

TOWN OF LONDONDERRY, NEW HAMPSHIRE



Cohas Brook Mitigation Improvements, Completed 2014

HAZARD MITIGATION PLAN UPDATE 2015

TOWN OF LONDONDERRY NEW HAMPSHIRE

HAZARD MITIGATION PLAN UPDATE 2015

Prepared by the Southern New Hampshire Planning Commission

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2015 Londonderry Hazard Mitigation Plan Update Committee (HMPUC) Members

- Al Sypek - Chair, Hazard Mitigation Plan Update Committee (HMPUC),
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Preface

Hazard mitigation planning is a relatively new field, spearheaded by the Federal Emergency Management Agency (FEMA) during the 1990s after Hurricane Andrew caused more than \$20 billion in damage across several southern states. That event resulted in 54 fatalities and the disruption of millions of lives. The Disaster Mitigation Act of 2000, developed by FEMA, was intended to help both communities and states prepare for, and deal with, such disasters. While New England normally does not have hurricanes of Andrew's magnitude, this area does experience many types of natural disasters that cost both lives and money.

These disasters and other natural hazards occur during all four seasons in the Northeast: winter ice, snow, and nor'easters; spring flooding; summer downbursts and thunderstorms; and fall hurricanes. Planning to make a community *disaster-resistant* before these events occur can help save lives as well as homes and infrastructure. FEMA has several programs designed to strengthen the nation's disaster resistance by reducing risks, and changing conditions and behaviors before a disaster in order to protect lives and prevent the loss of property.

FEMA has also raised its budget to upgrade the existing Flood Insurance Rate Maps through the Map Modernization project. Many communities have outdated maps that do not reflect the true extent of flooding potential.

A community's eligibility for hazard mitigation funding depends upon its having adopted a hazard mitigation plan that addresses these issues. Mitigation measures contained within the *Londonderry Hazard Mitigation Plan* Update 2015 may be sufficient to receive grant funding.

This document analyzes hazards in Londonderry and forecasts where potential disasters might occur in order to reduce their impact on people and the community.

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**Town of Londonderry, New Hampshire
Hazard Mitigation Plan
Executive Summary**

The *Londonderry Hazard Mitigation Plan Update 2015* has been developed to help Londonderry become a disaster-resistant community by taking measures to reduce future losses from natural or man-made hazardous events before they occur. The Londonderry Hazard Mitigation Committee (HMPUC), made up of community members and town officials, developed the plan.

Natural hazards are addressed as follows:

- | | | |
|-------------|------------------------|-------------------|
| A. Flooding | C. Fire | E. Seismic Events |
| B. Wind | D. Ice and Snow Events | F. Other Hazards |

The Londonderry Hazard Mitigation Committee identified critical facilities, areas at risk, commercial economic impact areas, and hazardous materials facilities.

Critical Facilities:

- Town Offices
- Federal Facilities
- Post Offices
- Police and Fire Stations
- Emergency Operations Centers
- Military Stations
- Public Works Garages
- Emergency Fuel Facilities
- Emergency Shelters
- Airport and Related Facilities
- Wireless Communication Facilities and Radio Towers
- Public Water Systems, Pumps and Booster Stations
- Water Storage Tanks
- Sewer Systems and Pumps
- Electrical Power Substations
- Gas Pump Stations

Areas at Risk:

- Solid Waste and Recycling Facilities
- Telephone Facilities
- Media Communications
- Major Roads and Bridges
- Dams
- Historic Properties
- Libraries
- Schools
- Child Care Facilities
- Senior Housing and Nursing Homes
- Hotels
- Recreation Areas
- Commercial Resources
- Medical Facilities
- Religious Facilities

Existing Hazard Mitigation Strategies

The Londonderry Hazard Mitigation Plan Update Committee identified existing strategies related to hazard mitigation that had been reported in the adopted 2010 Plan. Committee members reviewed each strategy and assigned an effectiveness rating according to the following scheme:

Rating

Poor... The policy, plan or mutual aid system does not work as it should and often falls short of meeting its goals.

Fair... The policy, plan or mutual aid system does not work as well as it should and sometimes fails short of meeting its goals.

Good... The policy, plan or mutual aid system works very well and is achieving its goals.

Excellent... The policy, plan or mutual aid system works and often exceeds its goals.

