Hazard zones also exist along Beaver Brook between Manchester Road and Amherst Street as well as near the intersection of Boston Post Road and Ponemah Road.	• Very High • Extreme For full definitions of Stream Sensitivity Ratings, see Section 3.5 Vulnerability by Hazard	railroads, power and phone lines, municipal communications, 911 communications, radio system. Water damage to structures and their contents. Environmental hazards resulting from damage. Isolation of neighborhoods resulting from damaged transportation infrastructure.
Hurricane/Severe Wind	Entire jurisdiction.	Saffir-Simpson Hurricane Wind Scale: • Category 1— sustained winds 74-95 mph • Category 2— sustained winds 96-110 mph • Category 3— sustained winds 111-129 mph • Category 4— sustained winds 130-156 mph • Category 5— sustained winds 157 mph or higher	Wind damage to structures and trees. Water damage to structures and their contents. Damage or loss of infrastructure, including roads, bridges, railroads, power and phone lines, municipal communications, 911 communications, radio system. Environmental hazards resulting from damage. Isolation of neighborhoods resulting from flooding. Water pressure, quality, and capacity issues impacting fire protection.

Hazard Type	Hazard Location within Jurisdiction	Hazard Extent	Impact
			Loss of natural resources.
Severe Thunderstorm/Lightning	Entire jurisdiction. Areas with large populations present outdoors, large open spaces (golf courses)	Heavy rainfall, high winds, lightning, tornados, downbursts, fires.	Smoke and fire damage to structures and property. Disruption to power lines, municipal communications, and 911 communications. Damage to critical electronic equipment. Injury or death to people involved in outdoor activity.
Severe Winter Weather	Entire jurisdiction.	Depth of snow in a given time frame (ex. 2 or more inches per hour over a 12 hour period). Blizzard—violent snowstorm with minimum winds of 35 mph and visibility less than ¼ mile for 3 hours. Ground snow load factor. Ice Storm—Sperry-Piltz Ice Accumulation Index: • 0—little impact • 5—catastrophic damage to exposed utility systems For full definitions of Sperry-Plitz Ice Accumulation Index, see Section 3.5 Vulnerability by Hazard	Disruption to road network. Damage to trees municipal communications, and 911 communications. Structural damage to roofs/collapse. Increase in CO, other hazards.
Tornado/Downburst	Entire jurisdiction.	Fujita Tornado Damage Scale:	Wind damage to structures and trees.

Hazard Type	Hazard Location within Jurisdiction	Hazard Extent	Impact
		• F0—winds <73 mph • F1—winds 73-112 mph • F2—winds 113-157 mph • F3—winds 158-206 mph • F4—winds 207-260 mph • F5—winds 261-318 mph	Damage or loss of infrastructure, including roads, bridges, railroads, power and phone lines, municipal communications, 911 communications, radio system. Environmental hazards resulting from damage. Medical surge. Loss of natural resources.
Wildfire	Areas particularly prone to wildfire include larger wooded areas such as Mac Hill and Chestnut Hill	NWCG Fire Size Classification: • A—greater than 0 but less than or equal to 0.25 acres • B—0.26 to 9.9 acres • C—10.0 to 99.9 acres • D—100-299 acres • E—300 to 999 acres • F—1,000 to 4,999 acres • G—5,000 to 9,999 acres • H—10,000 to 49,999 acres • I—50,000 to 99,999 acres • J—100,000 to 499,999 acres • K—500,000 to 999,999 acres • L—1,000,000+ acres	Smoke and fire damage to structures in wild land/urban interface. Damage to habitat. Impacts to air quality. Impact to roadways. Loss of natural resources.

Section 3.2 ~ Description of Previous Hazards

The first step in determining the probability of future hazard events in the Town of Amherst is to examine the location, extent, and impact of previous hazards. If a hazard event has not occurred within Amherst but has occurred in the region it is also noted.

Table 4—Previous Occurrences of Hazards in Jurisdiction

Hazard Type	Date	Hazard Location within Jurisdiction	Hazard Extent	Impact
Drought	1960-1969	Entire jurisdiction	Long term drought—9 years of less than normal precipitation	Farms had minimal grass for grazing animals and poor crops. Wells went dry for 2 consecutive years in mid-1960s.
Drought	1999	Entire jurisdiction	Level 2—Warning. Drought warning issued on June 29, 1999.	Damage to crops. Low water levels in dug wells.
Drought	March 2002	Entire jurisdiction	Level 3—Emergency. First time Level 3 Drought Impact Level had been declared.	Damage to crops. Low water levels in dug wells.
Earthquake		There have been no earthquakes centered in Amherst to date. Earthquakes noted below were centered in NH.	Earthquakes noted below had a magnitude of 3.0 or greater.	
Earthquake	March 18, 1926	Manchester, NH	No historic data on extent	Intensity V effects observed in Amherst, Lyndeborough, Manchester, Mason, and Wilton.
Earthquake	December 20, 1940	Lake Ossipee, NH	Magnitude 5.5 on Richter Scale	No damage in Amherst
Earthquake	December 24, 1940	Lake Ossipee, NH	Magnitude 5.5 on Richter Scale	No damage in Amherst
Earthquake	December 4, 1963	Laconia, NH (43.6 latitude, -71.5 longitude)	Magnitude 3.7 on Richter Scale	No damage in Amherst
Earthquake	June 28, 1981	Sanbornton, NH (43.56 latitude, -71.56 longitude)	Magnitude 3.0 on Richter Scale	No damage in Amherst

Hazard Type	Date	Hazard Location within Jurisdiction	Hazard Extent	Impact
Earthquake	January 19, 1982	Sanbornton, NH (43.5 latitude, -71.6 longitude)	Magnitude 4.7 on Richter Scale	No damage in Amherst
Earthquake	October 25, 1986	Northfield, NH (43.399 latitude, -71.59 longitude)	Magnitude 3.9 on Richter Scale	No damage in Amherst
Earthquake	October 20, 1988	Milan, NH (44.539 latitude, -71.158 longitude)	Magnitude 3.9 on Richter Scale	No damage in Amherst
Earthquake	November 22, 1988	Milan, NH (44.557 latitude, -71.183 longitude)	Magnitude 3.2 on Richter Scale	No damage in Amherst
Earthquake	April 6, 1989	Berlin, NH (44.511 latitude, -71.144 longitude)	Magnitude 3.5 on Richter Scale	No damage in Amherst
Earthquake	October 6, 1992	Canterbury, NH (43.324 latitude, -71.578 longitude)	Magnitude 3.4 on Richter Scale	No damage in Amherst
Earthquake	June 16, 1995	Lyman, NH (44.286 latitude, -71.915 longitude)	Magnitude 3.8 on Richter Scale	No damage in Amherst
Earthquake	August 21, 1996	Bartlett, NH (44.184 latitude, -71.352 longitude)	Magnitude 3.8 on Richter Scale	No damage in Amherst
Earthquake	January 27, 2000	Raymond, NH (43.00 latitude, -71.18 longitude)	Magnitude 3.0 on Richter Scale	No damage in Amherst
Earthquake	September 26, 2010	Boscawen, NH (43.2915 latitude, -71.6568 longitude)	Magnitude 3.4 on Richter Scale	No damage in Amherst
Earthquake		Earthquakes noted below were centered outside of NH but were felt by NH municipalities.		
Earthquake	November 18, 1929	Grand Banks, Newfoundland	Magnitude 7.2 on Richter Scale	No damage in Amherst
Earthquake	November 1, 1935	Timiskaming, Canada	Magnitude 6.25 on Richter Scale	No damage in Amherst
Earthquake	June 15, 1973	Near Canadian/NH border	Magnitude 4.8 on Richter Scale	No damage in Amherst
Earthquake	June 23, 2010	Buckingham, Quebec, Canada	Magnitude 5.0 on Richter Scale	No damage in Amherst
Earthquake	August 23, 2011	Washington, DC	Magnitude 5.8 on Richter Scale	No damage in Amherst
Earthquake	October 16, 2012	Hollis Center, ME	Magnitude 4.0 on Richter Scale	No damage in Amherst
Extreme Temperature (Cold)	January 16-20, 2000	Entire jurisdiction	5 consecutive days of minimum	No known impact in Amherst

Hazard Type	Date	Hazard Location within Jurisdiction	Hazard Extent	Impact
			temperatures at or below 0°F: • 1/16/00: -3°F • 1/17/00: -2°F • 1/18/00: -5°F • 1/19/00: -6°F • 1/20/00: -4°F	
Extreme Temperature (Cold)	January 28-30, 2000	Entire jurisdiction	3 consecutive days of minimum temperatures at or below 0°F: • 1/28/00: -6°F • 1/29/00: -2°F • 1/30/00: -4°F	No known impact in Amherst
Extreme Temperature (Cold)	January 18-20, 2003	Entire jurisdiction	3 consecutive days of minimum temperatures at or below 0°F: • 1/18/00: -9°F • 1/19/00: -11°F • 1/20/00: -11°F	No known impact in Amherst
Extreme Temperature (Cold)	January 28-31, 2003	Entire jurisdiction	4 consecutive days of minimum temperatures at or below 0°F: • 1/28/03: -9°F • 1/29/03: -5°F • 1/30/03: -0°F • 1/31/03: -0°F	No known impact in Amherst
Extreme Temperature (Cold)	February 13-17, 2003	Entire jurisdiction	5 consecutive days of minimum temperatures at or below 0°F: • 2/13/03: -3°F • 2/14/03: -11°F • 2/15/03: -10°F • 2/16/03: -7°F • 2/17/03: -2°F	No known impact in Amherst
Extreme Temperature (Cold)	February 26-28, 2003	Entire jurisdiction	3 consecutive days of minimum temperatures at or below 0°F: • 2/26/03: -4°F • 2/27/03: -6°F • 2/28/03: -1°F	No known impact in Amherst
Extreme Temperature (Cold)	January 9-12, 2004	Entire jurisdiction	4 consecutive days of minimum temperatures at or below 0°F:	No known impact in Amherst

Hazard Type	Date	Hazard Location within Jurisdiction	Hazard Extent	Impact
			• 1/9/04: -7°F • 1/10/04: -8°F • 1/11/04: -8°F • 1/12/04: -7°F	
Extreme Temperature (Cold)	January 14-17, 2004	Entire jurisdiction	4 consecutive days of minimum temperatures at or below 0°F: • 1/14/04: -10°F • 1/15/04: -10°F • 1/16/04: -12°F • 1/17/04: -9°F	Wind chills of -30°F, 6 fatalities in NH
Extreme Temperature (Cold)	January 24-27, 2004	Entire jurisdiction	4 consecutive days of minimum temperatures at or below 0°F: • 1/24/04: -4°F • 1/25/04: -6°F • 1/26/04: -6°F • 1/27/04: -0°F	No known impact in Amherst
Extreme Temperature (Cold)	January 18-25, 2005	Entire jurisdiction	8 consecutive days of minimum temperatures at or below 0°F: • 1/18/05: 0°F • 1/19/05: -8°F • 1/20/05: -3°F • 1/21/05: -5°F • 1/22/05: -12°F • 1/23/05: -9°F • 1/24/05: 0°F • 1/25/05: -1°F	No known impact in Amherst
Extreme Temperature (Cold)	January 28-30, 2005	Entire jurisdiction	3 consecutive days of minimum temperatures at or below 0°F: • 2/28/05: -1°F • 2/29/05: -7°F • 2/30/05: -5°F	No known impact in Amherst
Extreme Temperature (Cold)	January 16-18, 2009	Entire jurisdiction	3 consecutive days of minimum temperatures at or below 0°F: • 1/16/09: -16°F • 1/17/09: -16°F • 1/18/09: -9°F	No known impact in Amherst
Extreme Temperature (Cold)	January 25-27, 2009	Entire jurisdiction	3 consecutive days of minimum temperatures at or	No known impact in Amherst

Hazard Type	Date	Hazard Location within Jurisdiction	Hazard Extent	Impact
			below 0°F: • 1/25/09: -7°F • 1/26/09: -7°F • 1/27/09: -5°F	
Extreme Temperature (Cold)	January 15-18, 2011	Entire jurisdiction	4 consecutive days of minimum temperatures at or below 0°F: • 1/15/11: -6°F • 1/16/11: -5°F • 1/17/11: 0°F • 1/18/11: -2°F	No known impact in Amherst
Extreme Temperature (Cold)	January 23-27, 2011	Entire jurisdiction	5 consecutive days of minimum temperatures at or below 0°F: • 1/23/05: -5°F • 1/24/05: -10°F • 1/25/05: -9°F • 1/26/05: -3°F • 1/27/05: -2°F	No known impact in Amherst
Extreme Temperature (Cold)	January 15-17, 2012	Entire jurisdiction	3 consecutive days of minimum temperatures at or below 0°F: • 1/15/12: -2°F • 1/16/12: -2°F • 1/17/12: 0°F	No known impact in Amherst
Extreme Temperature (Heat)	May 3-5, 2001	Entire jurisdiction*	3 consecutive days of temperatures above 90°F: • 5/3/01—93°F • 5/4/01—92°F • 5/5/01—92°F	No known impact in Amherst
Extreme Temperature (Heat)	June 15-17, 2001	Entire jurisdiction	3 consecutive days of temperatures above 90°F: • 6/15/01—92°F • 6/16/01—95°F • 6/17/01—91°F	No known impact in Amherst
Extreme Temperature (Heat)	July 22-26, 2001	Entire jurisdiction	5 consecutive days of temperatures above 90°F: • 7/22/01—90°F • 7/23/01—90°F • 7/24/01—92°F • 7/25/01—95°F • 7/26/01—93°F	No known impact in Amherst
Extreme	August 7-10, 2001	Entire jurisdiction	4 consecutive days	No known impact in

Hazard Type	Date	Hazard Location within Jurisdiction	Hazard Extent	Impact
Temperature (Heat)			of temperatures above 90°F: • 8/7/01—94°F • 8/8/01—97°F • 8/9/01—96°F • 8/10/01—100°F	Amherst
Extreme Temperature (Heat)	July 2-5, 2002	Entire jurisdiction	4 consecutive days of temperatures above 90°F: • 7/2/02—90°F • 7/3/02—95°F • 7/4/02—98°F • 7/5/02—97°F	No known impact in Amherst
Extreme Temperature (Heat)	July 30-August 2, 2002	Entire jurisdiction	4 consecutive days of temperatures above 90°F: • 7/30/02—90°F • 7/31/02—91°F • 8/1/02—91°F • 8/2/02—93°F	No known impact in Amherst
Extreme Temperature (Heat)	August 13-20, 2002	Entire jurisdiction	8 consecutive days of temperatures above 90°F: • 8/13/02—94°F • 8/14/02—96°F • 8/15/02—98°F • 8/16/02—95°F • 8/17/02—94°F • 8/18/02—92°F • 8/19/02—94°F • 8/20/02—92°F	No known impact in Amherst
Extreme Temperature (Heat)	June 25-28, 2003	Entire jurisdiction	4 consecutive days of temperatures above 90°F: • 6/25/03—90°F • 6/26/03—93°F • 6/27/03—92°F • 6/28/03—92°F	No known impact in Amherst
Extreme Temperature (Heat)	July 5-7, 2003	Entire jurisdiction	3 consecutive days of temperatures above 90°F: • 7/5/03—91°F • 7/6/03—90°F • 7/7/03—91°F	No known impact in Amherst
Extreme Temperature (Heat)	July 17-19, 2006	Entire jurisdiction	3 consecutive days of temperatures above 90°F: • 7/17/06—90°F • 7/18/06—93°F	No known impact in Amherst

Hazard Type	Date	Hazard Location within Jurisdiction	Hazard Extent	Impact
			• 7/19/06—94°F	
Extreme Temperature (Heat)	August 2-4, 2006	Entire jurisdiction	3 consecutive days of temperatures above 90°F: • 8/2/06—96°F • 8/3/06—97°F • 8/4/06—92°F	No known impact in Amherst
Extreme Temperature (Heat)	August 16-20, 2006	Entire jurisdiction	5 consecutive days of temperatures above 90°F: • 8/16/09—90°F • 8/17/09—90°F • 8/19/09—91°F • 8/19/09—93°F • 8/20/09—90°F	No known impact in Amherst
Extreme Temperature (Heat)	July 4-10, 2010	Entire jurisdiction	7 consecutive days of temperatures above 90°F: • 7/4/10—90°F • 7/5/10—90°F • 7/6/10—97°F • 7/7/10—98°F • 7/8/10—97°F • 7/9/10—92°F • 7/10/10—92°F	No known impact in Amherst
Extreme Temperature (Heat)	July 17-20, 2010	Entire jurisdiction	4 consecutive days of temperatures above 90°F: • 7/17/10—93°F • 7/18/10—93°F • 7/19/10—93°F • 7/20/10—90°F	No known impact in Amherst
Extreme Temperature (Heat)	August 30-Sept. 3, 2010	Entire jurisdiction	5 consecutive days of temperatures above 90°F: • 8/30/10—92°F • 8/31/10—91°F • 9/1/10—94°F • 9/2/10—95°F • 9/3/10—96°F	No known impact in Amherst
Extreme Temperature (Heat)	July 21-24, 2011	Entire jurisdiction	4 consecutive days of temperatures above 90°F: • 7/21/11—92°F • 7/22/11—96°F • 7/23/11—101°F • 7/24/11—96°F	No known impact in Amherst
Extreme Temperature (Heat)	June 21-23, 2012	Entire jurisdiction	3 consecutive days of temperatures	No known impact in Amherst

Hazard Type	Date	Hazard Location within Jurisdiction	Hazard Extent	Impact
			above 90°F: • 6/21/12—96°F • 6/22/12—94°F • 6/23/12—93°F	
Extreme Temperature (Heat)	July 13-16, 2012	Entire jurisdiction	4 consecutive days of temperatures above 90°F: • 7/13/12—92°F • 7/14/12—92°F • 7/15/12—93°F • 7/16/12—91°F	No known impact in Amherst
Extreme Temperature (Heat)	August 3-6, 2012	Entire jurisdiction	4 consecutive days of temperatures above 90°F: • 8/3/12—91°F • 8/4/12—94°F • 8/5/12—95°F • 8/6/12—93°F	No known impact in Amherst
Extreme Temperature (Heat)	June 1-3, 2013	Entire jurisdiction	3 consecutive days of temperatures above 90°F: • 6/1/13—93°F • 6/2/13—92°F • 6/3/13—91°F	No known impact in Amherst
Extreme Temperature (Heat)	July 16-21, 2013	Entire jurisdiction	6 consecutive days of temperatures above 90°F: • 7/16/13—90°F • 7/17/13—91°F • 7/18/13—93°F • 7/19/13—93°F • 7/20/13—96°F • 7/21/13—91°F	No known impact in Amherst
Flooding	1927	Hillsborough County	No data on extent available	Damage to road network.
Flooding	March 11-21, 1936	Hillsborough County	25-50 year recurrence interval	$133,000,000 in property damage and 77,000 homeless throughout New England. Primary impact to structures, infrastructure, and road network. Flooding caused by heavy snowfall totals, heavy rains, and warm weather.