Strategy

Emergency Operations Plan (EOP) - **Good**

Floodplain Development Ordinance (Zoning Ordinance) - **Good**

Elevation Certificates - **Good**

Conservation Overlay Districts (Zoning Ordinance) - **Good**

Airport Zoning Regulation and Noise Overlay Zoning (Zoning Ordinance) - **Good**

Manufactured Housing (Zoning Ordinance) - **Good**

Steep Slopes (Zoning Ordinance) - **Good**

Londonderry Building Codes (Chapter V, Zoning Ordinance) - **Good**

Excavation Regulations - **Good**

Stormwater Regulations - **Good**

Erosion, Drainage, and Flood Control (Subdivision and Site Plan Regulations) - **Good**

Road Design Standards (Subdivision and Site Plan Regulations) - **Good**

Snow Emergency Regulations - **Good**

Fire Codes - **Good**

Hazardous Materials Regulations - **Good**

Town Radio System - **Fair** - Committee members noted that dead zones exist in some areas of Town

Police - **Good**

Manchester Water Works Emergency Operations Manual - **Excellent**

Pennichuck Water Works Londonderry Water Supply System Emergency Response Plan - **Good**

State Dam Program - **Good**

New Hampshire Shoreland Water Quality Protection Act, formally Comprehensive Shoreland Protection Act - **Good**

Best management Practices - **Good**

*Open Space Protection Plan*¹ - **Good**

¹ New Strategy Added in 2015 Update by direction of the editor.

Existing and New Mitigation Programs and Policies

The Committee carried forward four mitigation actions from the 2010 Plan and identified two new hazard mitigation actions for the update horizon, as follows:

Existing Actions

- Update the Schools Emergency Plan.
- Multiple educational public outreach campaign projects --- publish and distribute educational materials for residents of flood prone areas outlining disaster preparedness, response, and supply flood proofing/mitigation information to protect their property from flood damages.
- Develop a Local Sheltering Plan.
- Extend public water.

New Actions

- Construct fire lanes in the Musquash Conservation area.
- Improve radio communications through upgraded capabilities to repeater or microwave links.

Plan Monitoring

The Londonderry HMPUC will review the Londonderry Hazard Mitigation Plan, Update 2015 on an annual basis and will update the plan on a five-year cycle. The next review will be during 2016 with an update in 2020.

Plan Implementation

The 2010 Plan was incorporated into the 2013 Comprehensive Master Plan, which calls for continuing updates. Through its tenure, the local Hazard Mitigation Plan also served to inform and raise the priority level for recently completed mitigation projects including the purchase of generators to support the local emergency shelters, improvements to Auburn Road to mitigate recurring flooding and elevating homes on Brookview Drive, also to mitigate recurring flooding. The Town will continue to utilize this process to generate ideas and strategies for hazard mitigation. As a result of this process, the Town has already taken early steps to review implementation of fire roads in the Musquash Conservation Area, as recommended in this plan update.

SECTION I INTRODUCTION

"Plans are worthless. Planning is essential." –Dwight D. Eisenhower

Natural Hazards and Their Consequences

During the past decade, the United States has suffered a record number of natural disasters. In 1992, Hurricane Andrew caused an estimated \$25 billion in damage. The 1993 Midwest floods resulted in some \$12-\$16 billion in damage. The 1994 Northridge earthquake caused \$20 billion in damage, and the 2002 summer flooding in central Texas is expected to top \$1 billion in damage. In New England, more than 100 natural disasters during the past quarter century have been sufficiently catastrophic to be declared "disaster areas" by the president, making them eligible for federal disaster relief. That is about four major disasters per year. Nine out of ten of these disasters were the result of flooding. Much of this damage might have been averted with the implementation of foresighted hazard mitigation efforts.

Floods, tornados, winter storms, hurricanes, earthquakes, and wildfires – natural disasters – are part of the world around us. Their occurrence is inevitable. These events can wreak havoc on the natural environment by uprooting trees, eroding riverbanks and shorelines, carving new inlets, and blackening forests. Yet, the natural environment is amazingly resilient, often recuperating in a matter of days or weeks.

When these events strike the man-made environment, however, the result is often more devastating. Disasters occur when a natural hazard crosses paths with elements of the man-made environment, including buildings, roads, pipelines, or crops. When hurricanes tear roofs off houses, it is a disaster. When tornados ravage a town, it is a disaster. When floods invade low-lying homes, it is a disaster. If only undeveloped wetlands and floodplains are flooded, rather than homes and businesses, few take notice. The natural environment takes care of itself. The fabricated environment, in contrast, often needs some emergency assistance.



Cohas Brook at Auburn Road

What Is Hazard Mitigation?

Hazard mitigation is any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards (44 CFR 201.2). Hazard mitigation activities may be implemented prior to, during, or after an event. However, it has been demonstrated that hazard mitigation is most effective when based on an inclusive, comprehensive, long-term plan that is developed before a disaster occurs.² It includes both structural interventions, such as flood control devices, and nonstructural measures, such as avoiding construction in the most flood-prone areas. Mitigation includes not only avoiding the development of vulnerable sections of the community, but also making existing development in hazard-prone areas safer. For example, a community could identify areas that are susceptible to damage from natural disasters and take steps to make these areas less vulnerable. It could also steer growth to less risky areas. Keeping buildings and people out of harm's way is the essence of mitigation.

Mitigation should not be seen as an impediment to growth and development. On the contrary, incorporating mitigation into development decisions will result in a safer, more resilient community, one that is more attractive to new families and businesses.

Why Develop a Hazard Mitigation Plan?

The full cost of the damage resulting from natural hazards—personal suffering, loss of lives, disruption of the economy, and loss of tax base—is difficult to measure. New Hampshire is subject to many types of natural disasters: floods, hurricanes, nor'easters, winter storms, earthquakes, tornadoes, and wildfires, all of which can have significant economic and social impacts. Some, such as hurricanes, are seasonal and often strike in predictable locations. Others, such as floods, can occur any time of the year and almost anywhere in the state.

² FEMA *Local Mitigation Plan Review Guide*. October 1, 2011.

Benefits of Hazard Mitigation

Hazard mitigation offers many benefits for a community. It can:

- **Save lives and property.** A community can save lives and reduce property damage from natural hazards through identifying risks and taking action, such as elevating structures in the floodplain.
- **Reduce vulnerability to future hazards.** By having a mitigation plan in place, a community is prepared to take steps that will permanently reduce the risk of future losses. This opportunity is often lost when we build our communities without regard to natural hazards, or when we rebuild them after a disaster “just like they were before.” While it is natural to want to return things to the way they were, it is important to remember that, in many cases, the disaster would not have been as severe if a mitigation plan had been implemented.
- **Facilitate post-disaster funding.** By identifying and ranking recovery projects before the next disaster, a community will be in a better position to obtain post-disaster funding because much of the background work necessary for applying for federal funding will already be completed.
- **Speed recovery.** By developing a mitigation strategy, a community can identify post-disaster mitigation opportunities in advance of a disaster and be ready to respond quickly after a disaster.

Background: Londonderry Hazard Mitigation Planning

While FEMA requires a jurisdiction to have a local mitigation plan as a condition of receiving federal assistance, FEMA does not have a mandate for all local governments in NH to establish hazard mitigation plans. With funding from FEMA, the NH Department of Safety, Division of Homeland Security Emergency Management (HSEM) provided funding to the Southern New Hampshire Planning Commission to develop a local hazard mitigation plan for the Town of Londonderry. In order to satisfy the planning requirements of the Disaster Mitigation Act (DMA) of 2000, the Plan was initially developed in 2004, and has been updated and resubmitted to FEMA for approval every five years.

Plan	Adopted	FEMA Approval Date
Town of Londonderry Hazard Mitigation Plan (Original)	April 14, 2004	May 26, 2004
Town of Londonderry Hazard Mitigation Plan Update 2010	April 22, 2010	October 1, 2010
Town of Londonderry Hazard Mitigation Plan Update 2015	(Date)	(Date)

Purpose

The *Londonderry Hazard Mitigation Plan Update 2015* serves as a strategic planning tool for use by the Town of Londonderry in its efforts to reduce future losses from natural or man-made hazardous events before they occur. In addition, this plan may constitute an updated Chapter of the Londonderry Master Plan, as articulated in NH RSA 674:2, III e).

Authority

This Hazard Mitigation Plan was prepared in accordance with the Town of Londonderry Emergency Operations Plan, effective May 2010, under the authority of the Planning Mandate of Section 409 of Public Law 93-288 as amended by Public Law 100-707, the Robert T. Stafford Act of 1988, and the Disaster Mitigation Act of 2000. The *Londonderry Hazard Mitigation Plan Update 2015* will be referred to as the "*Plan*." After a public hearing was held at the Londonderry Town office on (Date) Londonderry Town Council formally adopted this *Plan* on (Date). Documentation of the adoption of this *Plan* is provided in Appendix H.