Hazard Type	Date	Hazard Location within Jurisdiction	Hazard Extent	Impact
Flooding	July 11, 1973	Hillsborough County	No data on extent available	FEMA Disaster Declaration #399
Flooding	July 29-August 10, 1986	Hillsborough County	No data on extent available	FEMA Disaster Declaration #771
Flooding	March 30-April 11, 1987	Hillsborough County	25-50+ year recurrence interval	$4,888,889 in damage in NH. FEMA Disaster Declaration #789. Primary impact to agricultural fields.
Flooding	August 7-11, 1990	Hillsborough County	No data on extent available	$2,297,777 in damage in NH. FEMA Disaster Declaration #876. Primary impact to infrastructure.
Flooding	October 20-23, 1996	Hillsborough County	No data on extent available	$2,341,273 in damage in NH. FEMA Disaster Declaration #1144. Primary impact to structures and infrastructure.
Flooding	July 2, 1998	Hillsborough County	No data on extent available	$3,400,000 in damage in NH, 6 counties impacted including Hillsborough. FEMA Disaster Declaration #1231. Primary impact to structures and infrastructure.
Flooding	October 26, 2005	Hillsborough County	50-100 year recurrence interval	5 counties impacted in NH, including Hillsborough. FEMA Disaster Declaration #1610. Primary impact to structures and infrastructure.
Flooding	May 12-23, 2006	Hillsborough County	As much as 14 inches of rainfall in region. 100-500 year recurrence interval.	7 counties impacted in NH, including Hillsborough. FEMA Disaster Declaration #1643. Numerous road closures in Amherst. Homes around Baboosic Lake flooded.

Hazard Type	Date	Hazard Location within Jurisdiction	Hazard Extent	Impact
Flooding	April 15, 2007	Hillsborough County	100-500 year recurrence interval	$27,000,000 in damages in NH; 2,005 home owners and renters applied for assistance in NH. FEMA Disaster Declaration #1695. Primary impact to structures and infrastructure. Homes around Baboosic Lake flooded.
Flooding	September 6-7, 2008	Hillsborough County	50-100 year recurrence interval	$6.90 per capita in damages in Hillsborough County. FEMA Disaster Declaration #1799 Primary impact to structures and infrastructure.
Flooding	March 14, 2010	Hillsborough County	50-100 year recurrence interval	$1,880,685 in FEMA public assistance in NH; $1.80 per capita in Hillsborough County. Flooding near Johnson Corner due to undersized culvert. FEMA Disaster Declaration #1913 Primary impact to roads and bridges.
Fluvial Erosion	May 13-14, 2006	Suncook River—Epsom, NH	Avulsion	River channel changed course following heavy rain event, shortening path by ½ mile. Excessive sedimentation downstream.
Fluvial Erosion	August 28, 2011	East Branch Pemigewasset River—Lincoln, NH	Stream bank erosion	Damage to bridge abutments at Loon Mountain Ski Resort during Tropical Storm Irene.
Fluvial Erosion	August 28, 2011	Peabody River—Gorham, NH	Berm breach and stream bank erosion	High flows eroded through a berm and

Hazard Type	Date	Hazard Location within Jurisdiction	Hazard Extent	Impact
				eroded the banks in front of numerous properties during Tropical Storm Irene. Significant damage to White Birch Lane.
Fluvial Erosion	August 28, 2011	Saco River—Harts Location, Bartlett, Conway, NH	Stream bank erosion	Stream bank erosion adjacent to a campground in Harts Location. Erosion of a protective berm in Bartlett.
Fluvial Erosion	July 2-3, 2013	Merriam Brook—Surry, NH	Aggradation	Existing channel path filled in with sediment following heavy rain event, forcing flow to begin creating new path in backyards of two properties.
Hurricane	Great Hurricane of 1938	Hillsborough County	No data on extent available	$12,337,643 total damages (not adjusted for inflation), 13 deaths and 494 injuries in NH. Damage to road network and structures caused by flooding.
Hurricane	August 31, 1954 (Carol)	Hillsborough County	Saffir-Simpson Scale Category 3.	Extensive tree and crop damage.
Hurricane	September 12, 1960 (Donna)	Hillsborough County	Saffir-Simpson Scale Category 3	Water damage to structures due to flooding.
Hurricane	September 27, 1985 (Gloria)	Hillsborough County	Saffir-Simpson Scale Category 2	Damage to trees and power lines from high winds.
Hurricane	August 19, 1991 (Bob)	Hillsborough County	Saffir-Simpson Scale Category 1	FEMA Disaster Declaration #917. Damage to structures, trees, and power lines from high winds.
Hurricane	September 16-18, 1999 (Floyd)	Hillsborough County	Tropical Storm (winds 39-73 mph)	FEMA Disaster Declaration #1305. Primary impact to trees, infrastructure,

Hazard Type	Date	Hazard Location within Jurisdiction	Hazard Extent	Impact
				and road network.
Hurricane	August 28, 2011 (Irene)	Hillsborough County	Tropical Storm (winds 39-73 mph).	Damage to trees and power lines from high winds. Flash floods. Mac Hill Road was under construction and was damaged.
Hurricane	October 26, 2012 (Sandy)	Hillsborough County	Tropical Storm (winds 39-73 mph).	Minimal damage.
Severe Thunderstorm	July 2001	Amherst Village	Lightning Strike	Lightning struck a large tree in the Amherst Village Oval that had to be removed by the DPW.
Severe Thunderstorm	August 2006	Amherst Village	Lightning Strike	Lightning struck a large tree in the Amherst Village Oval. It was evaluated by a professional forester for safety.
Severe Thunderstorm	2011	Nathanial Drive	Lightning strike	Home struck
Severe Winter Weather	March 11-14, 1888	Entire jurisdiction	30-50 inches of snow	No historic data on impact
Severe Winter Weather	1922	Entire jurisdiction	No historic data on extent	Extreme snow drifts paralyzed road network.
Severe Winter Weather	March 9, 1931	Baboosic Lake, The Moonbeam Ballroom	No historic data on extent	The Moonbeam Ballroom was demolished when the porch roof collapsed under heavy rain soaked snow and pulled over much of the building.
Severe Winter Weather	February 14-15, 1940	Entire jurisdiction	Over 30 inches of snow	Snow and high winds paralyzed road network.
Severe Winter Weather	February 14-17, 1958	Entire jurisdiction	20-33 inches of snow	Primary impact to road network.
Severe Winter Weather	March 18-21, 1958	Entire jurisdiction	22-24 inches of snow	Primary impact to road network.
Severe Winter Weather	March 2-5, 1960	Entire jurisdiction	Up to 25 inches of snow	Primary impact to road network.

Hazard Type	Date	Hazard Location within Jurisdiction	Hazard Extent	Impact
Severe Winter Weather	January 18-20, 1961	Entire jurisdiction	Up to 25 inches of snow	Blizzard conditions paralyze road network.
Severe Winter Weather	February 22-28, 1969	Entire jurisdiction	24-98 inches of snow in Central NH	Primary impact to road network. Slow moving storm.
Severe Winter Weather	December 25-28, 1969	Entire jurisdiction	12-18 inches of snow	Primary impact to road network.
Severe Winter Weather	January 19-21, 1978	Entire jurisdiction	Up to 16 inches of snow	Primary impact to road network.
Severe Winter Weather	February 5-7, 1978 (Blizzard of '78)	Entire jurisdiction	25-33 inches of snow	Snow paralyzed road network, trapped commuters in cars, and forced closure of businesses.
Severe Winter Weather	April 5-7, 1982	Entire jurisdiction	18-22 inches of snow	Primary impact to road network.
Severe Winter Weather	March, 1983	Entire jurisdiction	Over 18 inches of snow, 30-40 mph winds	Snow paralyzed road network and forced closure of businesses.
Severe Winter Weather	December 1996	Entire jurisdiction	14 inches of snow	Damage to power lines forces closure of businesses.
Severe Winter Weather	January 7, 1998	Entire jurisdiction	Ice storm, no data on extent available	$12,446,202 in total damages, 1 death and 6 injuries in NH. $17,000,000 in damages to PSNH equipment. FEMA Disaster Declaration #1199. 20 major road closures; 67,586 without power; 2,310 without phone service; 1 communication tower failure.
Severe Winter Weather	December 11, 2008	Entire jurisdiction	Ice storm, no data on extent available	$10,383,602 in FEMA public assistance in NH; $6.35 per capita in Hillsborough County. FEMA Disaster Declaration #1812 Damage to power and phone lines and trees.

Hazard Type	Date	Hazard Location within Jurisdiction	Hazard Extent	Impact
Severe Winter Weather	February 23, 2010	Entire jurisdiction	Snow followed by rainfall between 2-6 inches. Winds over 70 mph.	$6,268,179 in FEMA public assistance in NH; $3.68 per capita in Hillsborough County. FEMA Disaster Declaration #1892 Damage to power and phone lines, trees, and road network. Over 330,000 customers without power state-wide.
Severe Winter Weather	October 29-30, 2011	Entire jurisdiction	15-20 inches of snow.	$3,052,769 in FEMA public assistance in NH; $5.11 per capita in Hillsborough County. FEMA Disaster Declaration #4049 Damage to power and phone lines, trees, and road network.
Severe Winter Weather	February 8-10, 2013	Entire jurisdiction	Snowfall totals of 12-18 inches across region, up to 30 inches in parts of NH. Winds 10-20 mph with gusts up to 40 mph. Visibility less than ¼ mile.	FEMA Disaster Declaration #4105
Tornado	July 2, 1961	Northern Hillsborough Co, originated near Weare, NH	Fujita Scale F2	0 fatalities, 0 injuries
Tornado	July 21, 1961	Central Hillsborough Co, originated near New Boston, NH	Fujita Scale F1	0 fatalities, 0 injuries
Tornado	May 9, 1963	Northeastern, Hillsborough Co, originated near Goffstown, NH	Fujita Scale F1	0 fatalities, 0 injuries
Tornado	May 20, 1963	Western Hillsborough Co, originated near Peterborough, NH	Fujita Scale F1	0 fatalities, 0 injuries
Tornado	June 9, 1963	Northeastern	Fujita Scale F2	0 fatalities, 0 injuries

Hazard Type	Date	Hazard Location within Jurisdiction	Hazard Extent	Impact
		Hillsborough Co, originated near Manchester, NH		
Tornado	August 28, 1965	Eastern Hillsborough Co, originated near Litchfield, NH	Fujita Scale F1	0 fatalities, 0 injuries
Tornado	July 19, 1966	Southern Hillsborough Co, originated near Amherst, NH	Fujita Scale F1	0 fatalities, 0 injuries
Tornado	July 17, 1968	Central Hillsborough Co, originated near Wilton, NH	Fujita Scale F2	0 fatalities, 0 injuries
Tornado	August 20, 1968	Northeastern Hillsborough Co, originated near Manchester, NH	Fujita Scale F1	0 fatalities, 0 injuries
Tornado	July 19, 1972	Southeastern Hillsborough Co, originated near Hudson, NH	Fujita Scale F1	0 fatalities, 0 injuries
Tornado	July 5, 1984	Western Hillsborough Co, originated near Harrisville, NH	Fujita Scale F1	0 fatalities, 0 injuries
Tornado	July 5, 1984	Southeastern Hillsborough Co, originated near Pelham, NH	Fujita Scale F1	0 fatalities, 0 injuries
Tornado	June 16, 1986	Western Hillsborough Co, originated near Swanzey, NH	Fujita Scale F1	0 fatalities, 0 injuries
Tornado	July 3, 1997	Central Hillsborough Co, originated near Greenfield, NH	Fujita Scale F2	0 fatalities, 0 injuries
Tornado	May 31, 1998	Western Hillsborough Co, orginated near Antrim, NH	Fujita Scale F2	0 fatalities, 0 injuries
Downburst	July 6, 1999	Merrimack, Grafton, and Hillsborough Co.	Macroburst	2 fatalities, 2 lost roofs, damage to trees and utility infrastructure
Wildfire	2008-2009	Eagle Rock	No data on extent.	Illegal burn, high winds, significant brush fire. No damage to property or infrastructure.

Section 3.3 ~ Probability of Future Hazard Events

After documenting the occurrence of previous hazard events in the Town of Amherst and the surrounding region, the Hazard Mitigation Team used this information to calculate the annual probability of these events occurring in the future. The first step was to determine how many times a particular hazard had occurred in a given number of years. The number of occurrences was then divided by the number of years to determine annual probability. For example, if history shows that a particular hazard typically occurs 1 time every 4 years, the annual probability is 25%. Annual probability was calculated twice for each hazard. First, annual probability was calculated since the first recorded historic occurrence of the event. Second, annual probability was calculated based on occurrences since 2000 to reflect potential recent changes in hazard event occurrence rates. The probability of future hazard events for each hazard type in the Town of Amherst is outlined in Table 5.

Table 5—Probability of Future Hazard Events

Hazard Type	Probability of Future Event	Source
Drought	11 years of drought from 1960 through 2013. 11 events in 54 years = .204 events per year **Annual Probability = 20.4%** 1 year of drought from 2000 through 2013. 1 event in 14 years = .071 **Annual Probability = 7.1%**	NH Dept. of Environmental Services and public input
Earthquake	History shows no known earthquakes centered in Amherst. However, this hazard is still possible. 6 magnitude 5.0 or greater earthquakes felt in NH from 1929 through 2013. 6 events in 85 years = .071 events per year **Annual Probability = 7.1%**	US Geological Survey; Northern California Earthquake Data Center, Advanced National Seismic System http://www.ncedc.org/anss/catalog-search.html

Hazard Type	Probability of Future Event	Source
	2 magnitude 5.0 or greater earthquakes felt in NH from 2000 through 2013. 2 events in 14 years = .143 events per year **Annual Probability = 14.3%**	
Extreme Temperatures	21 extreme heat events from 2000 through 2013. 21 event in 14 years = 1.5 event per year **Annual Probability = 100%** 16 extreme cold events from 2000 through 2013. 16 event in 14 years = 1.14 event per year **Annual Probability = 100%**	National Climatic Data Center, National Oceanic and Atmospheric Administration http://www.ncdc.noaa.gov/cdo-web/search
Flooding	24 flooding events in Hillsborough County from 1785 through 2013. 24 events in 229 years = .105 events per year **Annual Probability = 10.5%** 6 flooding events in Hillsborough County from 2000 through 2013. 6 events in 14 years = .429 events per year **Annual Probability = 42.9%**	FEMA, local knowledge, and public input
Fluvial Erosion	Because of limited data on previous fluvial erosion events, probability cannot be calculated statistically.	NH Dept. of Environmental Services, local knowledge, and public input

Hazard Type	Probability of Future Event	Source
	Low probability is defined as 0-25% chance of occurrence annually. **Annual Probability = 0-25%**	
Hurricane/Severe Wind	8 hurricanes/tropical storms from 1938 through 2013. 8 events in 76 years = .105 events per year **Annual Probability = 10.5%** 2 hurricanes/tropical storms from 2000 through 2013. 2 events in 14 years = .143 events per year **Annual Probability = 14.3%**	National Weather Service and public input
Severe Thunderstorm/Lightning	3 severe thunderstorms from 2000 through 2013. 3 events in 14 years = .214 events per year **Annual Probability = 21.4%**	Local knowledge and public input
Severe Winter Weather	20 severe winter weather events from 1888 through 2013. 19 events in 126 years = .159 events per year **Annual Probability = 15.9%** 4 severe winter weather events from 2000 through 2013. 4 events in 14 years = .286 events per year **Annual Probability = 28.6%**	FEMA, local knowledge, and public input

Hazard Type	Probability of Future Event	Source
Tornado/Downburst	16 tornados and 1 downburst in Hillsborough Co. from 1961 through 2013. 17 events in 53 years = .321 events per year **Annual Probability = 32.1%** 0 tornados and 0 downbursts in Hillsborough Co. from 2000 through 2013. 0 events in 14 years = 0 events per year **Annual Probability = 0-25%**	Tornado History Project (Joshua Lietz, Storm Prediction Center, National Climatic Data Center) and public input http://www.tornadohistoryproject.com
Wildfire	1 wildfire event from 2000 through 2013. 1 events in 14 years = .071 events per year **Annual Probability = 7.1%**	Local knowledge and public input

Section 3.4 ~ Critical Facilities and their Vulnerability

The next step in determining Amherst's overall vulnerability was to inventory the Town's community assets and determine what assets would be affected by each type of hazard event. The Hazard Mitigation Team began by reviewing the Amherst Zoning Ordinance to provide information on where and how the Town builds and to identify the corridors where critical facilities would likely be located. The Team then identified the broad categories of important assets within Amherst, including critical facilities essential to health and welfare; vulnerable populations, such as children and the elderly; economic assets and major employers; areas of high-density residential and commercial development; and historic, cultural, and natural resources. The Team then further divided the Town's critical facilities into the following categories:

1. **General Occupancy**
    a. Residential
    b. Commercial
    c. Industrial
    d. Agriculture
    e. Religion

f. Government
g. Education

2. **Essential Facilities**
   a. Fire Station
   b. Police Station
   c. Department of Public Works
   d. Schools
   e. Emergency Operations Centers
   f. Medical Care Facilities
3. **Transportation Systems**
   a. Highway Systems
   b. Railway Systems
   c. Bus Facilities
   d. Airport Systems
4. **Utility Systems**
   a. Potable Water
   b. Drinking Water
   c. Oil/Propane Facilities
   d. Natural Gas Facilities
   e. Electric Power
   f. Communications
5. **High Potential Hazard Facilities**
   a. Dams/Levees
   b. Nuclear Power Plants
   c. Military
6. **Hazardous Materials Facilities (**http://www2.epa.gov/toxics-release-inventory-tri-program)

The critical facilities within each category appear in the Tables 6.1-6.6 below. Each table includes the critical facility's name, content vulnerability, and locational vulnerability to hazards.