Scope of the Plan

The scope of the *Londonderry Hazard Mitigation Plan Update 2015* includes the identification of natural hazards affecting the Town, as identified by the Londonderry Hazard Mitigation Plan Update Committee (HMPUC). The committee reviewed hazards in the following categories as outlined in the *State of New Hampshire Multi-Hazard Mitigation Plan Update 2013*:

- A. Flooding (including hurricanes, 100-year floodplain events, debris-impacted infrastructure, erosion, mudslides, rapid snow pack melt, river ice jams, and dam breach or failure)
- B. Wind (including hurricanes, tornadoes, nor'easters, downbursts, and lightning)
- C. Fire (including grass fires, wild fires and issues such as isolated homes and residential areas)
- D. Ice and snow events (including heavy snowstorms, ice storms, nor'easters, and hailstorms)

- E. Earthquakes (including landslides and other geologic hazards related to seismic activity)
- F. Other events, such as radon and drought.

Plan Update Methodology

In late 2014, the Londonderry Hazard Mitigation Plan Update Committee (HMPUC) was formed to begin updating the plan. The Update Committee used the nine-step planning process included in the *Local Mitigation Planning Handbook*, prepared by FEMA, March 2013. Each section of the plan was reviewed and updated according to new information and the events of the past five years. The Update Committee consisted of representatives from various local agencies, including the Londonderry Community Development Department, Fire Chief / Emergency Management Director, Police Department, Public Works Department, and Londonderry Planning Board. The Committee held a total of six public meetings beginning in January 2015 and ending in July 30, 2015 to collect information, compile the plan update, and review the draft contents.

Town of Londonderry 2015 Hazard Mitigation Committee Members

- | | |
|-------------------|---|
| Al Sypek | - Chair, Hazard Mitigation Plan Update Committee (HMPUC), Planning Board Member Town of Londonderry |
| James Roger | - Battalion Chief, Londonderry Fire Department |
| John Vogl | - GIS Manager/Comprehensive Planner, Planning and Economic Development Department, Town of Londonderry |
| Tim Jones | - Lieutenant, Londonderry Police Department |
| John R. Trottier | - Assistant Director of Public Works and Engineering, Department of Public Works, Town of Londonderry |
| Richard G. Canuel | - Senior Building Inspector/ Health Officer, Zoning Administrator, Code Enforcement Officer, Building and Zoning Enforcement, Town of Londonderry |

Public Involvement, Public Outreach Process and Public Committee Meetings

On the following dates, the Londonderry Hazard Mitigation Plan Committee held public meetings at the Londonderry Town Offices: January 30, 2015, February 26, 2015, March 26, 2015, April 30, 2015, May 28, 2015 and July 30, 2015. All of the Committee's meetings were posted in two public places as required by New Hampshire state law, and in addition on the Town website, Cable Access Channel, Town Offices and the Town Library SNHPC sent a press release to the media informing them of each HMPUC meeting. A member of the local media (Kaitlyn G. Woods, Reporter for the Londonderry Times) attended the last two HMPUC meetings. Southern New Hampshire Planning Commission (SNHPC) staff facilitated each meeting and prepared an agenda, attendance sheet and

minutes, which were then distributed to the committee and made available for public review on the town website and upon request.

A complete Draft Londonderry HMP, Update 2015 was posted to the Town website and hardcopies made available at the Town library and Town Offices. Public input for the draft plan was solicited via public notices at the Town Hall and Town library, on the Town website and local access television station (see Appendix G). The Town informed the abutting municipalities of the HMP Update 2015 process and invited comments.

On June 23, 2015, the Chair of the HMPUC along with the Town Planner, Assistant Public Works Director and SNHPC consultant participated in an hazard mitigation informational session on Londonderry Access Center (local cable TV) regarding the HMP planning process. Londonderry Access Center carried the show in late June, July and August during the public comment period. The Town established a page on its website for the Hazard Mitigation Committee.

See

http://www.londonderrynh.org/Pages/LondonderryNH_BComm/hazard/index

Committee Members, Al Sypek and John Vogl provided an overview of the plan process and recommendations at the October 27, 2015 Londonderry Conservation Commission meeting. The Conservation Commission established a subcommittee to consider fire roads in the Musquash Conservation Area as recommended by this plan. Both will provide a similar update to the Town's Planning Board in December, 2015. No other public comment was received prior to the Town submitting this Plan to FEMA for review.

Coordination with Other Agencies and Individuals

The HMPUC members and their respective Town Departments contributed to the HMP Update 2015 by including updated information and by reviewing the *Plan* drafts. Departments represented were:

- Building Department
- Fire Department / Emergency Management
- Planning and Economic Development Department
- Police Department
- Public Works and Engineering

Comprehensive Planner and HMPUC member John Vogl invited the following individuals and agencies to review and comment on the *Plan*.