Table 6.1—General Occupancy Critical Facilities

Facility Type and Name	Content Vulnerability	Drought	Earthquake	Extreme Temperatures	Flooding	Fluvial Erosion*	Hurricane	Severe Thunderstorm	Severe Winter Weather	Tornado/Downburst	Wildfire

Facility Type and Name	Content Vulnerability	Drought	Earthquake	Extreme Temperatures	Flooding	Fluvial Erosion*	Hurricane	Severe Thunderstorm	Severe Winter Weather	Tornado/Downburst	Wildfire
Commercial—Gymnastics Village	Potentially large population present, located in 0.2% annual floodplain		✓		✓	n/a	✓	✓	✓	✓	✓
Commercial—Sunrise Children's Center	Potentially large population present		✓			n/a	✓	✓	✓	✓	✓
Commercial—Little Einstein's Preschool	Potentially large population present		✓			n/a	✓	✓	✓	✓	✓
Commercial—Nelly's Tree house Daycare	Potentially large population present		✓			n/a	✓	✓	✓	✓	✓
Commercial—Kids Inn of Amherst Daycare	Potentially large population present		✓			n/a	✓	✓	✓	✓	✓
Commercial—Camp Young Judea	Potentially large population present		✓			n/a	✓	✓	✓	✓	✓
Commercial—Homestead Grocery and Deli	Potentially large population present, contents valuable to local economy		✓			n/a	✓	✓	✓	✓	✓
Commercial—Moulton's Market	Potentially large population present, contents valuable to local economy		✓			n/a	✓	✓	✓	✓	✓
Commercial—Cider Mill Convenience Store	Potentially large population present, contents valuable to local economy, located in 1% annual floodplain		✓		✓	n/a	✓	✓	✓	✓	✓
Commercial—Wal Mart	Potentially large population present, contents valuable to local economy		✓			n/a	✓	✓	✓	✓	✓
Commercial—Lowe's Home Improvement	Potentially large population present, contents valuable to local economy		✓			n/a	✓	✓	✓	✓	✓

Facility Type and Name	Content Vulnerability	Drought	Earthquake	Extreme Temperatures	Flooding	Fluvial Erosion*	Hurricane	Severe Thunderstorm	Severe Winter Weather	Tornado/Downburst	Wildfire
Commercial—Atlas Fireworks	Potentially large population present, contents valuable to local economy		✓			n/a	✓	✓	✓	✓	✓
Commercial—Amherst Flea Market	Potentially large population present, contents valuable to local economy		✓			n/a	✓	✓	✓	✓	✓
Education—Montessori School	Potentially large population present		✓			n/a	✓	✓	✓	✓	✓
Education—RSEC Academy	Potentially large population present		✓			n/a	✓	✓	✓	✓	✓
Education—Montessori School	Potentially large population present		✓			n/a	✓	✓	✓	✓	✓
Government—Amherst Transfer Station	Potentially large population present		✓			n/a	✓	✓	✓	✓	✓
Government—Amherst Library	Official records and documents, potentially large population present		✓			n/a	✓	✓	✓	✓	✓
Government—Amherst Historical Society	Official records and documents		✓			n/a	✓	✓	✓	✓	✓
Government—Amherst Town Hall	Official records and documents, potentially large staff and population present		✓			n/a	✓	✓	✓	✓	✓
Government—Amherst Post Office	Contents important to communications		✓			n/a	✓	✓	✓	✓	✓
Government—Amherst Public Works Garage	Official records and documents		✓			n/a	✓	✓	✓	✓	✓
Recreation—Town Beach	Potentially large population present	✓				n/a		✓			
Recreation—Amherst Country Club	Potentially large population present, located in 1% annual floodplain	✓			✓	n/a		✓			

Facility Type and Name	Content Vulnerability	Drought	Earthquake	Extreme Temperatures	Flooding	Fluvial Erosion*	Hurricane	Severe Thunderstorm	Severe Winter Weather	Tornado/Downburst	Wildfire
Recreation—Cemetery Field	Potentially large population present	✓				n/a		✓			
Recreation—Ponemah Green	Potentially large population present, located in 1% annual floodplain	✓			✓	n/a		✓			
Recreation—Souhegan Woods Golf Course	Potentially large population present	✓				n/a		✓			
Religious—River of Life Church	Potentially large population present		✓			n/a	✓	✓	✓	✓	✓
Religious—Souhegan Congregational Church	Potentially large population present		✓			n/a	✓	✓	✓	✓	✓
Religious—St. Luke's Anglican Church	Potentially large population present		✓			n/a	✓	✓	✓	✓	✓
Religious—Messiah Lutheran Church	Potentially large population present		✓			n/a	✓	✓	✓	✓	✓
Religious—Amherst Congregational Church	Potentially large population present		✓			n/a	✓	✓	✓	✓	✓
Religious—First Baptist Church	Potentially large population present		✓			n/a	✓	✓	✓	✓	✓
Religious—Household of Faith	Potentially large population present		✓			n/a	✓	✓	✓	✓	✓
Religious—Amherst Christian Church	Potentially large population present		✓			n/a	✓	✓	✓	✓	✓
Religious—Christ Church of Amherst	Potentially large population present		✓			n/a	✓	✓	✓	✓	✓
Residential—Amherst Gardens Mobile Homes	Large population present, contents have personal value to owners		✓			n/a	✓	✓	✓	✓	✓

Facility Type and Name	Content Vulnerability	Drought	Earthquake	Extreme Temperatures	Flooding	Fluvial Erosion*	Hurricane	Severe Thunderstorm	Severe Winter Weather	Tornado/Downburst	Wildfire
Residential—Parkhurst Place	Large population present, contents have personal value to owners, elderly population present		✓			n/a	✓	✓	✓	✓	✓
Residential—Island View Court, Amherst Street	Large population present, contents have personal value to owners		✓			n/a	✓	✓	✓	✓	✓

**It is beyond the scope of this project to determine whether each general occupancy facility is located in the fluvial erosion hazard zone. A mapping exercise such as this has been included as a mitigation action in Section 4.2 of this Plan Update.*

Table 6.2—Essential Facilities

Facility Name	Content Vulnerability	Drought	Earthquake	Extreme Temperatures	Flooding	Fluvial Erosion	Hurricane	Severe Thunderstorm	Severe Winter Weather	Tornado/Downburst	Wildfire
Amherst Police Department	Contents and staff valuable to emergency management		✓				✓	✓	✓	✓	✓
Amherst Fire Department North	Contents and staff valuable to emergency management		✓				✓	✓	✓	✓	✓
Amherst Fire Department South	Contents and staff valuable to emergency management, located in 0.2% annual floodplain		✓		✓		✓	✓	✓	✓	✓
Amherst Public Works Garage	Contents valuable to transportation network and public infrastructure		✓				✓	✓	✓	✓	✓
Amherst DPW	Contents valuable to transportation network and public infrastructure, located in 0.2% annual floodplain		✓		✓		✓	✓	✓	✓	✓

Facility Name	Content Vulnerability	Drought	Earthquake	Extreme Temperatures	Flooding	Fluvial Erosion	Hurricane	Severe Thunderstorm	Severe Winter Weather	Tornado/Downburst	Wildfire
Amherst Town Hall	Contents valuable to municipal operations		✓				✓	✓	✓	✓	✓
Clark School	Potentially large population present		✓				✓	✓	✓	✓	✓
Wilkins Elementary School	Potentially large population present		✓				✓	✓	✓	✓	✓
Amherst Middle School	Potentially large population present		✓				✓	✓	✓	✓	✓
Souhegan High School	Potentially large population present, located in 0.2% annual floodplain		✓		✓		✓	✓	✓	✓	✓
Medical Association	Contents valuable to public health, large staff and population present		✓				✓	✓	✓	✓	✓
Amherst Family Practice	Contents valuable to public health, large staff and population present		✓				✓	✓	✓	✓	✓
Amherst Medical Association	Contents valuable to public health, large staff and population present		✓				✓	✓	✓	✓	✓

Table 6.3—Transportation Critical Facilities

Facility Type and Name	Content Vulnerability	Drought	Earthquake	Extreme Temperatures	Flooding	Fluvial Erosion*	Hurricane	Severe Thunderstorm	Severe Winter Weather	Tornado/Downburst	Wildfire
Highway System—Thornton Ferry Rd bridge over Beaver Brook	Structure valuable to motor vehicle travel and safety, located in 1% annual floodplain		✓		✓	n/a	✓		✓	✓	

Facility Type and Name	Content Vulnerability	Drought	Earthquake	Extreme Temperatures	Flooding	Fluvial Erosion*	Hurricane	Severe Thunderstorm	Severe Winter Weather	Tornado/Downburst	Wildfire
Highway System—Horace Greeley Rd bridge over Pulpit Brook	Structure valuable to motor vehicle travel and safety, located in 1% annual floodplain		✓		✓	n/a	✓		✓	✓	
Highway System—Brook Rd bridge over Joe English Brook	Structure valuable to motor vehicle travel and safety, located in 1% annual floodplain		✓		✓	n/a	✓		✓	✓	
Highway System—Horace Greeley Rd bridge over Joe English Brook	Structure valuable to motor vehicle travel and safety, located in 1% annual floodplain		✓		✓	n/a	✓		✓	✓	
Highway System—NH Route 101 bridge over Joe English Brook	Structure valuable to motor vehicle travel and safety, located in 1% annual floodplain		✓		✓	n/a	✓		✓	✓	
Highway System—Merrimack Rd bridge over Beaver Brook	Structure valuable to motor vehicle travel and safety, located in 1% annual floodplain		✓		✓	n/a	✓		✓	✓	
Highway System—Boston Post Rd bridge over Souhegan River	Structure valuable to motor vehicle travel and safety, located in 1% annual floodplain		✓		✓	n/a	✓		✓	✓	
Highway System—NH Route 122 bridge over Souhegan River	Structure valuable to motor vehicle travel and safety, located in 1% annual floodplain		✓		✓	n/a	✓		✓	✓	
Highway System—New Boston Rd bridge over Beaver Brook	Structure valuable to motor vehicle travel and safety, located in 1% annual floodplain		✓		✓	n/a	✓		✓	✓	
Highway System—Mont Vernon Rd bridge over Ceasars Brook	Structure valuable to motor vehicle travel and safety, located in 1% annual floodplain		✓		✓	n/a	✓		✓	✓	
Highway System—NH Route 101 bridge over Souhegan River	Structure valuable to motor vehicle travel and safety, located in 1% annual floodplain		✓		✓	n/a	✓		✓	✓	

Facility Type and Name	Content Vulnerability	Drought	Earthquake	Extreme Temperatures	Flooding	Fluvial Erosion*	Hurricane	Severe Thunderstorm	Severe Winter Weather	Tornado/Downburst	Wildfire
Highway System—Boston Post Rd bridge over Beaver Brook	Structure valuable to motor vehicle travel and safety, located in 1% annual floodplain		✓		✓	n/a	✓		✓	✓	
Highway System—Pine Rd bridge over Joe English Brook	Structure valuable to motor vehicle travel and safety, located in 1% annual floodplain		✓		✓	n/a	✓		✓	✓	
Highway System—NH Route 122/Amherst St bridge over Beaver Brook	Structure valuable to motor vehicle travel and safety, located in 1% annual floodplain		✓		✓	n/a	✓		✓	✓	
Highway System—Manchester Rd bridge over Beaver Brook	Structure valuable to motor vehicle travel and safety, located in 1% annual floodplain		✓		✓	n/a	✓		✓	✓	
Highway System—Boston Post Rd bridge over Beaver Brook	Structure valuable to motor vehicle travel and safety, located in 1% annual floodplain		✓		✓	n/a	✓		✓	✓	
Highway System—Boston Post Rd bridge over Beaver Brook	Structure valuable to motor vehicle travel and safety, located in 1% annual floodplain		✓		✓	n/a	✓		✓	✓	
Highway System—NH Route 101 bridge over NH Route 122	Structure valuable to motor vehicle travel and safety, located in 1% annual floodplain		✓		✓	n/a	✓		✓	✓	
Highway System—Camp Rd bridge over Baboosic Brook	Structure valuable to motor vehicle travel and safety, located in 1% annual floodplain		✓		✓	n/a	✓		✓	✓	
Highway System—New Boston Rd bridge over Beaver Brook	Structure valuable to motor vehicle travel and safety, located in 1% annual floodplain		✓		✓	n/a	✓		✓	✓	
Highway System—NH Route 101 bridge over Boston Post Rd/Beaver Brook	Structure valuable to motor vehicle travel and safety, located in 1% annual floodplain		✓		✓	n/a	✓		✓	✓	

Facility Type and Name	Content Vulnerability	Drought	Earthquake	Extreme Temperatures	Flooding	Fluvial Erosion*	Hurricane	Severe Thunderstorm	Severe Winter Weather	Tornado/Downburst	Wildfire
Highway System—NH Route 122/Main St bridge over NH Route 101	Structure valuable to motor vehicle travel and safety, located in 0.2% annual floodplain		✓		✓	n/a	✓		✓	✓	
Highway System—NH Route 122/Main St bridge over NH Route 101	Structure valuable to motor vehicle travel and safety, located in 0.2% annual floodplain		✓		✓	n/a	✓		✓	✓	
Highway System—NH Route 101 bridge over Thorntons Ferry Rd	Structure valuable to motor vehicle travel and safety, located in 0.2% annual floodplain		✓		✓	n/a	✓		✓	✓	
Highway System—NH Route 101 bridge over Merrimack Rd	Structure valuable to motor vehicle travel and safety, located in 0.2% annual floodplain		✓		✓	n/a	✓		✓	✓	
Highway System—Manchester Rd culvert over Beaver Brook	Structure valuable to motor vehicle travel and safety, structure received Mostly Compatible rating		✓		✓		✓		✓	✓	
Highway System—Amherst St culvert over Beaver Brook	Structure valuable to motor vehicle travel and safety, structure received Partially Compatible rating		✓		✓		✓		✓	✓	
Railroad following 101A	Infrastructure utilized in the movement of hazardous materials		✓				✓		✓	✓	
Airport System—FAA Traffic Control Facility	Structure valuable to air traffic control and public safety, located in 1% annual floodplain		✓		✓		✓	✓	✓	✓	✓

**The field assessment protocol used to determine fluvial erosion hazard zones was only able to determine potential structural vulnerability in culverts and cannot be applied to bridges.*

Table 6.4—Utility Systems

Facility Type and Name	Content Vulnerability	Drought	Earthquake	Extreme Temperatures	Flooding	Fluvial Erosion*	Hurricane	Severe Thunderstorm	Severe Winter Weather	Tornado/Downburst	Wildfire
Communication—Amherst emergency communications located on Pennichuck water tower	Structure valuable to communications and emergency management		✓			n/a	✓	✓	✓	✓	✓
Communication—Amherst Police Dept. tower	Structure valuable to communications and emergency management		✓			n/a	✓	✓	✓	✓	✓
Communication—New Boston Air Force tracking station and municipal communication tower	Structure valuable to communications and emergency management		✓			n/a	✓	✓	✓	✓	✓
Communications—switching station on Boston Post Rd at Stearns Rd	Structure valuable to communications		✓			n/a	✓	✓	✓	✓	✓
Communications—switching station on Boston Post Road at Merrimack Road	Structure valuable to communications		✓			n/a	✓	✓	✓	✓	✓
Communications—switching station on Amherst St near Milford Rd	Structure valuable to communications		✓			n/a	✓	✓	✓	✓	✓
Communications—switching stations on Limbo Lane (2)	Structure valuable to communications		✓			n/a	✓	✓	✓	✓	✓
Electric—PSNH substation #1	Structure valuable to utility network		✓			n/a	✓	✓	✓	✓	✓
Electric—PSNH substation #2	Structure valuable to utility network		✓			n/a	✓	✓	✓	✓	✓
Fuel—Amherst Mobile	Private fuel tanks, contents valuable to energy supply		✓			n/a	✓	✓	✓	✓	✓
Fuel—Walt's Texaco	Private fuel tanks, contents valuable to energy supply		✓			n/a	✓	✓	✓	✓	✓

Facility Type and Name	Content Vulnerability	Drought	Earthquake	Extreme Temperatures	Flooding	Fluvial Erosion*	Hurricane	Severe Thunderstorm	Severe Winter Weather	Tornado/Downburst	Wildfire
Fuel—Irving Oil Co.	Private fuel tanks, contents valuable to energy supply		✓			n/a	✓	✓	✓	✓	✓
Fuel—municipal fuel tanks at DPW Garage (10,000 gallons diesel; 5,000 gallons gas)	Contents valuable to emergency management		✓			n/a	✓	✓	✓	✓	✓
Oil/Propane—Liberty Propane, tank farm storage facility	Contents valuable to energy supply		✓			n/a	✓	✓	✓	✓	✓
Oil/Propane—Danbury Circle	Contents valuable to energy supply		✓			n/a	✓	✓	✓	✓	✓
Water—Curtis Well #1	Structure valuable to water supply, located in 1% annual floodplain	✓			✓	n/a					
Water—Pump Station	Structure valuable to water supply	✓				n/a					
Water—Pennichuck Pump Station	Structure valuable to water supply	✓				n/a					
Water—Water Tower	Structure valuable to water supply		✓			n/a	✓	✓	✓	✓	✓

**It is beyond the scope of this project to determine whether utility infrastructure is located in the fluvial erosion hazard zone. A mapping exercise such as this has been included as a mitigation action in Section 4.2 of this Plan Update.*

Table 6.5—High Potential Hazard Facilities

Facility Type and Name	Content Vulnerability	Drought	Earthquake	Extreme Temperatures	Flooding	Fluvial Erosion*	Hurricane	Severe Thunderstorm	Severe Winter Weather	Tornado/Downburst	Wildfire

Facility Type and Name	Content Vulnerability	Drought	Earthquake	Extreme Temperatures	Flooding	Fluvial Erosion*	Hurricane	Severe Thunderstorm	Severe Winter Weather	Tornado/Downburst	Wildfire
Freestyle Farm Dam Location—42.9108 lat, -71.6319 long Hazard Class—L Water body—Joe English Brook tributary Owner—privately held	Structure valuable to flood control, located in 0.2% annual floodplain		✓		✓	n/a	✓		✓	✓	
Lincoln Pond Dam Location—42.8877 lat, -71.6069 long Hazard Class—NM Water body—Joe English Brook tributary Owner—privately held	Structure valuable to flood control, located in 0.2% annual floodplain		✓		✓	n/a	✓		✓	✓	
Woolford Dam Location—42.8663 lat, -71.6252 long Hazard Class—NM Water body—Beaver Brook Owner—privately held	Structure valuable to flood control, located in 1% annual floodplain		✓		✓	n/a	✓		✓	✓	
York Pond Dam Location—42.8494 lat, -71.5713 long Hazard Class—NM Water body—Souhegan River Tributary Owner—privately held	Structure valuable to flood control, located in 1% annual floodplain		✓		✓	n/a	✓		✓	✓	
Farm Pond Dam Location—42.8591 lat, -71.63 long Hazard Class—NM Water body—natural swale Owner—privately held	Structure valuable to flood control		✓			n/a	✓		✓	✓	
Recreation Pond Dam Location—42.8736 lat, -71.6552 long Hazard Class—NM Water body—natural swale Owner—privately held	Structure valuable to flood control		✓			n/a	✓		✓	✓	

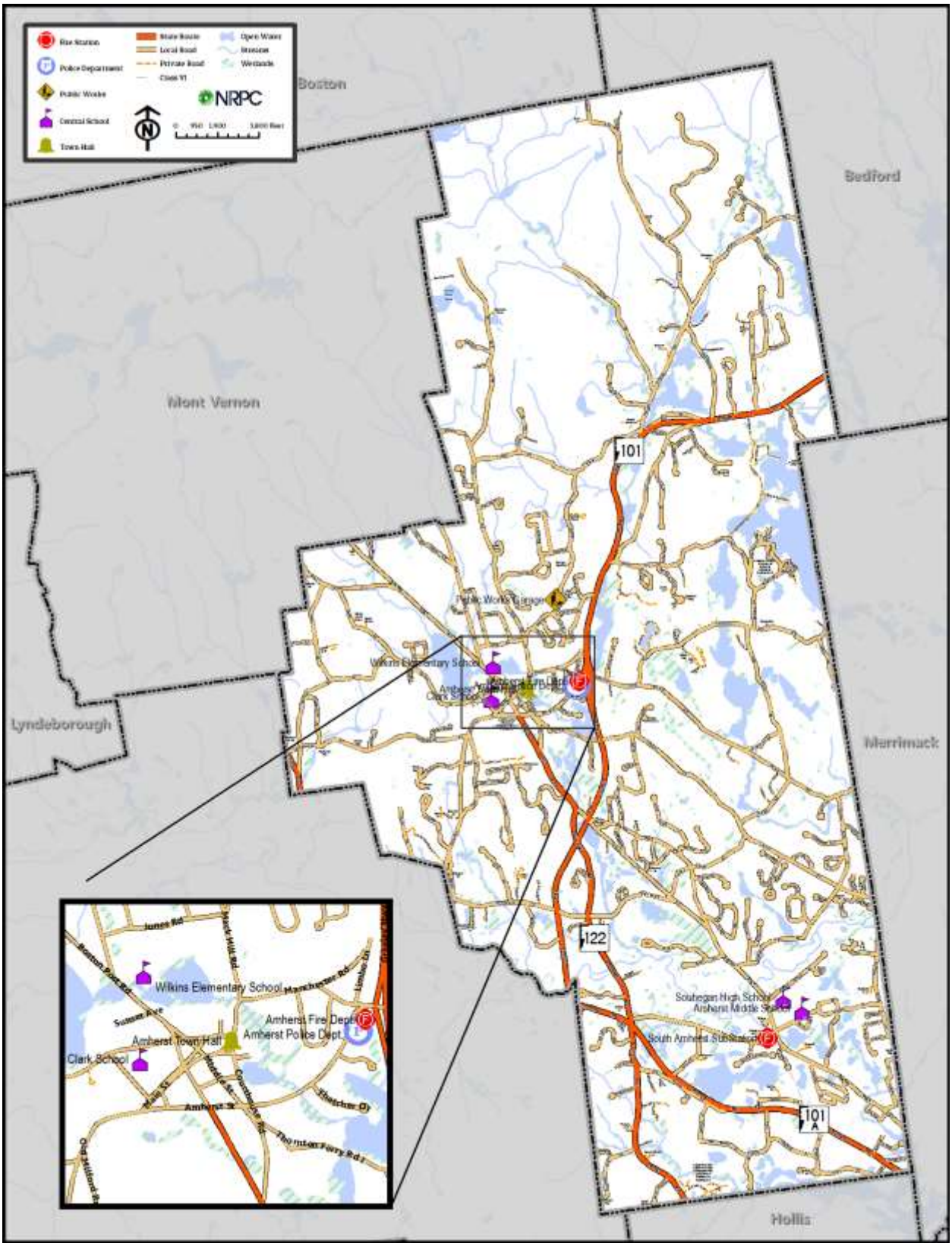
Facility Type and Name	Content Vulnerability	Drought	Earthquake	Extreme Temperatures	Flooding	Fluvial Erosion*	Hurricane	Severe Thunderstorm	Severe Winter Weather	Tornado/Downburst	Wildfire
Glen Echo Pond Dam Location—42.9116 lat, -71.6297 long Hazard Class—NM Water body—intermittent stream Owner—privately held	Structure valuable to flood control, located in 0.2% annual floodplain		✓		✓	n/a	✓		✓	✓	
Dream Lake Dam Location—42.8691 lat, -71.6033 long Hazard Class—NM Water body—natural swale Owner—privately held	Structure valuable to flood control, located in 0.2% annual floodplain		✓		✓	n/a	✓		✓	✓	
The Hillside Fire Pond Location—42.8547 lat, -71.6286 long Hazard Class—NM Water body—natural swale Owner—privately held	Structure valuable to flood control		✓			n/a	✓		✓	✓	
Stearns Fire Pond Dam Location—42.8872 lat, -71.63 long Hazard Class—NM Water body—unnamed stream Owner—privately held	Structure valuable to flood control		✓			n/a	✓		✓	✓	
Fire Pond Dam Location—42.935 lat, -71.6058 long Hazard Class—NM Water body—unnamed stream Owner—privately held	Structure valuable to flood control		✓			n/a	✓		✓	✓	
Pond Dam Location—42.87961 lat, -71.652316 long Hazard Class—NM Water body—unknown Owner—privately held	Structure valuable to flood control, located in 0.2% annual floodplain		✓		✓	n/a	✓		✓	✓	

**The field assessment protocol used to determine fluvial erosion hazard zones was only able to determine potential structural vulnerability in culverts and cannot be applied to dams.*

Table 6.6—Hazardous Materials Facilities

Facility Type and Name	Content Vulnerability	Drought	Earthquake	Extreme Temperatures	Flooding	Fluvial Erosion	Hurricane	Severe Thunderstorm	Severe Winter Weather	Tornado/Downburst	Wildfire
There are no Hazardous Materials Facilities in Amherst as reported by the EPA Toxics Release Inventory Program.											

Amherst Critical Facilities Map



Section 3.5 ~ Vulnerability by Hazard

Drought

Hydrological drought is evidenced by extended periods of negative departures from normal rainfall. New Hampshire has been under several drought warnings, including a drought emergency, since 1999. The most severe drought conditions occurred between 1960 and 1969; the event had a greater than 25 year recurrence interval. The southern New Hampshire region experienced a 100-year drought event from 1964 to 1965.

Although drought is not likely to damage structures, low water levels can have a negative impact on existing and future home sites, especially those that depend on groundwater for water needs. Additionally, the dry conditions of a drought may lead to an increase wild fire risk. Drought can cause the most significant impact to agricultural land and assets.

Because the impacts of drought are long lasting and wide ranging, it is beyond the scope of this Plan to estimate the dollar value of losses to Amherst resulting from drought. Instead, the Hazard Mitigation Team estimated the percentage of land in Amherst vulnerable to drought as a quantitative measure of this hazard's impact.

Total Acres of Land in Amherst	Total Acres of Agricultural Land in Amherst	% of Land in Amherst Vulnerable to Drought
22,272	98	0.44%

Critical Facility Type	Total Number of this type of Critical Facilities in Amherst	Number of this type of Critical Facilities in Drought Hazard Area	Percentage of this type of Critical Facilities in Drought Hazard Area
General Occupancy	39	5	12.8%
Essential Facilities	13	0	0%
Transportation	27	0	0%
Utility System	19	3	15.8%
High Potential Hazard	12	0	0%
Hazardous Materials	0	0	0%

Earthquake

The Richter magnitude scale was developed by Charles F. Richter in 1935 as a way to compare the size of earthquakes. The magnitude of an earthquake is calculated from the logarithm of the amplitude of waves recorded by seismographs.

- Magnitude <2.0—micro-earthquakes. Recorded by seismographs, but not felt or rarely felt by people. Several million occur annually worldwide on average.
- Magnitude 2.0-2.9—felt slightly by some people. No damage to buildings. Over 1 million occur annually worldwide on average.
- Magnitude 3.0-3.9—often felt by people but very rarely cause damage. Shaking of indoor objects can be noticeable. Over 100,000 occur annually worldwide on average.
- Magnitude 4.0-4.9—noticeable shaking of indoor objects and rattling noises. Felt by most people in affected area. Generally causes minimal to no damage. Moderate to significant damage is very unlikely. 10,000-15,000 occur annually worldwide on average.
- Magnitude 5.0-5.9—felt by everyone. Can cause damage of varying severity to poorly constructed buildings; slight to no damage to all other buildings. Few, if any, casualties. 1,000-1,500 occur annually worldwide on average.
- Magnitude 6.0-6.9—felt up to hundreds of miles from epicenter. Strong to violent shaking in epicenter. Damage to many buildings in populated areas. Poorly designed structures have moderate to severe damage. Earthquake-resistant structures have slight to moderate damage. Damage can be caused far from epicenter. Death toll up to 25,000. 100-150 occur annually worldwide on average.
- Magnitude 7.0-7.9—felt in very large area. Damage to most buildings, including partial or complete collapse. Death toll up to 250,000. 10-20 occur annually worldwide on average.
- Magnitude 8.0-8.9—felt in extremely large region. Major damage to buildings over large areas. Structures likely destroyed. Moderate to heavy damage to sturdy or earthquake-resistant buildings. Death toll up to 1 million. 1 occurs annually worldwide on average.
- Magnitude 9.0< —damage and shaking extends to distant locations. Near or total destruction. Severe damage and collapse to all buildings. Permanent changes in ground topography. 1 occurs every 10-50 years worldwide on average.

Since 1940, there have been 14 earthquakes centered in NH with a magnitude of 3.0 or greater and only two earthquakes with a magnitude of 5.0 or greater. There have been no recorded earthquakes to-date centered in Amherst, however, one could occur.

Earthquake Hazard Loss Estimate

Step 1. Determine potential earthquake strength in Amherst

- US Seismic Hazard, 2% in 50 years PGA is 0.10 to 0.12(g) in Amherst
- *Source: USGS NH Seismic Map*

Step 2. Determine percent building damage ratio to single family residence from PGA (g) 0.10 earthquake

- Wood Frame Construction with Low general seismic design level = 0.6% building damage
- *Source: FEMA Identifying Hazards and Estimating Losses, pg 4-17*

Step 3. Determine percent of structures in Amherst that would be damaged by PGA (g) 0.10 earthquake

- 1-5% of structures estimated to be damaged by earthquake
- *Source: Amherst Hazard Mitigation Team (no historical data on earthquake damage in Amherst)*

Step 4. Determine total assessed value of structures in Amherst

- Total Assessed Value of all Structures in Amherst = $1,066,039,350
- *Source: Amherst Assessing Department (2014)*

Step 5. Determine total loss from PGA (g) 0.10 Earthquake

- Total Loss from Earthquake = Total Assessed Value of all Structures *Percentage of Structures Estimated to be Damaged * Percent Building Damage Ratio
- Total Loss from Earthquake = $1,066,039,350 * .01 * .006 = $63,962.36
- Total Loss from Earthquake = $1,066,039,350 * .05 * .006 = $319,811.81
- **$63,962.36 to $319,811.81**

Critical Facility Type	Total Number of this type of Critical Facilities in Amherst	Number of this type of Critical Facilities in Earthquake Hazard Area	Percentage of this type of Critical Facilities in Earthquake Hazard Area
General Occupancy	39	34	87.2%
Essential Facilities	13	13	100%
Transportation	27	27	100%
Utility System	19	16	84.2%
High Potential Hazard	12	12	100%
Hazardous Materials	0	0	0%

Extreme Temperatures

Extreme temperatures can be broken into both extreme heat and extreme cold. Though the hazards are different, the effects would be similar to vulnerable populations in Amherst.

Extreme heat is defined as a period of three consecutive days during which the air temperature reaches 90 degrees Fahrenheit or higher on each day. Extreme heat should not be confused with a drought (extended periods of negative departures from normal rainfall). Overburdened power networks may experience failures due to the impacts of extreme heat.

Extreme cold has no formal definition in New Hampshire, though can be explained as the extended exposure to typical winter temperatures without heat and shelter. With the rising costs of heating fuel and electric heat, many low-income or homeless citizens are not able to adequately heat their homes, exposing themselves to cold related emergencies or death. Extremely cold winters can lead to shortages in heating fuels due to high demand.

Though the entire Amherst population may experience a thermal emergency, populations without adequate climate control are most at risk. Extreme temperatures are not likely to cause damage to structures, although pipes can burst in extreme cold conditions.

Flooding

Localized Flooding

Localized flooding can result from even minor storms. Runoff overloads the drainage ways and flows into the streets and low-lying areas. Homes and businesses can be inundated, especially basements and the lower part of first floors. Localized flooding poses most of the same problems caused by larger floods, but because it typically has an impact on fewer people and affects small areas, it tends to bring less State or Federal involvement such as funding, technical help, or disaster assistance. As a result, the community and the affected residents or business owners are left to cope with the problems on their own. Finally, flooding of this type tends to recur; small impacts accumulated over time can become major problems.

Riverine Flooding

Riverine flooding involves the overflowing of normal flood channels, rivers or streams, generally as a result of prolonged rainfall or rapid thawing of snow cover. The lateral spread of floodwater is largely a function of the terrain, becoming greater in wide, flat areas, and affecting narrower areas in steep terrain. In the latter cases, riparian hillsides in combination with steep declines in riverbed elevation often force waters downstream rapidly, sometimes resulting in flash floods.

Floodplains in Amherst are widest and most extensive adjacent to the Souhegan River and Beaver Brook. Narrower floodplains lie adjacent to Witches Spring Brook, the unnamed stream south of Baboosic Lake, Baboosic Lake, Pulpit Brook, and Joe English Brook extending northeast to Damon Pond and southwest to Lincoln Pond. Many of these floodplains encompass large wetlands areas.

Floodplains cover approximately 15% of Amherst; 11.4% of the Town is within the 1% Annual Floodplain and 3.6% of the Town is within the 0.2% Annual Floodplain.

Dam Failure

The NH Department of Environmental Services indicates several failure modes for dams. Most typical include hydraulic failure or the uncontrolled overflowing of water, seepage, or leaking at the dam's foundation or gate; structural failure or rupture; general deterioration; and gate inoperability. These modes vary between dams depending on their construction type.

The State of New Hampshire uses a hazard potential classification to define the extent of a dam breach or failure. All class S (Significant) and H (High hazard) dams have the potential to cause damage if they breach or fail.

Class H—high hazard: dam that has a high hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in probably loss of human life as a result of: water levels and velocities causing the structural failure of a foundation of a habitable residential structure or commercial or industrial structure that is occupied under normal conditions; water levels rising above 1st floor elevation of a habitable residential structure or a commercial or industrial structure that is

occupied under normal conditions when the rise due to dam failure is greater than 1 foot; structural damage to an interstate highway, which could render the roadway impassible or otherwise interrupt public safety services; release of a quantity and concentration of material that qualify as "hazardous waste" under RSA 147-A:2 VII; any other circumstance that would more likely than not cause one or more deaths.

Class S—significant hazard: dam 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 any of the following: no probably loss of lives; major economic loss to structures or property; structural damage to a Class I or Class II road that would render the road impassable or otherwise interrupt public safety services; major environmental or public health losses.

Class L—low hazard: dam 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 any of the following: no possible loss of life; low economic loss to structures or property; structural damage to a town or city road or private road accessing property other than the dam owner's that could render the road impassible or otherwise interrupt public safety service; the release of liquid industrial, agricultural, or commercial wastes, septage, or contaminated sediment if the storage capacity is less than 2 acre-feet and is located more than 250 feet from a water body or water course; reversible environmental losses to environmentally-sensitive sites.

Class NM—non-menace: 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, provided the dam is less than 6 feet in height it if has a storage capacity greater than 50 acre-feet; or less than 25 feet in height if it has a storage capacity of 15-50 acre-feet.

Amherst has 12 Class NM dams (Non-Menace), 1 Class L dams (Low hazard potential), 0 Class S dams (Significant hazard potential), and 0 Class H dams (High hazard potential). There have been no known dam breaches to-date in Amherst.

Flood Hazard Loss Estimate

Step 1. Determine percent building damage to a 1 or 2 story building with basement

- 1 foot flood depth = 15% building damage
- 2 foot flood depth = 20% building damage
- 3 foot flood depth = 23% building damage
- 4 foot flood depth = 28% building damage
- *Source: FEMA Identifying Hazards and Estimating Losses, pg 4-13*

Step 2. Determine number of buildings in Amherst located in the floodplain

- 221 buildings located in floodplain
- *Source: Amherst Assessing Department (2014)*

Step 3. Determine total value of buildings in Amherst located in floodplain

- Average assessed value of all structures in Amherst = $229,009.53
- Total number of buildings in Amherst located in floodplain = 221

- Total assessed value of all buildings in Amherst in floodplain = $229,009.53 * 221
- Total assessed value of all buildings in Amherst in floodplain = $50,611,106.13
- *Source: Amherst Hazard Mitigation Team calculations based on Amherst Assessing data*

Step 4. Determine total loss from flooding

- Total Loss from Flooding = Total Assessed Value of all Buildings in Floodplain * Percent Building Damage Ratio
- Total Loss from 1 foot flood depth = $50,611,106.13 * .15 = **$7,591,665.92**
- Total Loss from 2 foot flood depth = $50,611,106.13 * .20 = **$10,122,221.23**
- Total Loss from 3 foot flood depth = $50,611,106.13 * .23 = **$11,640,554.41**
- Total Loss from 4 foot flood depth = $50,611,106.13 * .28 = **$14,171,109.72**

Critical Facility Type	Total Number of this type of Critical Facilities in Amherst	Number of this type of Critical Facilities in 1% Annual Floodplain	Percentage of this type of Critical Facilities in 1% Annual Floodplain	Number of this type of Critical Facilities in 0.2% Annual Floodplain	Percentage of this type of Critical Facilities in 0.2% Annual Floodplain
General Occupancy	39	3	7.7%	1	2.6%
Essential Facilities	13	0	0%	3	23.1%
Transportation	27	22	81.5%	4	14.8%
Utility System	19	1	5.3%	0	0%
High Potential Hazard	12	2	16.7%	5	41.7%
Hazardous Materials	0	0	0%	0	0%

Fluvial Erosion

Fluvial (river-related) erosion is the wearing away of river beds and banks by the action of running water. Fluvial erosion is a natural process and is most active during flood events. It can result in significant changes to the physical location and dimensions of river and stream channels.