- Conservation Commission
- Londonderry Elder Affairs
- Londonderry Town Council

- Manchester Airport
- Londonderry School Department
- SE HazMat Mutual Aid District
- Manchester Water Works
- Pennichuck Water Works
- Londonderry Planning Board

The abutting communities including the City of Manchester and Towns of Auburn, Derry, Hudson, Litchfield, and Windham were informed when a draft Plan was available for their review and comment. The HMPUC did not receive comments from abutting communities. In addition a copy of the Plan was available at the Town Clerk's Office, Town Planning Department, and SNHPC office, for public review and comment. The draft Plan was posted on the Londonderry Town website and a notice was provided at the Town Hall and SNHPC office. Documentation of the public process and solicitation of comments from both the public and outside agencies may be found in Appendix G. HMPUC members also produced a brief video that was broadcast on the local cable access channel and has been made available online. This video alerted the public to contact the SNHPC with any comments or questions. In the month of March, Town staff produced an article on the hazard mitigation planning process that was included in the Town's monthly newsletter. The article provided an overview of the Plan and provided contact information to the public.

Review and Incorporation of Existing Plans and Studies

The planning process included a complete review of the 2010 Hazard Mitigation Plan. Each section of the 2010 Plan was reviewed and updated according to new information and the events of the past five years. Each element of the old plan was examined and revised to reflect current conditions. In addition, referring to the 2010 Plan, Committee members were able to reassess strategies from the past and to improve upon mitigation strategies for the future. The Town's 2010 Emergency Operations Plan (update anticipated 2016) was also reviewed and considered throughout the process in the development of the 2015 HMP.

The 2010 *Londonderry Emergency Operations Plan* states in part:

The Comprehensive Hazard Analysis shows that the community could be subjected to the damaging effects of several hazards. Various programs are available to prevent or lessen these effects through mitigation. In order that these mitigation programs be effective, certain regulations and/or ordinances must be enacted by the community and must be accomplished during a pre-crisis period.

The citizens would be receptive to initiating mitigation programs when the potential benefits are properly explained. Private

companies, which might present potential hazards to the community, would cooperate with officials to plan for mitigating these hazards. (Town of Londonderry, EOP 53)

State of New Hampshire Legislation Related to Master Plans

In 2002, the State of New Hampshire adopted legislation related to master plans that requires municipalities to "provide more definitive guidance in planning and managing future growth." This new legislation allows a natural hazards section to be considered during the master planning process and incorporated into the master plan.. This legislation, *RSA 674:2 Master Plan; Purpose and Description*, reads:

The Master Plan may also include the following sections:

...(e) A natural hazards section which documents the physical characteristics, severity, frequency, and extent of any potential natural hazards to the community. It should identify those elements of the built environment at risk from natural hazards as well as extent of current and future vulnerability that may result from current zoning and development policies.

The 2010 Plan was incorporated into the 2013 Comprehensive Master Plan, which calls for continuing updates. The Londonderry Hazard Mitigation Plan Update 2015 may serve as a new section of a future Comprehensive Master Plan, when the Town enacts such a Plan.

Plan Development Steps

To complete this *Plan*, the Londonderry Hazard Mitigation Committee followed 10 planning steps during six committee meetings.

Step 1: Map the Hazards

Committee members identified areas where damage from natural disasters had previously occurred, areas of potential damage, and man-made facilities and other features that were at risk for loss of life, property damage, and other risk factors. Base maps provided by SNHPC were used in the process. A summary map illustrating hazard zones, as identified by the Londonderry Hazard Mitigation Committee, is presented at the end of Section II.

Step 2: Determine Potential Damage

Committee members identified facilities that were considered to be of value to the Town for emergency management purposes, for provision of utilities and services, and for historic, cultural, and social value. The assessed value was noted for each facility, as well as its proximity to the hazard zones. Summary tables of assets in each hazard zone are located in Section III.

Step 3: Identify Plans and Policies Already in Place

Using information and activities outlined in the handbook *Local Mitigation Planning Handbook*, FEMA, March 2013, the HMPUC and SNHPC staff identified

existing mitigation strategies and ordinances related to flood, wind, fire, ice and snow events, earthquakes, and other hazards that are already being implemented by the Town. The HMPUC reviewed the State of NH Multi-Hazard Mitigation Plan, Update 2013, the Londonderry Comprehensive Master Plan, March 2013, the proposed Woodmont Common PUD, 2014 among others. A summary chart is presented in Section IV.