New Hampshire has more than 16,000 miles of rivers and streams. Communities have historically developed along these waterways, placing infrastructure and property in hazard prone areas. Riverine flooding is the most common disaster event in NH. In recent years, some areas of the State have experienced multiple disastrous flood events at recurrence intervals of less than 10 years. On October 3, 2008 Hillsborough and Merrimack Counties experienced severe storms and flooding that led to a Presidential Disaster Declaration and $1,050,147 in damages.

Transportation infrastructure and agricultural property are typically the most vulnerable to fluvial erosion hazards. Fluvial erosion events frequently cause culverts failures, undermine bridges and roads,

and wash away stream banks. Residential, commercial, and municipal properties as well as utility infrastructure can also be impacted.

The New Hampshire Department of Environmental Services (DES) and New Hampshire Geological Survey (NHGS) conducted an assessment to identify areas prone to river and stream erosion that could impact public health and safety. The assessment was conducted over the summer and fall of 2013 in the Souhegan and Piscataquog River watersheds. A private firm that specializes in the science of fluvial geomorphology, Field Geology Services, was contracted to conduct the field work. They assessed river and stream reaches using field surveys, topographical maps, aerial photos, and historic archives. Within the Souhegan Watershed, assessments were conducted on segments of the Souhegan River main stem, Baboosic Brook, Beaver Brook, Blood Brook, Great Brook, Hartshorn Brook, Stoney Brook, and Tucker Brook. Only a small section of the Piscataquog River Watershed falls within the Nashua Region and the only reach that was assessed in this area was the South Branch Piscataquog River in Lyndeborough.

Fluvial Erosion Hazard Zone maps provide an important tool for planners, emergency management personnel, and municipal officials. They can be used to identify opportunities for bridge and culvert upgrades, stream and floodplain restoration projects, and areas where development may want to be avoided. The Nashua Regional Planning Commission has incorporated the Fluvial Erosion Hazard data generated by this study into the Town's 2015 Hazard Mitigation Plan Update. Specific mitigation actions that can address public safety and fluvial erosion hazards include:

Map & Assess Vulnerability to Erosion

- Conduct stream assessments and prepare fluvial erosion hazard zone maps
- Develop and maintain a database to track community vulnerability to erosion
- Use GIS to identify concentrations of at-risk structures and infrastructure

Structure and Infrastructure Projects

- Ensure adequate stormwater drainage
- Reduce encroachment of roads, bridges, and culverts into stream channels and flood prone areas
- Ensure culverts and bridges are adequately sized and properly aligned and graded
- Consider relocating at-risk buildings and infrastructure

Help Citizens and Emergency Management Officials become More Aware of Erosion Risks

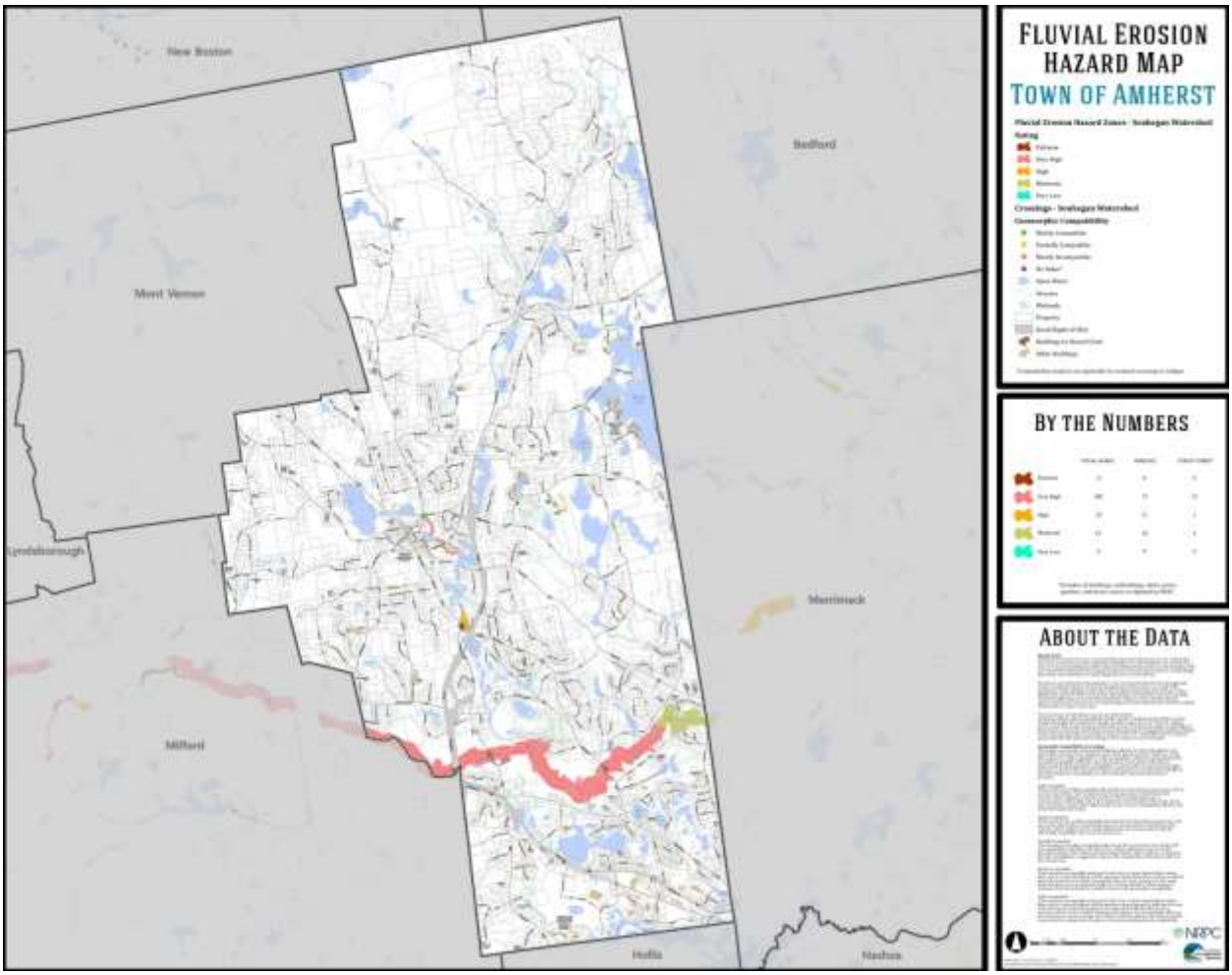
- Notify property owners in high-risk areas
- Develop outreach materials describing erosion risks and potential mitigation techniques
- Offer GIS erosion hazard mapping online

Consider Fluvial Erosion Hazard Areas in Land Use Policy

- Adopt sediment and erosion control regulations
- Consider establishing fluvial erosion hazard overlay districts

- Develop and implement an erosion management plan
- Locate utilities and critical facilities outside of areas susceptible to erosion
- Provide rivers and streams the area they need to maintain or re-establish their natural equilibrium in order to minimize erosion hazards, protect public safety and welfare, and decrease property damage and loss.

Map 2—Fluvial Erosion Hazard Zones in Amherst



Fluvial Erosion Hazard (FEH) zones attempt to identify lands most vulnerable to fluvial erosion. Each river reach assessed through this project was assigned a sensitivity rating as a measure of extent. Sensitivity can be defined as the potential of a river to respond to flood events, through bank erosion and lateral migration (across the floodplain) processes. Rivers, as a result of the combination of their geologic context and extent of historical development, will vary in their likelihood to experience flood-event driven rapid changes. Past activities, such as for example channel straightening, can increase the potential for change in a flood. Reaches already experiencing erosion are prone to such rapid changes, given the exposed bank materials available for the power of water to erode into. The occurrences of such features are incorporated into the sensitivity rankings, where generally, the greater number of

features present that can cause changes, the higher the sensitivity to change.

Broadly, assignment of an "Extreme" category means a reach that is experiencing considerable erosion of its beds and banks, and typically has flood chutes and meander cutoffs that maximize the potential for changing flow paths and further erosion during a large flood. Conversely, a rating of "Very Low" is typically found in a bedrock gorge, where the flow path will not change on time scales of concern to people.

Fluvial Erosion Hazard Zones in Amherst

Sensitivity Rating	Total Acres	Parcels	Structures*
Extreme	0	0	0
Very High	382	72	15
High	10	11	1
Moderate	67	25	2
Very Low	0	0	0

*Includes all buildings, outbuildings, decks, pools, gazebos, and tennis courts as digitized by Nashua Regional Planning Commission

It is beyond the scope of this project to assign potential damage estimates to structures caused by fluvial erosion. This data is not readily available because specific flood damages caused by channel erosion and migration processes are not often documented. In addition, standard loss estimation models and tables for erosion damage are not available (*Understanding Your Risks*, FEMA, pg 4-30).

Culverts were also assessed as part of the Fluvial Erosion Hazard study and each culvert was assigned a score ranking it on a scale from "fully compatible" to "fully incompatible." These rankings provide guidance on the long-term ability of culverts to handle flow and sediment transport processes and their risk of failure. Not all culverts in Amherst were assessed in this study. The following results only include those culverts that were assessed.

- Fully Compatible culverts conform with natural river channel form and process and have a low risk of failure. Culvert replacement is not expected over the lifetime of the structure. When replaced, a similar structure is recommended. ***Total # of Fully Compatible culverts in Amherst =* 0**
- Mostly Compatible culverts also have a low risk of failure and replacement is not expected over the lifetime of the structure. When replaced, minor design adjustments are recommended to achieve full compatibility. ***Total # of Mostly Compatible culverts in Amherst =* 1**
- Partially Compatible culverts are either compatible with current form or process, but not both. There is a moderate risk of culvert failure and replacement may be needed during the design lifetime. When replaced, a redesign of the culvert installation is recommended. ***Total # of Partially Compatible culverts in Amherst =* 1**
- Mostly Incompatible culverts are typically undersized for their channel and/or are poorly aligned with the upstream channel geometry. These culverts have a moderate to high risk of structural failure and should be redesigned when replaced to improve compatibility. ***Total # of Mostly Incompatible culverts in Amherst =* 0**

- Fully Incompatible culverts are typically undersized for their channel and/or are poorly aligned with the upstream channel geometry. They also have reduced passage of sediment through the culvert and an increased risk of erosion. These culverts have a high risk of failure and should be prioritized for replacement with more compatible structures. ***Total # of Fully Incompatible culverts in Amherst* = 0**

A complete table of all the culverts assessed in Amherst, including location information and compatibility ratings, appears in the Appendix to this Plan.

Hurricane/Tropical Storm

The Atlantic hurricane season lasts from June 1 through November 30 and peaks in late August and September. The Saffir-Simpson Hurricane Wind Scale categorizes hurricanes from 1 to 5 based on sustained wind speed. The National Weather Service National Hurricane Center provides the following estimates of potential property damage based on hurricane wind speed (http://www.nhc.noaa.gov/aboutsshws.php).

Category 1—sustained winds 74-95 mph. Very dangerous winds will produce some damage. Well-constructed frame homes could have damage to roof, shingles, vinyl siding, and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.

Category 2—sustained winds 96-110 mph. Extremely dangerous winds will cause extensive damage. Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.

Category 3—sustained winds 111-129 mph. Devastating damage will occur. Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.

Category 4—sustained winds 130-156 mph. Catastrophic damage will occur. Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

Category 5—sustained winds 157 mph or higher. Catastrophic damage will occur. A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possible months. Most of the area will be uninhabitable for weeks or months.

FEMA declared disasters in Hillsborough County during Hurricane Bob (1991) and Hurricane Floyd (1999). Though these were the only formally declared incidents, Amherst has experienced strong remnants of numerous tropical cyclones including Hurricane Carol (1954), Donna (1960), Gloria (1985), Irene (2011), and Sandy (2012).

Hurricane Hazard Loss Estimate

There are no standard loss estimation models or tables for wind damage (*Understanding Your Risks,* FEMA, pg 4-30). As such, the Hazard Mitigation Team used data from previous hurricane events to determine damage estimates. Historically, the strongest hurricane seen in NH was a Category 3, so loss estimates were calculated based on a hurricane of that strength. Hurricanes have primarily damaged road networks and infrastructure in NH. It is beyond the scope of this project to estimate the costs of repairing or replacing transportation and utility infrastructure damaged by a hurricane. The Hazard Mitigation Team used the following calculations to estimate loss to single family residential structures from a hurricane.

Step 1. Determine percent building damage ratio to single family residence from Category 3 hurricane

- Wood Frame Construction, Low general hurricane design level = 20% building damage
- *Source: Amherst Hazard Mitigation Team*

Step 2. Determine percent of structures in Amherst that would be damaged by Category 3 hurricane

- 5% of structures estimated to be damaged by Category 3 hurricane
- *Source: Amherst Hazard Mitigation Team (no historical data on hurricane damage in Amherst)*

Step 3. Determine total assessed value of structures in Amherst

- Total Assessed Value of all Structures in Amherst = $1,066,039,350
- *Source: Amherst Assessing Department (2014)*

Step 4. Determine total loss from Category 3 hurricane

- Total Loss from Hurricane = Total Assessed Value of all Structures *Percentage of Structures Estimated to be Damaged * Percent Building Damage Ratio
- Total Loss from Hurricane = $1,066,039,350 * .05 * .2 = **$10,660,393.50**

Critical Facility Type	Total Number of this type of Critical Facilities in Amherst	Number of this type of Critical Facilities in Hurricane Hazard Area	Percentage of this type of Critical Facilities in Hurricane Hazard Area
General Occupancy	39	34	87.2%
Essential Facilities	13	13	100%
Transportation	27	27	100%
Utility System	19	16	84.2%
High Potential Hazard	12	12	100%
Hazardous Materials	0	0	0%

Severe Thunderstorm

Severe thunderstorms typically contain heavy rainfall, high winds, and lightning. In extreme cases, thunderstorms have the potential to create tornadoes and downbursts. While thunderstorms are a common occurrence during the summer, not all thunderstorms create damage or injure humans.

Severe thunderstorms can create heavy rainfall, which may result in localized flooding. While thunderstorm tracking has become more accurate, severe thunderstorms typically result in very little warning and the aftermath of their rain and wind is extremely difficult to estimate.

By definition, all thunderstorms contain lightning. Lightning is a giant spark of electricity that occurs within the atmosphere or between the atmosphere and the ground. As lightning passes through the air, it heats the air to a temperature of about 50,000 degrees Fahrenheit, considerably hotter than the surface of the Sun. During a lightning discharge, the sudden heating of the air causes it to expand rapidly. After the discharge, the air contracts quickly as it cools back to ambient temperatures. This rapid expansion and contraction causes a shock wave that we hear as thunder.

Lightning is a major hazard to citizens involved in outdoor activities. A lightning strike at a densely attended special event has the potential to create a major mass casualty incident. Lightning also can create wildfires and structure fires and may cause power and/or communications outages.

Severe Thunderstorm Hazard Loss Estimate

Losses from severe thunderstorms would be similar to those sustained by hurricanes, only on a smaller, more localized scale. The Hazard Mitigation Team used the following calculations to estimate loss to single family residential structures from a severe thunderstorm.

Step 1. Determine percent building damage ratio to single family residence from severe thunderstorm

- Wood Frame Construction, Low general hurricane design level = 5% building damage
- *Source: Amherst Hazard Mitigation Team*

Step 2. Determine percent of structures in Amherst that would be damaged by severe thunderstorm

- 0.5% of structures estimated to be damaged by severe thunderstorm
- *Source: Amherst Hazard Mitigation Team (no historical data on severe thunderstorm damage in Amherst)*

Step 3. Determine total assessed value of structures in Amherst

- Total Assessed Value of all Structures in Amherst = $1,066,039,350
- *Source: Amherst Assessing Department (2014)*

Step 4. Determine total loss from severe thunderstorm

- Total Loss from Severe Thunderstorm = Total Assessed Value of all Structures *Percentage of Structures Estimated to be Damaged * Percent Building Damage Ratio
- Total Loss from Severe Thunderstorm = $1,066,039,350 * .005 * .05 = **$266,509.84**

Critical Facility Type	Total Number of this type of Critical Facilities in Amherst	Number of this type of Critical Facilities in Severe Thunderstorm Hazard Area	Percentage of this type of Critical Facilities in Severe Thunderstorm Hazard Area
General Occupancy	39	39	100%
Essential Facilities	13	13	100%
Transportation	27	1	3.7%
Utility System	19	16	84.2%
High Potential Hazard	12	0	0%
Hazardous Materials	0	0	0%

Severe Winter Weather

A heavy snowstorm is generally considered to be one that deposits two or more inches of snow per hour in a twelve-hour period. Heavy snow can immobilize a region, stranding commuters, closing businesses, and disrupting emergency services. Accumulating snow can collapse buildings and knock down trees and power lines. Snow removal from roadways, utility damage, and disruption to businesses can have a significant economic impact on municipalities and residents.

A blizzard is a violent snowstorm with winds blowing at a minimum speed of 35 miles per hour and visibility of less than one-quarter mile for three hours. 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 impact the coast and inland areas in a Northeasterly direction. Winds from a Nor'easter can meet or exceed hurricane force, knocking down trees, utility poles, and power lines.

Ice storms occur when a mass of warm, moist air collides with a mass of cold, arctic air. The less dense warm air rises and the moisture precipitates out in the form of rain. When this rain falls through the colder, more-dense air and comes in contact with cold surfaces, ice forms and can become several inches thick. Heavy accumulations of ice can knock down trees, power lines, and communications for extended periods of time. Ice Storm extent can be defined by the Sperry-Piltz Ice Accumulation Index:

- 0—minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages
- 1—some isolated or localized utility interruptions are possible, typically lasing on a few hours. Roads and bridges may become slick and hazardous.
- 2—scattered utility interruptions expected, typically lasing 12-24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
- 3—numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasing 1-5 days.
- 4—prolonged and widespread utility interruptions with extensive damage to main distribution feeder lines and some high voltage transmission lines/structures. Outages lasing 5-10 days.
- 5—catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed

In recent years, FEMA issued disaster declarations in Hillsborough County for severe winter weather in 1998, 2008, 2010, 2011, and 2013. Among these storms was a rare Nor'easter in late October of 2011 that caused major destruction in Hillsborough and Rockingham Counties. Heavy wet snow fell on trees that had much of their foliage remaining. Many trees could not withstand the extra weight of the snow and collapsed under the stress. Damage was very focused in the southern part of New Hampshire and caused nearly three times the amount of debris that the 2008 ice storm produced.

Severe Winter Weather Hazard Loss Estimate

Severe Winter Weather events have primarily damaged road networks and infrastructure in NH. It is beyond the scope of this project to estimate the costs of repairing or replacing transportation and utility infrastructure damaged by severe winter weather. The Hazard Mitigation Team used the following calculations to estimate loss to single family residential structures from severe winter weather.