Step 4: Identify the Gaps in Protection and Mitigation

Existing strategies were reviewed for coverage, effectiveness, and implementation, as well as need for improvement. A summary chart and the results of these activities are presented in Section IV. Additionally, the Committee brainstormed what past and potential hazards are not protected by existing mitigation efforts. A list of these future mitigation strategy objectives can be found at the beginning of Section V.

Step 5: Determine Actions to be Taken

During a brainstorming session, the Committee developed a list of other possible actions and strategies to improve Londonderry's response to hazardous events. Ideas put forth included culvert replacements, public education programs, and road improvements, among many other programs. New strategies were developed to respond to the mitigation gaps and identified future mitigation strategy objectives. These new strategies are shown in Section V.

Step 6: Evaluate Feasible Options

The Committee reviewed each of the hazard mitigation actions and strategies that were identified in the brainstorming session using the evaluation charts from Chapter 2 of FEMA's *Developing the Mitigation Plan*. Fourteen evaluation factors (based on the STAPLEE criteria) were used to evaluate feasible actions. Each mitigation action was then scored individually by five committee members and all scores were averaged and totaled for each strategy. The results of this analysis are shown in Section V's Preliminary Prioritization. A description of the STAPLEE criteria and scores is found in Appendix E.

Step 7: Determine Priorities

The Committee reviewed the preliminary prioritization list in order to make changes and determine a final prioritization for hazard mitigation actions. The priorities can be found at the end of Section VI, in the Implementation Strategy.

Step 8: Develop Implementation Strategy

Using the chart provided under Step 9 in the handbook, the Committee created an implementation strategy that includes department(s) responsible for implementation, a schedule for completion, and a funding source or technical assistance source for each identified hazard mitigation action. Additionally, the Committee reviewed the estimated cost of each project. The implementation strategy can be found in Section VI.

Step 9: Coordinate with Other Agencies/Entities

The Londonderry Community Development Department contacted agencies with expertise in hazard mitigation or missions related to any of the mitigation strategies identified herein. A copy of the draft *Plan* was made available to these agencies for their review and comments. Additionally, the *Plan* was made available to the public at three locations for review. A listing of these agencies can be found in the previous pages of this section.

Step 10: Adopt and Monitor the Plan

SNHPC staff compiled the results of Steps 1 to 9 in a draft document, as well as helpful and informative materials from the *State of New Hampshire Natural Hazard Mitigation Plan*. The HMPUC reviewed, revised, and approved a draft of the *Londonderry Hazard Mitigation Plan Update 2015*. After FEMA approval was received, a revised draft document was then submitted to the Londonderry Town Council for its review. The *Plan* shall be reviewed on an annual basis to be certain the goals and objectives are being met, and the policies are being adopted. Section VII of the *Plan* details the adoption and monitoring requirements.

"... [M]itigation works. The Seattle-Tacoma area did not suffer significant losses [following the February 28, 2001, earthquake] because 20 to 30 years ago local leaders invested in its future by passing building codes and issuing municipal bonds that implemented solid protective measures."

—Joe Allbaugh, Director of FEMA, Congressional testimony, May 16, 2001

Hazard Mitigation Goals of the Town of Londonderry

The *Town of Londonderry Hazard Mitigation Plan Update 2015*, prepared by the SNHPC and the LHNC is maintained by the Londonderry Planning Department. The Plan identifies the following hazard mitigation goals:

1. To improve upon the protection of the general population, citizens and guests of the Town, from all natural and man-made hazards.
2. To reduce the potential impact of natural and man-made disasters on the Town's Critical Support Services and Critical Facilities.
3. To reduce the potential impact of natural and man-made disasters on the Town's infrastructure.
4. To improve the Town's Emergency Preparedness, Disaster Response and Recovery Capability.
5. To reduce the potential impact of natural and man-made disasters on private property.
6. To reduce the potential impact of natural and man-made disasters on the Town's economy.
7. To reduce the potential impact of natural and man-made disasters on the Town's natural environment.
8. To reduce the Town's liability with respect to natural and man-made hazards generally.
9. To reduce the potential impact of natural and man-made disasters on the Town's specific historic treasures.
10. To identify, introduce and implement cost effective Hazard Mitigation measures so as to accomplish the Town's Goals.
11. To address the challenges posed by climate change as they pertain to increasing risks in the Town's infrastructure and natural environment.
12. Provide information and resources to residents of Londonderry so that they can become more resilient to hazards that impact the Town's critical support services, critical facilities, infrastructure, economy, environment, historical and cultural assets and private property.

At its March 26, 2015 meeting the HMPUC adopted the above goals, derived from the State of New Hampshire Multi-Hazard Mitigation Plan, Update 2013.

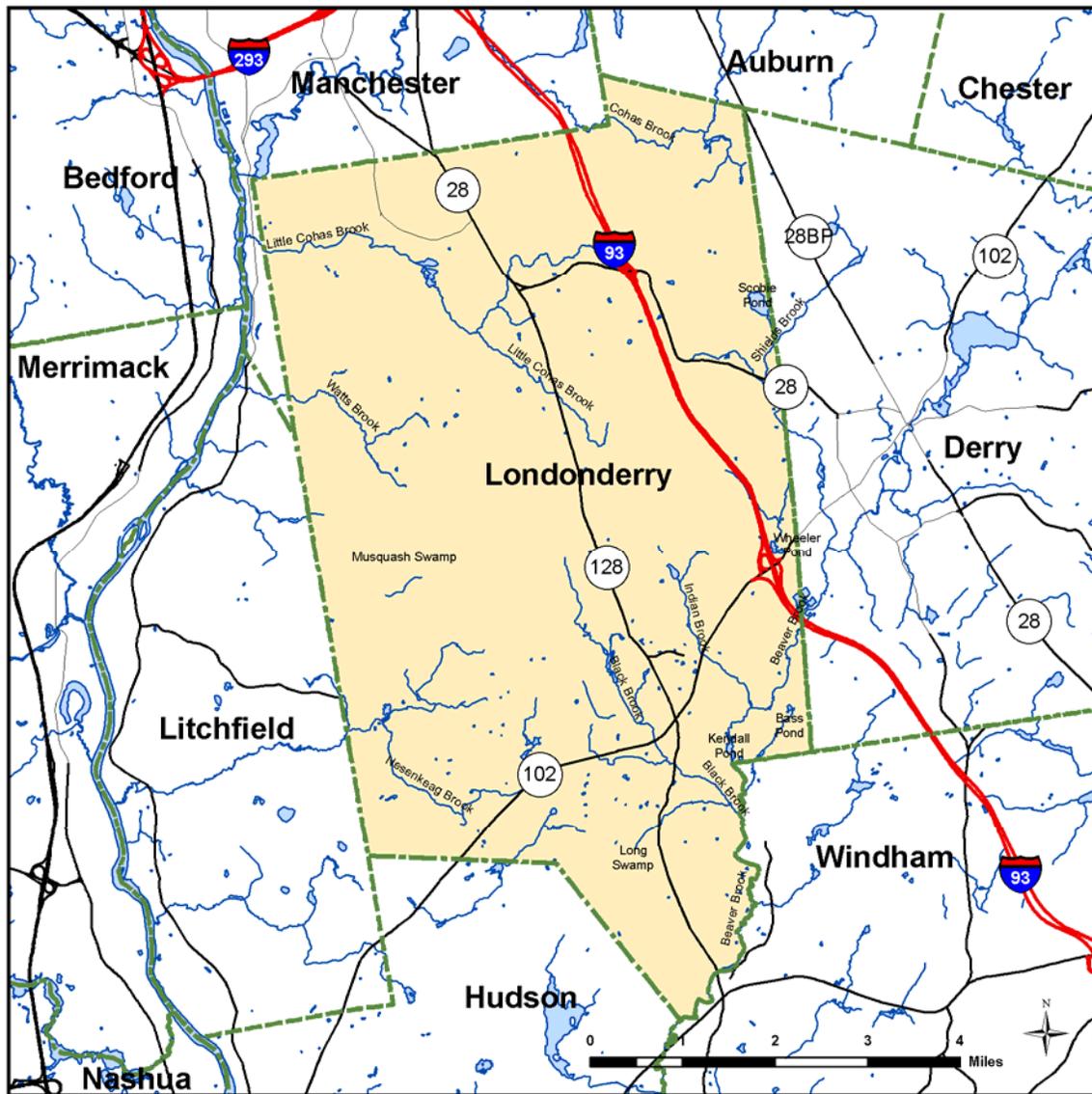
More specific objectives, established after the Committee's analysis of past and potential hazards and review of existing mitigation strategies, may be found at the beginning of Section V: Newly Identified Mitigation Strategies and Critical Evaluation.