Step 1. Determine percent building damage ratio to single family residence from severe winter weather

- Wood Frame Construction, no additional provisions for roof snow loads = 5% building damage
- *Source: Amherst Hazard Mitigation Team*

Step 2. Determine percent of structures in Amherst that would be damaged by severe winter weather

- 1% of structures estimated to be damaged by severe winter weather
- *Source: Amherst Hazard Mitigation Team*

Step 3. Determine total assessed value of structures in Amherst

- Total Assessed Value of all Structures in Amherst = $1,066,039,350
- *Source: Amherst Assessing Department (2014)*

Step 4. Determine total loss from Severe Winter Weather

- Total Loss from Severe Winter Weather = Total Assessed Value of all Structures *Percentage of Structures Estimated to be Damaged * Percent Building Damage Ratio
- Total Loss from Severe Winter Weather = $1,066,039,350 * .01 * .05 = **$533,019.68**

Critical Facility Type	Total Number of this type of Critical Facilities in Amherst	Number of this type of Critical Facilities in Severe Winter Weather Hazard Area	Percentage of this type of Critical Facilities in Severe Winter Weather Hazard Area
General Occupancy	39	34	87.2%
Essential Facilities	13	13	100%
Transportation	27	27	100%
Utility System	19	16	84.2%
High Potential Hazard	12	12	100%
Hazardous Materials	0	0	0%

Tornado/Downburst

A tornado is a violently rotating column of air extending from a thunderstorm to the ground. The most violent tornadoes are capable of tremendous destruction with wind speeds of 250 mph or more. Damage paths can be in excess of 1 mile wide and 50 miles long. Tornadoes are created when cold air overrides warm air, causing the warm air to rise rapidly.

A downburst is a severe localized wind blasting down from a thunderstorm. These 'straight line' winds are distinguishable from tornadic activity by their pattern of destruction and debris. Depending on the size and location of these events, the destruction to property may be devastating. Downbursts fall into two categories. Microbursts cover an area less than 2.5 miles in diameter and macrobursts cover an area at least 2.5 miles in diameter.

Hillsborough County has a higher risk of tornado activity compared to the rest of the State. Between 1961 and 1998 there were 15 known tornadoes in Hillsborough County. The most recent downburst activity occurred on July 6, 1999 in the form of a macroburst in Merrimack, Grafton and Hillsborough Counties. There were two fatalities as well as roof damage, widespread power outages, and downed trees, utility poles and wires.

Tornado Hazard Loss Estimate

There are no standard loss estimation models or tables for tornados (*Understanding Your Risks,* FEMA, pg 4-27). As such, the Hazard Mitigation Team used data from previous tornado events to determine damage estimates. Historically, the strongest tornado seen in Hillsborough County was a F2, so loss estimates were calculated based on a tornado of that strength.

Step 1. Determine percent building damage ratio to single family residence from F2 tornado

- Wood Frame Construction, Low general tornado design level = 50% building damage
- *Source: Amherst Hazard Mitigation Team*

Step 2. Determine percent of structures in Amherst that would be damaged by F2 tornado

- 1% of structures estimated to be damaged by F2 tornado
- *Source: Amherst Hazard Mitigation Team (no historical data on tornado damage in Amherst)*

Step 3. Determine total assessed value of structures in Amherst

- Total Assessed Value of all Structures in Amherst = $1,066,039,350
- *Source: Amherst Assessing Department (2014)*

Step 4. Determine total loss from F2 Tornado

- Total Loss from Tornado = Total Assessed Value of all Structures *Percentage of Structures Estimated to be Damaged * Percent Building Damage Ratio
- Total Loss from Tornado = $1,066,039,350 * .01 * .5 = **$5,330,196.75**

Critical Facility Type	Total Number of this type of Critical Facilities in Amherst	Number of this type of Critical Facilities in Tornado Hazard Area	Percentage of this type of Critical Facilities in Tornado Hazard Area
General Occupancy	39	34	87.2%

Essential Facilities	13	13	100%
Transportation	27	27	100%
Utility System	19	16	84.2%
High Potential Hazard	12	12	100%
Hazardous Materials	0	0	0%

Wildfire

Wildfires are fires ignited in grassy or wooded areas. They may be ignited intentionally by humans, naturally through lightning, or accidentally due to spark ignition from sources such as power lines or fireworks. The interface between forested lands and developed lands poses an ongoing threat to property from wildfires. Potential wildfire areas outside of the recommended response time radius from the fire station may pose a higher risk to structures and residents than those located closer to the fire station.

Wildfire Hazard Loss Estimate

Step 1. Determine percent building damage ratio to single family residence from wildfire

- Wood Frame Construction, combustible siding and decking = 20% building damage
- *Source: Amherst Hazard Mitigation Team*

Step 2. Determine percent of structures in Amherst that would be damaged by wildfire

- 0.5% of structures estimated to be damaged by wildfire
- *Source: Amherst Hazard Mitigation Team*

Step 3. Determine total assessed value of structures in Amherst

- Total Assessed Value of all Structures in Amherst = $1,066,039,350
- *Source: Amherst Assessing Department (2014)*

Step 4. Determine total loss from Wildfire

- Total Loss from Wildfire = Total Assessed Value of all Structures *Percentage of Structures Estimated to be Damaged * Percent Building Damage Ratio
- Total Loss from Wildfire = $1,066,039,350 * .005 * .2 = **$1,066,039.35**

Critical Facility Type	Total Number of this type of Critical Facilities in Amherst	Number of this type of Critical Facilities in Wildfire Hazard Area	Percentage of this type of Critical Facilities in Wildfire Hazard Area
General Occupancy	39	34	87.2%
Essential Facilities	13	13	100%
Transportation	27	1	3.7%
Utility System	19	16	84.2%
High Potential Hazard	12	0	0%
Hazardous Materials	0	0	0%

Section 3.6 ~ Overall Summary of Vulnerability

Table 7a—Overall Summary of Vulnerability by Hazard

Hazard	Types of Critical Facilities Impacted by Hazard	Impact of Hazard	% of Critical Facilities in Hazard Area	% of Structures Estimated to be Damaged	$ Value of Loss
Drought	Agricultural land. Not likely to have a significant impact on structures.	Loss of crops. Inadequate quantity of drinking water. Loss of water for fire protection. Increased risk of fire.	General Occupancy = 12.8% Essential Facilities = 0% Transportation = 0% Utility Systems = 15.8% High Potential Hazard = 0% Hazardous Materials = 0%	98 acres of agricultural land	Calculating $ value of losses is beyond the scope of this Plan (see Section 3.5 Drought for explanation)
Earthquake	• General Occupancy • Essential Facilities • Transportation • Utility Systems • High Potential Hazard • Hazardous Materials	Structural damage or collapse of buildings. Damage or loss of infrastructure, including roads, bridges, railroads, power and phone lines, municipal communications, radio system. Loss of water for fire protection. Risk to life, medical surge.	General Occupancy = 87.2% Essential Facilities = 100% Transportation = 100% Utility Systems = 84.2% High Potential Hazard = 100% Hazardous Materials = 0%	1-5%	$63,962.36 to $319,811.81
Extreme Temperatures	Not likely to have a significant impact on structures.	Overburdened power networks. Heating fuel	General Occupancy = 0%	0%	$0

Hazard	Types of Critical Facilities Impacted by Hazard	Impact of Hazard	% of Critical Facilities in Hazard Area	% of Structures Estimated to be Damaged	$ Value of Loss
		shortages. Risk to life from prolonged exposure.	Essential Facilities = 0% Transportation = 0% Utility Systems High Potential Hazard = 0% Hazardous Materials = 0%		
Flooding	• General Occupancy • Transportation • High Potential Hazard • Hazardous Materials	Water damage to structures and their contents. Damage or loss of infrastructure, including roads, bridges, railroads, power and phone lines, municipal communications, radio system. Environmental hazards resulting from damage. Isolation of neighborhoods resulting from flooding.	General Occupancy = 7.7% in 1% annual floodplain; 2.6% in 0.2% annual floodplain Essential Facilities = 0% in 1% annual floodplain; 23.1% in 0.2% annual floodplain Transportation = 81.5% in 1% annual floodplain; 14.8% in 0.2% annual floodplain Utility Systems = 5.3% in 1% annual floodplain; 0% in 0.2% annual floodplain High Potential Hazard =	Up to 221 buildings	1 foot flood = $7,591,665.92 2 foot flood = $10,122,221.23 3 foot flood = $11,640,554.41 4 foot flood = $14,171,109.72

Hazard	Types of Critical Facilities Impacted by Hazard	Impact of Hazard	% of Critical Facilities in Hazard Area	% of Structures Estimated to be Damaged	$ Value of Loss
			16.7% in 1% annual floodplain; 41.7% in 0.2% annual floodplain Hazardous Materials = 0% in 1% annual floodplain; 0% in 0.2% annual floodplain		
Fluvial Erosion	• General Occupancy • Essential Facilities • Transportation • Utility Systems	Washed out culverts. Undermined bridges and roadways. Property loss and damage to structures located along washed out stream banks.	General Occupancy = n/a Essential Facilities = 0% Transportation = 0% Utility Systems = n/a High Potential Hazard = n/a Hazardous Materials = 0%	Up to 18 structures	It is beyond the scope of this project to assign potential damage estimates to structures caused by fluvial erosion.
Hurricane/Tropical Storm	• General Occupancy • Essential Facilities • Transportation • Utility Systems • High Potential • Hazard • Hazardous Materials	Wind damage to structures and trees. Water damage to structures and their contents. Damage or loss of infrastructure, including roads, bridges, railroads, power and phone lines, municipal	General Occupancy = 87.2% Essential Facilities = 100% Transportation = 100% Utility Systems = 84.2% High Potential	5%	$10,660,393.50

Hazard	Types of Critical Facilities Impacted by Hazard	Impact of Hazard	% of Critical Facilities in Hazard Area	% of Structures Estimated to be Damaged	$ Value of Loss
		communications, radio system. Environmental hazards resulting from damage. Isolation of neighborhoods resulting from flooding.	Hazard = 100% Hazardous Materials = 0%		
Severe Thunderstorm	• General Occupancy • Essential Facilities • Utility System • High Potential Hazard • Hazardous Materials	Smoke and fire damage to structures. Disruption to power lines and municipal communications. Damage to critical electronic equipment. Injury or death to people involved in outdoor activity.	General Occupancy = 100% Essential Facilities = 100% Transportation = 3.7% Utility Systems = 84.2% High Potential Hazard = 0% Hazardous Materials = 0%	0.5%	$266,509.84
Severe Winter Weather	• General Occupancy • Essential Facilities • Transportation • Utility • High Potential Hazard • Hazardous Materials	Disruption to road network. Damage to trees and power lines, communications. Structural damage to roofs/collapse. Increase in CO, other hazards.	General Occupancy = 87.2% Essential Facilities = 100% Transportation = 100% Utility Systems = 84.2% High Potential Hazard = 100%	1%	$533,019.68

Hazard	Types of Critical Facilities Impacted by Hazard	Impact of Hazard	% of Critical Facilities in Hazard Area	% of Structures Estimated to be Damaged	$ Value of Loss
			Hazardous Materials = 0%		
Tornado/Downburst	• General Occupancy • Essential Facilities • Transportation • Utility System • High Potential Hazard • Hazardous Materials	Wind damage to structures and trees. Damage or loss of infrastructure, including roads, bridges, railroads, power and phone lines, municipal communications, radio system. Environmental hazards resulting from damage. Medical surge.	General Occupancy = 87.2% Essential Facilities = 100% Transportation = 100% Utility Systems = 84.2% High Potential Hazard = 100% Hazardous Materials = 0%	1%	$5,330,196.75
Wildfire	• General Occupancy • Essential Facilities • Utility System • High Potential Hazard • Hazardous Materials	Smoke and fire damage to structures in wild land/urban interface. Damage to habitat. Impacts to air quality. Loss of natural resources.	General Occupancy = 87.2% Essential Facilities = 100% Transportation = 3.7% Utility Systems = 84.2% High Potential Hazard = 0% Hazardous Materials = 0%	0.5%	$1,066,039.35

Table 7b—Overall Summary of Vulnerability by Facility Type

Facility Type	Total # of facilities	# susceptible to Drought	# susceptible to Earthquake	# susceptible to Extreme Temperatures	# susceptible to Flooding	# susceptible to Fluvial Erosion	# susceptible to Hurricane	# susceptible to Severe Thunderstorm	# susceptible to Severe Winter Weather	# susceptible to Tornado/Downburst	# susceptible to Wildfire
General Occupancy	39	5	34	0	3 in 1% annual, 1 in 0.2% annual	n/a	34	39	34	34	34
Essential Facilities	13	0	13	0	0 in 1% annual; 3 in 0.2% annual	0	13	13	13	13	13
Transportation	27	0	27	0	22 in 1% annual; 4 in 0.2% annual	0	27	1	27	27	1
Utility	19	3	16	0	1 in 1% annual; 0 in 0.2% annual	n/a	16	16	16	16	16
High Hazard	12	0	12	0	2 in 1% annual; 5 in 0.2% annual	n/a	12	0	12	12	0
Hazardous Materials	0	0	0	0	0 in 1% annual; 0 in 0.2% annual	0	0	0	0	0	0

Section 3.7 ~ National Flood Insurance Program

The Town of Amherst participates in the National Flood Insurance Program (NFIP). This provides full insurance coverage based on risk as shown on detailed Flood Insurance Rate Maps (FIRMs). Amherst joined the NFIP on July 2, 1979. The Town's initial Flood Hazard Boundary Map was identified on March 22, 1974 and its initial Flood Insurance Rate Map was identified on July 2, 1979. The current effective map date is September 25, 2009.

Amherst has 92 NFIP policies in force and $21,862,500 of insurance in force. There have been 42 paid losses totaling $511,091. Amherst has 9 repetitive loss properties with total repetitive loss payments of $406,535. All repetitive loss structures in Amherst have been single family residential.

As a participant in the NFIP, communities must agree to adopt a floodplain management ordinance and enforce the regulations found in the ordinance. Amherst has adopted the "Floodplain Conservation District," found in Section 4.10 of the Town of Amherst, NH Zoning Ordinance. The Floodplain Conservation District is enacted to promote public health, safety, and general welfare and to minimize public and private losses due to flood conditions in specific areas of Amherst by the establishment of standards designed to: prevent the development of buildings and uses in areas that are unsatisfactory and hazardous due to the threat of flooding, protect natural flow and drainage, and comply with the requirements of the National Flood Insurance Act of 1968 (P.L. 90-488, as amended).

The Floodplain Conservation District 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 Hillsborough, NH" dated September 25, 2009 or as amended, together with the associated "Flood Insurance Rate Maps" dated September 25, 2009, or as amended. The ordinance includes the following sections: General, Purpose, Definition, Permitted Uses, Building Permit, and Variances and Appeals.

To demonstrate the Amherst's continued compliance with NFIP requirements, the Hazard Mitigation Team identified the follow mitigation actions as part of its comprehensive mitigation strategy. These actions also appear in Section 4.2, Table 9—Mitigation Actions.

Table 8—National Flood Insurance Program Mitigation Actions

National Flood Insurance Program Mitigation Actions			
Mitigation Action	**Mitigation Type**	**Hazard Addressed**	**Critical Facilities Addressed**
Establish mutual aid agreements with neighboring communities to address administering the NFIP following a major storm event.	• Emergency Services Protection	• Flooding • Erosion • Hurricane	• General Occupancy • Essential Facilities • Transportation Systems • Utility Systems • High Potential Hazard • Hazardous Materials
Revise and enforce floodplain, stormwater, and erosion control regulations to improve floodplain management in Amherst. Utilize site plan regulations to encourage permeable driveways and surfaces to reduce runoff and promote groundwater recharge.	• Prevention • Natural Resources Protection	• Flooding • Erosion • Hurricane • Drought	• General Occupancy • Essential Facilities • Transportation Systems • Utility Systems • High Potential Hazard • Hazardous Materials

CHAPTER 4. MITIGATION STRATEGY

Section 4.1 ~ Goals and Objectives to Reduce Vulnerabilities to Hazards

The first step in developing a mitigation strategy is to establish goals that reflect what the municipality wishes to achieve through the implementation of its Hazard Mitigation Plan. The Amherst Hazard Mitigation Team established the following goals and objectives, based on its desire to protect the Town's population, critical facilities, infrastructure, emergency services, natural resources, and private property. These goals provided the basis for identifying and prioritizing mitigation actions.

Goal 1—Prevent the impacts of natural hazards on the Town's population, critical facilities, infrastructure, emergency services, natural resources, and private property whenever possible.

- Objective 1.1—Manage development of known hazard areas to avoid the risks associated with natural hazards.
- Objective 1.2—Plan to incorporate hazard mitigation into capital improvements and other future initiatives.
- Objective 1.3—Ensure building codes and other standards include requirements that make new construction more disaster resistant.
- Objective 1.4—Support the maintenance of this hazard mitigation plan.

Goal 2—Protect the Town's existing critical facilities, infrastructure, and private property from the impacts of natural hazards through cost effective mitigation activities.

- Objective2.1—Modify existing structures to reduce damage from future natural hazard events.
- Objective 2.2—Perform cost effective flood hazard mitigation measures to protect private property.

Goal 3—Educate and inform the Town's residents to help them become more resilient to natural hazards impacting the community.

- Objective 3.1—Utilize educational methods to change the perception from "disaster losses are acceptable" to "many disaster losses are preventable if mitigation practices are followed."
- Objective 3.2—provide educational opportunities across all age ranges.
- Objective 3.3—Develop and distribute public awareness materials regarding the relative risk of natural hazards and practical mitigation measures to reduce damages and injuries.

Goal 4—Address the challenges of natural resource degradation and the associated increased risk from hazards.

- Objective 4.1—Ensure development in hazard areas does not destroy natural barriers to damage, such as floodplains and vegetation.

- Objective 4.2—Protect or recreate environmental assets to help safeguard the built environment.

Goal 5—Protect emergency services, critical facilities, and other critical capabilities from hazard damage in order for them to remain operational.

- Objective 5.1—Identify critical facilities, infrastructure, and emergency services and their vulnerabilities to natural hazards.
- Objective 5.2— Develop and implement programs to promote hazard mitigation actions that protect the provision of emergency services in Town.
- Objective 5.3—Identify, maintain, and protect evacuation routes from hazard damage so they are usable when needed.

Section 4.2 ~ Mitigation Actions

After establishing goals and objectives to reduce vulnerabilities to each hazard type, the Hazard Mitigation Team identified mitigation actions to achieve these goals. The resulting mitigation actions appear in Table 9 below.

Table 9—Mitigation Actions

Mitigation Action	Mitigation Type	Hazard Addressed	Critical Facilities Addressed
Mitigation Actions from 2007 Plan			
Culvert and bridge capacity improvements at the following locations: • Boston Post Road between Simeon Wilson & Thornton Ferry Road II • Stearns Road between Veterans Road and Route 122 • Merrimack Road between Holt Road and Souhegan Ave	• Structural	• Flooding • Fluvial Erosion • Hurricane	• Transportation Systems
National Flood Insurance Program Mitigation Actions			
Establish mutual aid agreements with neighboring communities to address administering the NFIP following a major storm event.	• Emergency Services Protection	• Flooding • Erosion • Hurricane	• General Occupancy • Essential Facilities • Transportation Systems • Utility Systems • High Potential Hazard

Mitigation Action	Mitigation Type	Hazard Addressed	Critical Facilities Addressed
			• Hazardous Materials
Revise and enforce floodplain, stormwater, and erosion control regulations to improve floodplain management in Amherst. Utilize site plan regulations to encourage permeable driveways and surfaces to reduce runoff and promote groundwater recharge.	• Prevention • Natural Resources Protection	• Flooding • Erosion • Hurricane • Drought	• General Occupancy • Essential Facilities • Transportation Systems • Utility Systems • High Potential Hazard • Hazardous Materials
Additional Mitigation Actions			
Reduce wildfire risk, including preventing or alleviating wildfires by proper separation of power lines as well as efficient response to fallen power lines; routinely inspecting the functionality of fire hydrants; and requiring and maintaining safe access for fire apparatus to wildland-urban interface neighborhoods and properties.	• Prevention	• Wildfire	• General Occupancy • Essential Facilities • Transportation Systems • Utility Systems • High Potential Hazard • Hazardous Materials
Conduct outreach and education programs to increase awareness of wildfire, tornado, hurricane, extreme temperatures, and carbon monoxide risks. Utilize Code Red and community access TV.	• Public Information	• Wildfire • Tornado • Hurricane • Extreme Temperatures	• General Occupancy • Essential Facilities • Transportation Systems • Utility Systems • High Potential Hazard • Hazardous Materials
Monitor water supply and drought conditions. Utilize NH Division of Forest and Lands reports to monitor	• Natural Resources Protection	• Wildfire • Drought	• General Occupancy • Essential Facilities • Transportation Systems • Utility Systems

Mitigation Action	Mitigation Type	Hazard Addressed	Critical Facilities Addressed
drought indicators.			• High Potential Hazard • Hazardous Materials
Proactively enforce the International Building Code (IBC) and International Residential Code (IRC) to protect buildings and infrastructure from the impacts of severe winter weather, hurricanes, flooding, and earthquake.	• Prevention • Property Protection	• Severe Winter Weather • Hurricanes • Flood • Earthquake	• General Occupancy • Essential Facilities • High Potential Hazard • Hazardous Materials
Protect critical facilities and infrastructure from lightning damage. Install and maintain surge protection on critical electronic equipment and grounding on radio towers. Protect power lines by working with utility companies to harden electrical infrastructure, including trimming trees near power lines. Consider the costs and benefits of requiring that overhead power lines be buried in all new developments.	• Property Protection	• Severe Thunderstorm	• General Occupancy • Essential Facilities • Utility Systems • Hazardous Materials
Protect vulnerable populations from the impacts of extreme temperatures and severe winter storms by establishing shelters and cooling stations at designated municipal and school facilities.	• Prevention • Public Information	• Extreme Temperatures • Severe Winter Weather	• Human lives
Improve stormwater	• Prevention	• Flooding	• General Occupancy

Mitigation Action	Mitigation Type	Hazard Addressed	Critical Facilities Addressed
drainage system capacity and flood control infrastructure. Consider costs and benefits of a variety of infrastructure upgrades, including stormwater pipe storage, stormwater ponds, stormwater tank storage, and culvert upsizing and realignment.	• Structural		• Essential Facilities • Transportation Systems • Utility Systems • High Potential Hazard • Hazardous Materials
Work with property owners to elevate or remove loss structures from flood-prone areas to minimize future flood losses.	• Prevention	• Flooding	• General Occupancy • Essential Facilities • Utility Systems • Hazardous Materials
Map and assess vulnerability to erosion. Conduct stream assessments and prepare fluvial erosion hazard zone maps.	• Prevention	• Fluvial Erosion	• General Occupancy • Essential Facilities • Transportation Systems • Utility Systems • High Potential Hazard • Hazardous Materials

Section 4.3 ~ Prioritizing Mitigation Actions

After identifying mitigation actions to address each hazard, the Team then began a two-step process to prioritize them. The first step was to conduct a benefit cost review. Benefit cost reviews provide a comprehensive overview of the monetary and non-monetary costs and benefits associated with each action. During this process, the Hazard Mitigation Team asked a variety of questions such as, “How beneficial is this action to the entire Town?” “How many people will benefit from this action?” “How large of an area is impacted by this project?” “How costly is this project?”

Table 10—Benefit Cost Review

Mitigation Action	Likely Benefits	Likely Costs
Conduct outreach and education programs to increase awareness of wildfire, tornado, hurricane, extreme temperatures, carbon monoxide risks, and severe winter weather. Utilize Code Red and community access TV.	• The Town currently has the capacity to implement this action. • This action is beneficial to all residents in Town.	• This action may have limited impact because it can be difficult to get people to pay attention to outreach campaigns. • percentage of $7,715 *(source: FY2015 Amherst Operating Budget, Emergency Management line item)*
Map and assess vulnerability to erosion.	• This action is the first step towards avoiding and reducing future losses from erosion. • This action can help determine how areas at greatest risk of erosion can be targeted for hazard mitigation opportunities.	• $0—the entire cost of this action is being borne by the NH DES through a FEMA Pre-Disaster Mitigation grant. There are no costs to the Town.
Proactively enforce the International Building Code (IBC) and International Residential Code (IRC) to protect buildings and infrastructure from the impacts of earthquakes, flooding, hurricanes, and winter storms.	• This action would be effective at avoiding and reducing future losses. • This action is beneficial to all applicable buildings across the entire Town.	• This action may not benefit older structures not subject to newer building codes. • $85,000 *(source: Amherst Strategic Plan: Community Development 2013)*
Reduce wildfire risk, including preventing or alleviating wildfires by proper separation of power lines as well as efficient response to fallen power lines; routinely inspecting the functionality of fire hydrants; and requiring and maintaining safe access for fire apparatus to wild land-urban interface neighborhoods and properties.	1. This action would be most beneficial to portions of Town near wooded areas. 2. This action would also be beneficial to mitigate man-made fire related hazards.	1. Wildfire is relatively rare in Amherst and therefore the costs of implementing this action may outweigh the benefits of reduced property damage. 2. Opinions vary about wildfire management, so this action could cause social and political tension. 3. $1,200 per tree for large tree removal; overall costs $5,000-$50,000 depending on scope and location *(source: FY2015 Amherst Operating Budget, Fire Department Operational costs)*
Culvert and bridge capacity improvements:	1. Taking this action helps reduce the risk of major	• It is expensive to replace culverts.

Mitigation Action	Likely Benefits	Likely Costs
• Boston Post Road • Stearns Road • Merrimack Road	repair costs that might occur if no action were taken. 2. There are environmental benefits to local waterways and aquatic organisms. 3. Although individual culvert and storm drain repairs only occur in a localized area, they may be beneficial to a large portion of the population depending on how heavily traveled and densely developed the area is.	• Individual culvert and storm drain repairs may only benefit a localized area, while the economic costs are shared among the entire population. • $5,000-$105,000 per culvert; $800,000 per bridge *(source: Amherst 2015-2020 CIP and Town of Amherst 2013 DPW Strategic Plan)*
Protect power lines by working with utility companies to harden electrical infrastructure, including trimming trees near power lines. Consider the costs and benefits of requiring that overhead power lines be buried in all new developments. Protect critical facilities and equipment from lightning damage by installing lightning protection devices.	• Reduced inconvenience and loss associated with a shutdown of critical facilities due to lightning damage and power outages	• Tree removal may be incompatible with local aesthetics • Burying power lines may be cost prohibitive • $1,200 per large tree for removal *(source: Amherst DPW budget)* • $1,000-$5,000 per critical facility for lightning protection devices *(source: Amherst Operating budget for each department)*
Work with property owners to elevate or remove loss structures from flood-prone areas to minimize future flood losses.	• This action would avoid future flood losses to the properties that are moved. • Decrease in emergency response costs.	• Loss of tax revenue from the properties that are removed. • FEMA covers the administrative costs associated removing structures. • Property owners cover costs of elevating structures • $0—no direct costs to Town, town only coordinates process • Percentage of $267,526 for coordination by Town *(source: FY2015 Amherst Operating Budget, Zoning Dept.*

Mitigation Action	Likely Benefits	Likely Costs
		line item)
Improve stormwater drainage system capacity and flood control infrastructure. Consider costs and benefits of a variety of infrastructure upgrades, including stormwater pipe storage, stormwater ponds, stormwater tank storage, and culvert upsizing and realignment.	• Taking this action helps reduce the risk of major repair costs that might occur if no action were taken. • There are environmental benefits to surface water quality. • Although individual culvert and storm drain repairs only occur in a localized area, they may be beneficial to a large portion of the population depending on how heavily traveled and densely developed the area is.	• It is expensive to upgrade stormwater drainage systems. • Individual culvert and storm drain repairs may only benefit a localized area, while the economic costs are shared among the entire population. • Estimate of $75,000 per drainage project *(source: Amherst CIP)*
Revise and enforce floodplain, stormwater, and erosion control regulations to improve floodplain management in Amherst. Utilize site plan regulations to encourage permeable driveways and surfaces to reduce runoff and promote groundwater recharge.	• This action would be most beneficial to residents in flood-prone areas of Town. • This action has the potential to reduce flood related economic losses.	• This action would impact property owners subject to the revised regulations. • $51,300 *(source: NH Community Planning Grant award to Amherst)*
Monitor water supply and drought conditions. Utilize NH Division of Forest and Lands reports to monitor drought indicators.	1. This action has environmental benefits if residents comply with reduced water consumption measures.	1. This action may have limited impact if there is not an accompanying enforcement mechanism. 2. Amherst has a mix of public and private wells, which makes enforcement difficult. 3. $0 additional costs; percentage of existing $255,850 budget *(source: FY2015 Amherst Operating Budget, Fire Department Operational costs)*
Establish mutual aid agreements with neighboring communities to address administering the NFIP following a major storm event. Form partnerships between local, state, and regional entities	• This action helps municipalities to share resources and decreases the burden on any one community. • This action would be most	• Responding to a mutual aid call in a neighboring community could take away resources from Amherst. • Mutual aid calls for non-

Mitigation Action	Likely Benefits	Likely Costs
to expand resources and improve coordination to support floodplain management.	beneficial to residents in flood-prone areas of Town. • This action has the potential to reduce flood related economic losses.	federally declared disasters would not be reimbursed by FEMA. • $0 additional cost to establish agreements; percentage of $100,000 existing budget for response *(source: FY2015 Amherst Budget, Article 23 Contingency Fund)*
Protect vulnerable populations from the impacts of extreme temperatures and severe winter storms by establishing shelters and cooling stations at designated municipal and school facilities.	• This action would benefit the entire Town and particularly the most at risk and needy populations. • This action has broad social benefits for the community.	• percentage of $7,715 *(source: FY2015 Amherst Operating Budget, Emergency Management line item)*

After completing a Benefit Cost review for each action, the Hazard Mitigation Team then prioritized the actions by conducting a STAPLEE Analysis, which stands for Social, Technical, Administrative, Political, Legal, Economic, and Environmental factors. For each mitigation action, the Team asked the following questions:

- Social— Will the action unfairly affect any one segment of the population? Will it disrupt established neighborhoods? Is it compatible with present and future community values? Will it adversely affect cultural resources?
- Technical—How effective is the action in avoiding or reducing future losses? Will it create more problems than it solves? What are some secondary impacts? Does it solve a problem or only a symptom?
- Administrative— Does the community have the capability to implement the action? Can the community provide the necessary maintenance? Can it be accomplished in a timely manner?
- Political— Is there public support both to implement and maintain the action? Is the political leadership willing to support it? Does it present a financial burden to stakeholders?
- Legal— Does the community have the authority to implement the action? Is enabling legislation necessary? What are the legal side effects? Will the community be liable for the actions, support of actions, or lack of actions?
- Economic— What are the costs of this action? How will the costs be borne? Are state/federal grant programs applicable? Does the action fit into existing capital improvements or economic development budgets?
- Environmental— How will this action affect the environment? Does it comply with local, state, and federal environmental regulations? Is it consistent with community environmental goals? Are endangered or threatened species likely to be affected?

The cost and benefit of each mitigation action were then evaluated and assigned a quantitative score based on the STAPLEE criteria.

Benefit Score Range: 0 = Not Beneficial, 1 = Somewhat Beneficial, 2 = Beneficial, 3 = Very Beneficial

Cost Score Range: 0 = Not Costly, -1 = Somewhat Costly, -2 = Costly, -3 = Very Costly

Next, the scores for each action were added to determine priority. Finally, the Hazard Mitigation Team reviewed the scores and resulting prioritization to make sure it was consistent with the Town's goals and Master Plan. The STAPLEE analysis and prioritized mitigation actions appear in Table 11 below.

Table 11—STAPLEE Analysis

Mitigation Action: Conduct outreach and education programs to increase awareness of wildfire, tornado, hurricane, extreme temperatures, carbon monoxide risks, and severe winter weather. Utilize Code Red and community access TV.			
Criteria	**Evaluation**	**Cost**	**Benefit**
Social	This action does not unfairly affect any one segment of the population. It is available to all Amherst residents who have access to Community TV through Code Red. It may unfairly impact members of the population who do not have cable access.	-1	3
Technical	This action would help to decrease risk and avoid future loss.	0	2
Administrative (including responsible party)	Amherst has the capability to implement this action. This action would be the responsibility of Emergency Management. It would be implemented through the Emergency Management Committee and Public Safety Directors using a combination of Code Red and Community TV.	0	2
Political	There is public support to implement and maintain this action.	0	2
Legal	Amherst has the legal authority to implement this action.	0	0
Economic (including direct cost)	There are no additional costs associated with this project since Code Red is part of the existing Emergency Management budget.	0	2
Environmental	This action has the potential to reduce property damage and subsequent environmental impacts.	0	1
Subtotal		**-1**	**12**
Total		**11**	
Priority		**1**	

Mitigation Action: Map and assess vulnerability to erosion. Conduct stream assessments and prepare fluvial erosion hazard zone maps.			
Criteria	**Evaluation**	**Cost**	**Benefit**
Social	This action will not unfairly affect any segment of the population, disrupt established neighborhoods, or adversely affect cultural resources. It is compatible with the community's values of protecting life and property.	0	1
Technical	This action is the first step towards avoiding and reducing future losses from erosion. Mapping and assessment will help to determine how areas at greatest risk of erosion can be targeted for hazard mitigation	0	1

	opportunities.		
Administrative	NH Department of Environmental Services (NH DES) is the responsible party to implement this action. NH DES is currently conducting fluvial erosion hazard assessments in the Souhegan and Piscataquog River watersheds. This action can be accomplished in a timely manner. Field assessments will be complete by September 2014.	0	2
Political	There is public support to implement and maintain this action. The political leadership is also willing to support it.	0	1
Legal	NH DES and the Town of Amherst have the authority to implement the action and no enabling legislation is necessary.	0	1
Economic	The entire cost of this action is being borne by NH DES through a FEMA Pre-Disaster Mitigation grant. There are no costs to the Town of Amherst.	0	3
Environmental	This action has the potential to reduce property damage and subsequent environmental impacts.	0	2
Subtotal		**0**	**11**
Total		**11**	
Priority		**1**	

Mitigation Action: Proactively enforce the International Building Code (IBC) and International Residential Code (IRC) to protect buildings and infrastructure from the impacts of severe winter weather, hurricanes, flooding, and earthquake.			
Criteria	**Evaluation**	**Cost**	**Benefit**
Social	There are no social impacts associated with this action. Enforcement would apply evenly across all applicable buildings, including new construction, major renovations, and changes of use.	-1	1
Technical	This action is effective at avoiding and reducing future losses and it mitigates the impacts of these hazards.	0	3
Administrative (including responsible party)	Amherst has the capability to implement this action. Responsibility would fall under the Community Development Department .	0	3
Political	There is public support for this action, though concerns exist among some property owners who would be directly impacted.	-1	1
Legal	Amherst has adopted these codes and has the legal authority to enforce them.	0	2
Economic (including direct cost)	This action falls under the existing Community Development budget. There may be additional costs for enforcement. This action could have a positive economic impact by reducing the number of emergency response calls.	-1	3
Environmental	This action has the potential to reduce property damage and subsequent environmental impacts.	0	0
Subtotal		**-3**	**13**
Total		**10**	

Priority		**2**

Mitigation Action: Reduce wildfire risk, including preventing or alleviating wildfires by proper separation of power lines as well as efficient response to fallen power lines; routinely inspecting the functionality of fire hydrants; and requiring and maintaining safe access for fire apparatus to wildland-urban interface neighborhoods and properties.			
Criteria	**Evaluation**	**Cost**	**Benefit**
Social	This action would be particularly beneficial to those living in rural areas.	0	3
Technical	This action would help to solve the problem of wildfires and reduce future loss.	0	3
Administrative (including responsible party)	A number of parties are responsible for various components of this action. The Amherst Conservation Commission mows hay on conservation land to reduce fire risk. Community Development is responsible for overseeing tree removal on scenic roads. The Conservation Commission and DPW are responsible for maintaining access for fire apparatus. Pennichuck is responsible for hydrant maintenance. PSNH is responsible for power lines.	-1	0
Political	There is public support to implement and maintain this action. There are possible political issues surrounding tree removal along scenic roads.	-1	1
Legal	Amherst has the legal authority to implement this action. Scenic roads and town owned ROW must use best management practices.	-1	2
Economic (including direct cost)	PSNH covers the costs of power line maintenance. Fire hydrant maintenance is covered under Pennichuck's hydrant rental fees. All other components of this action are covered as part of regular Town budget, with the exception of significant tree removal on town land or ROWs.	0	3
Environmental	Maintaining forest ecology can reduce wildlife risk and have a positive impact on habitat.	0	1
Subtotal		**-3**	**13**
Total		**10**	
Priority		**2**	

Mitigation Action: Protect vulnerable populations from the impacts of extreme temperatures and severe winter storms by establishing shelters and cooling stations at designated municipal and school facilities.			
Criteria	**Evaluation**	**Cost**	**Benefit**
Social	This action primarily benefits Amherst's most vulnerable residents. It is compatible with present and future community values.	0	2
Technical	This action does not solve the problem of extreme temperatures but it does solve the symptom of exposure.	0	2
Administrative	Amherst has the capability to implement this action. The Fire	0	2

(including responsible party)	Department is the responsible party and this action falls under its ongoing emergency management operations.		
Political	There is public support to implement and maintain this action.	0	2
Legal	Amherst has the legal authority to implement this action.	0	0
Economic (including direct cost)	This action falls under Amherst's existing emergency management budget and does not impose additional costs on the Town.	0	2
Environmental	There are no environmental impacts associated with this action.	0	0
Subtotal		**0**	**10**
Total		**10**	
Priority		**2**	

Mitigation Action: Protect power lines by working with utility companies to harden electrical infrastructure, including trimming trees near power lines. Consider the costs and benefits of requiring that overhead power lines be buried in all new developments. Protect critical facilities and equipment from lightning damage by installing lightning protection devices.			
Criteria	**Evaluation**	**Cost**	**Benefit**
Social	This action will not unfairly affect any segment of the population, disrupt established neighborhoods, or adversely affect cultural resources.	0	2
Technical	This action is effective in avoiding or reducing future losses. It will not create more problems than it solves. It solves the problem rather than only a symptom. It will reduce the inconvenience from a shutdown of critical facilities resulting from power outages.	0	3
Administrative	Amherst has the capacity to implement this action. The Highway Department would be the responsible party to implement the tree trimming portion of this action. Each critical facility department head is responsible for implementing the installation of lightning protection devices. Community Development is responsible for considering the costs/benefits of burying power lines.	-1	2
Political	There is public support to implement and maintain this action. The political leadership is also willing to support it. Developers may not support this action if it significantly increases their costs.	-1	2
Legal	Amherst has the authority to implement this action. All applicable local and state laws will be followed.	0	2
Economic	The costs of installing lightning protection devices would be borne by the Town of Amherst. The cost of taking this action is significantly less than the potential costs of damage to critical electronics and facilities. Tree trimming costs may be borne by utility companies.	-1	2
Environmental	This action will not impact the environment.	0	0
Subtotal		**-3**	**13**
Total		**10**	
Priority		**2**	

Mitigation Action: Culvert and bridge capacity improvements at the following locations: • Boston Post Road between Simeon Wilson & Thornton Ferry Road II • Stearns Road between Veterans Road and Route 122 • Merrimack Road between Holt Road and Souhegan Ave			
Criteria	**Evaluation**	**Cost**	**Benefit**
Social	This action is compatible with present and future community values, including ensuring safe, reliable transportation. This action could be disruptive to residents living near construction. It may also affect property owners if easements are taken.	-1	3
Technical	This action solves the problem of bridge and roadway flooding.	0	3
Administrative (including responsible party)	Amherst has the capability to implement and maintain this action. Evaluations of roadways occur annually to ensure it is accomplished in a timely manner. The DPW is the responsible party.	-3	2
Political	There is public and political support to implement and maintain this action.	0	2
Legal	Amherst has the legal authority to implement this action and no enabling legislation is needed.	0	0
Economic (including direct cost)	This action is very costly to implement. It does fit into the existing Capital Improvements budget.	-3	3
Environmental	This action is beneficial to the environment by reducing flooding and road washout.	0	3
Subtotal		**-7**	**16**
Total		**9**	
Priority		**3**	

Mitigation Action: Improve stormwater drainage system capacity and flood control infrastructure. Consider costs and benefits of a variety of infrastructure upgrades, including stormwater pipe storage, stormwater ponds, stormwater tank storage, and culvert upsizing and realignment.			
Criteria	**Evaluation**	**Cost**	**Benefit**
Social	This action is compatible with present and future community values, including ensuring safe, reliable transportation. This action could be disruptive to residents living near maintenance operations if they lasted a significant length of time.	-1	3
Technical	This action solves the problem of bridge and roadway flooding.	0	3
Administrative (including responsible party)	Amherst has the capability to implement and maintain this action. Evaluations of roadways occur annually to ensure it is accomplished in a timely manner. The DPW is the responsible party.	-3	2
Political	There is public and political support to implement and maintain this action.	0	2

Legal	Amherst has the legal authority to implement this action and no enabling legislation is needed.	0	0
Economic (including direct cost)	This action is very costly to implement. It does fit into the existing Capital Improvements budget.	-3	3
Environmental	This action is beneficial to the environment by reducing flooding and road washout.	0	3
Subtotal		**-7**	**16**
Total		**9**	
Priority		**3**	

Mitigation Action: Revise and enforce floodplain, stormwater, and erosion control regulations to improve floodplain management in Amherst. Utilize site plan regulations to encourage permeable driveways and surfaces to reduce runoff and promote groundwater recharge.			
Criteria	**Evaluation**	**Cost**	**Benefit**
Social	This action would affect property owners in the floodplain and town owned land in the floodplain. It would have a positive social impact on the community by reducing flooding.	-2	2
Technical	This action helps solve the problem of flood related damage. It is effective in reducing future losses.	0	2
Administrative (including responsible party)	Amherst has the capability to implement this action. Revisions to regulations require a town vote and public hearing. Community Development is the responsible party for this action.	0	1
Political	There is public support for this action, though concerns exist among some property owners who would be directly impacted.	-1	2
Legal	Amherst has the legal authority to implement this action.	0	0
Economic (including direct cost)	Amherst recently received grant funding to update its stormwater regulations, so there would be no additional cost to the Town to complete this portion. Amherst could lose tax revenue from limiting development on floodplain land.	0	2
Environmental	This action has positive environmental impacts by encouraging erosion control and reduced floodplain development. It is consistent with community environmental goals.	0	2
Subtotal		**-3**	**11**
Total		**8**	
Priority		**4**	

Mitigation Action: Monitor water supply and drought conditions. Utilize NH Division of Forest and Lands reports to monitor drought indicators.			
Criteria	**Evaluation**	**Cost**	**Benefit**
Social	This action does not unfairly impact any segment of the population and it is compatible with present and future community values.	0	2
Technical	This action helps to solve symptoms of drought by making emergency response personnel and residents aware of current	0	1

	conditions. Monitoring alone has limited ability to reduce future loss—additional action is needed.		
Administrative (including responsible party)	The Fire Department is responsible for monitoring water supply and drought conditions. Fire, Police, and EMS are responsible for providing water in emergency situations. This requires some coordination, which is done through Code Red. Requests for water resources are made through the State Emergency Operations Center. CERT is responsible for water distribution.	-1	0
Political	There is public and political support for this action.	0	0
Legal	Amherst has the legal authority to implement this action.	0	0
Economic (including direct cost)	Monitoring costs are covered under the existing Fire Dept. budget. There are minimal costs for obtaining water in emergency situations, which are part of the DPW budget. Staff time to distribute water in emergency situations is provided by CERT on a volunteer basis.	0	3
Environmental	This action has a positive impact on the environment by providing the data needed to promote water conservation.	0	2
Subtotal		**-1**	**8**
Total			**7**
Priority			**5**

Mitigation Action: Work with property owners to elevate or remove loss structures from flood-prone areas to minimize future flood losses.			
Criteria	**Evaluation**	**Cost**	**Benefit**
Social	This action impacts people with structures in the floodplain. It does not unfairly affect any one segment of the population because participation is voluntary.	0	1
Technical	This action would avoid future losses due to flooding.	0	3
Administrative (including responsible party)	Amherst does have the capability to implement this action. The Community Development Dept. would be responsible for this action in cooperation with FEMA.	-1	2
Political	It is unclear whether there is public and political support for this action.	-1	1
Legal	There are no legal issues associated with this action. FEMA is responsible for purchasing properties. Amherst simply facilitates the process.	0	1
Economic (including direct cost)	FEMA covers the administrative costs associated with removing properties. Property owners are responsible for the costs of elevating properties. Amherst would see a loss of tax revenue from removing properties, however, emergency response costs would also decrease.	-2	1
Environmental	This action would reduce property damage and subsequent environmental impacts. It may also create additional open space in Town, depending on how the parcel was reused.	0	2
Subtotal		**-4**	**11**
Total			**7**

Priority		**5**

Mitigation Action: Establish mutual aid agreements with neighboring communities to address administering the NFIP following a major storm event.			
Criteria	**Evaluation**	**Cost**	**Benefit**
Social	There are no social impacts related to this action. It will not unfairly affect any segment of the population or disrupt established neighborhoods. It is compatible with present and future community values of working cooperatively with neighboring municipalities.	0	1
Technical	This action may reduce future losses by allowing Amherst to provide flood aid more quickly. It also helps the Town to know what resources are available for use in an emergency.	0	2
Administrative (including responsible party)	Amherst has the capability to implement this action and it can be accomplished in a timely manner. Police, Fire, and Public Works departments are each responsible for establishing their own agreements.	-1	1
Political	There is public support to implement and maintain this action and the Board of Selectmen is willing to support it.	0	1
Legal	Amherst has the legal authority to implement this action. No enabling legislation is necessary.	0	1
Economic (including direct cost)	The cost of mutual aid calls would be reimbursed by FEMA at 75% if the Town was responding to a declared disaster. This action could add costs for non-declared events. It would fall under contingency spending and is not included as a separate line item in department budgets.	-3	3
Environmental	This action has no negative environmental impacts. It could positively benefit the environment by improving floodplain management.	0	1
Subtotal		**-4**	**10**
Total			**6**
Priority			**6**

Section 4.4 ~ Implementing and Administering Mitigation Actions

The Town of Amherst has integrated its 2007 Hazard Mitigation Plan into a variety of other planning mechanisms, including the Amherst Emergency Response Plan, Pavement Improvement Plan, Evacuation Plan, Emergency Operations Plan, and Water Resources Plan.

In addition, the Town of Amherst has incorporated and will continue to integrate requirements of the Amherst Hazard Mitigation Plan Update 2015 into other planning mechanisms. For example, hazard assessments from the Amherst Hazard Mitigation Plan Update 2015 will be integrated into the Emergency Response Plan.

Updates to Amherst's Capital Improvement Plan will include any applicable mitigation projects identified in the Hazard Mitigation Plan, such as drainage improvements. The next update to the Town's Master Plan will also incorporate elements of the Hazard Mitigation Plan where applicable.

The Amherst Hazard Mitigation Team will be responsible for helping Town boards and departments to integrate the Hazard Mitigation Plan into their own planning mechanisms. The Hazard Mitigation Team developed Table 12, which is an action plan that outlines who is responsible for implementing the prioritized mitigation actions, how they will be funded, and when they will be completed.

Table 12—Implementation and Administration

Mitigation Action	Responsible Party	Cost & Funding	Timeframe
Conduct outreach and education programs to increase awareness of wildfire, tornado, hurricane, extreme temperatures, carbon monoxide risks, and severe winter weather. Utilize Code Red and community access TV.	Town of Amherst Emergency Management Committee and Public Safety Directors	Cost = $0 additional costs; percentage of existing $7,715 budget Funding Source: Town of Emergency Management budget	Anticipated start by December 2015. This action will be completed on an ongoing basis throughout the life of the plan.
Map and assess vulnerability to erosion. Conduct stream assessments and prepare fluvial erosion hazard zone maps.	NH Department of Environmental Services	Cost = $0 Funding Source: FEMA Pre-Disaster Mitigation Grant	Anticipated start by September 2014. Anticipated completion by March 2015.
Proactively enforce the International Building Code (IBC) and International Residential Code (IRC) to protect buildings and infrastructure from the impacts of severe winter weather, hurricanes, flooding, and earthquake.	Town of Amherst Community Development Department	Cost = $85,000 Funding Source: Town of Amherst Community Development budget *(source: Amherst Strategic Plan: Community Development 2013)*	Anticipated start by June 2016. This action will be completed on an ongoing basis throughout the life of the plan.
Reduce wildfire risk, including preventing or alleviating wildfires by proper separation of power lines as well as efficient response to fallen power	Town of Amherst Conservation Commission, Department of Public Works, and Community	Cost: $0 additional dollars power line maintenance; $0 additional hydrant maintenance; percentage of $255,850	Anticipated start by June 2015. This action will be completed on an ongoing

Mitigation Action	Responsible Party	Cost & Funding	Timeframe
lines; routinely inspecting the functionality of fire hydrants; and requiring and maintaining safe access for fire apparatus to wildland-urban interface neighborhoods and properties.	Development Department; Pennichuck; PSNH	Fire Department Operational Costs budget; $1,200 per tree for large tree removal Source: Pennichuck hydrant rental fee, PSNH utility fees, Town of Amherst Fire Dept. budget, Town of Amherst DPW budget	basis throughout the life of the plan.
Protect vulnerable populations from the impacts of extreme temperatures and severe winter storms by establishing shelters and cooling stations at designated municipal and school facilities.	Town of Amherst Fire Department	Cost = percentage of $7,715 Funding Source: Town of Amherst Emergency Management budget	Anticipated start by April 2015. This action will be completed on an ongoing basis throughout the life of the plan.
Protect power lines by working with utility companies to harden electrical infrastructure, including trimming trees near power lines. Consider the costs and benefits of requiring that overhead power lines be buried in all new developments. Protect critical facilities and equipment from lightning damage by installing lightning protection devices.	Town of Amherst DPW, Community Development Department, department heads in each critical facility	Cost = $1,200 per large tree for removal; $1,000-$5,000 per critical facility for lightning protection devices Funding Source: Amherst Operating budget for each department, Amherst DPW budget, Amherst Zoning Dept. budget	Anticipated start by May 2015. Anticipated completion by May 2017.
Culvert and bridge capacity improvements: • Boston Post Road • Stearns Road • Merrimack Road	Town of Amherst DPW	Cost: $630,000 per bridge Funding Source: 20% local match—Town of Amherst CIP; remaining 80% DOT State Bridge Aid grant	Anticipated start by January 2015. Anticipated completion by December 2017.
Improve stormwater drainage system capacity and flood control infrastructure. Consider	Town of Amherst DPW	Cost: $15,000 per year Funding Source: Town of Amherst CIP	Anticipated start by March 2015. Anticipated

Mitigation Action	Responsible Party	Cost & Funding	Timeframe
costs and benefits of a variety of infrastructure upgrades, including stormwater pipe storage, stormwater ponds, stormwater tank storage, and culvert upsizing and realignment.			completion by March 2017.
Revise and enforce floodplain, stormwater, and erosion control regulations to improve floodplain management in Amherst. Utilize site plan regulations to encourage permeable driveways and surfaces to reduce runoff and promote groundwater recharge.	Town of Amherst Community Development Department	Cost: $22,000 to combine, simplify, and update water resource ordinances; $29,300 to revise Wetlands & Watershed Protection Conservation District and Aquifer Conservation and Wellhead Protection District Funding Source: Community Planning Grant	Anticipated start by April 2015. Anticipated completion by March 2017.
Monitor water supply and drought conditions. Utilize NH Division of Forest and Lands reports to monitor drought indicators.	Town of Amherst Fire Department	Cost: $0 additional costs; percentage of existing $255,850 budget Funding Source: Amherst Fire Department Operational Costs budget	Anticipated start by August 2015. This action will be completed on an ongoing basis throughout the life of the plan.
Work with property owners to elevate or remove loss structures from flood-prone areas to minimize future flood losses.	FEMA in cooperation with Amherst Community Development Department	Cost = $0 direct costs to Town; percentage of $267,526 for coordination by Town Funding Source: FEMA, private property owners, Town of Amherst Zoning Dept. budget	Anticipated start by April 2017. This action will be completed on an ongoing basis throughout the life of the plan.
Establish mutual aid agreements with neighboring communities to	Town of Amherst Police, Fire, and Public Works	Cost: $0 additional cost to establish agreements;	Anticipated start by January 2015.

Mitigation Action	Responsible Party	Cost & Funding	Timeframe
address administering the NFIP following a major storm event.	Departments	percentage of $100,000 existing budget for response Funding Source: 75% FEMA reimbursement for response to federally declared disasters; 25% Town of Amherst Contingency Fund	Anticipated completion by October 2015.

CHAPTER 5. PLAN ADOPTION

Section 5.1 ~ Formal Adoption by Governing Body

CERTIFICATE OF ADOPTION

Town of Amherst, NH BOARD OF SELECMEN

A RESOLUTION ADOPTING THE TOWN OF AMHERST, NH HAZARD MITIGATION PLAN UPDATE 2015

WHEREAS, the Town of Amherst has historically experienced damage from natural hazards and it continues to be vulnerable to the effects of earthquake, extreme temperatures, flooding, fluvial erosion, hurricane/tropical storm, severe thunderstorm, severe winter weather, tornado, and wildfire, resulting in loss of property and life, economic hardship, and threats to public health and safety; and

WHEREAS, the Town of Amherst has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its Hazard Mitigation Plan Update 2015 under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held between November 14, 2013 and January 16, 2014 regarding the development and review of the Hazard Mitigation Plan Update **2015**; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedure for the Town of Amherst; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the Town of Amherst, with the effect of protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this Plan will make the Town of Amherst eligible for funding to alleviate the impacts of future hazards; now therefore be it

RESOLVED by the Amherst Board of Selectmen:

1. The Plan is hereby adopted as an official plan of the Town of Amherst
2. The respective officials identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;
3. Future revisions and Plan maintenance required by 44 CFR 201.6 and FEMA are hereby adopted as a part of this resolution for a period of five (5) years from the date of this resolution.
4. An annual report on the progress of the implementation elements of the Plan shall be presented to the City Council/Board of Selectmen by the Amherst Hazard Mitigation Team.

Adopted this day, the 6th **of** April, **2015.**

Dwight Brew

Dwight Brew, Chairman, Amherst Board of Selectmen

IN WITNESS WHEREOF, the undersigned has affixed his/her signature and the corporate seal of the Town of Amherst the 6th **of** April, **2015.**

Witness

Section 5.2 ~ FEMA Approval Letter

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

FEMA

JUL 28 2015

Dwight Brew, Chairman
Board of Selectmen
Town of Amherst
2 Main Street
P.O. Box 960
Amherst, NH 03031

Dear Mr. Brew:

Thank you for the opportunity to review the Town of Amherst, New Hampshire Hazard Mitigation Plan Update 2015. 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 Amherst 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,** or through your local floodplain administrator.

The Town of Amherst, New Hampshire Hazard Mitigation Plan Update 2015 must be reviewed, revised as appropriate, and resubmitted to FEMA for approval within **five years of the plan approval date of June 8, 2015** 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.

JUL 28 2015

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,

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
James O'Mara, Town Administrator, Amherst
Jill Longval, Senior Environmental Planner, NRPC

Enclosure