SECTION II

HAZARD IDENTIFICATION

Location, Population, Topography, and Climate

The Town of Londonderry is located in the south-central portion of the State of New Hampshire in Rockingham County. Londonderry is bordered by the City of Manchester to the north; the towns of Derry and Windham to the east; the Town of Hudson to the south; and the Town of Litchfield to the west. It is located 30 miles south of the City of Concord and about eight miles north-east of the City of Nashua. U.S. 93, along with N.H. Routes 128, 28, and 102 provide primary highway access to the Town.



Location Map of Londonderry, New Hampshire

Londonderry is situated in the seaboard lowland section of New Hampshire "on a southeast-sloping plain which has been greatly modified by Pleistocene

glaciation." The area is typified by ice-carved bedrock hills, where the northwest slopes are thickly covered with till and southeast slopes thinly covered. The valleys are characterized by stratified and unstratified material, consisting of silt, sand and gravel deposited by the meltwaters of a retreating glacial ice sheet. Additionally, there are glacial kettle holes and swampy areas that serve as the headwaters for the many streams in the area. Elevation ranges from approximately 150 feet near the Merrimack River, at the northwest corner of the Town, to 523 feet on a hilltop near Hardy Road and the Eversource (formerly PSNH) right of way. (FEMA, FIS 6)

The major watercourse flowing through Londonderry is Beaver Brook, which flows from Auburn, Chester, and Derry before entering southeastern Londonderry, emptying into Kendall Pond, then forming the town boundary with Windham. Other major brooks in Londonderry are Black Brook, a tributary of Beaver Brook; Little Cohas Brook and Watts Brook to the northwest; Cohas Brook and Shields Brook to the northeast; Nessenkeag Brook to the southwest; and Indian Brook to the southeast. Water bodies of significance include Scobie Pond and Wheeler Pond along the eastern town line and Kendall Pond to the southeast of Town. Additionally, there are two swamps, Musquash Swamp, the most notable, and Long Swamp. (Ibid 5)

The climate of Londonderry is typical of southern New Hampshire, with warm summers and cool winters. Temperatures during the month of July range from an average high of 82.1 degrees Fahrenheit to an average low of 54.6 degrees. January temperatures range from an average high of 32.3 degrees to an average low of 5.2 degrees. Prolonged periods of severe cold are rare. Annual average precipitation is 39.82 inches. (Golden Gate Weather Services)

Current Land Use Development Trends in Londonderry

The Town of Londonderry, New Hampshire is located in Rockingham County within the Southern New Hampshire Planning Commission Region and is nestled among broad expanses of open spaces. Originally a rural agricultural community, Londonderry experienced extreme growth in the 1980s, making it the suburban community that it is today, with a mix of low-density residential neighborhoods, auto-oriented retail, and a strong office and industrial presence. With a population of 24,129, the Town is the third largest in the Southern New Hampshire region and functions as a suburban bedroom community for Manchester and Boston, with almost 80% of residents commuting out for work.

Londonderry is a transportation hub within the Golden Triangle formed by I-93, I-293/NH 101, and the Everett Turnpike, all converging on the Manchester-Boston Regional Airport. Interstate 93 connects Londonderry to Boston, located 45 miles to the south and Manchester, located just 10 miles north.

Londonderry is within a practical commuting distance (30 minutes) of approximately 750,000 people and beyond that, has easy access to the City of Boston and the I-495 corridor. Its prime geographic location affords access to employment, health, education, and commercial resources provided by the greater Boston metropolitan area.

Besides providing convenient access for commuters, Londonderry benefits from the presence of Manchester-Boston Regional Airport, and has the only large area of undeveloped land around the airport. How this land is used in the future is critical to the Town and region. In addition to the airport, there is also a proposal to extend passenger rail service from Boston, Massachusetts through Nashua and Manchester.

Londonderry remains a growing community, with both residential and non-residential growth advancing at a rapid rate. Over the last five years, since the adoption of the 2010 Hazard Mitigation Plan, the Town experienced a rapid slowdown in development commensurate with the national economic recession, however construction and approvals have recently accelerated and projects that were once shelved are beginning to be realized. Most significantly, the recent (2014-15) construction of Pettengill Road has opened up a large area of prime industrial land immediately south of the MBRA for active development. In 2014, the Town saw the construction of the 600,000ft² UPS/Pratt & Whitney and the 400,000ft² FedEx distribution facility.

There remains a large area of vacant property for future projects. As improvement to I-93 are proceeding, commercial development has accelerated in the Route 28 Corridor including development of a new travel center, service station and completion of the NH DOT Park n Ride and bus terminal. As improvements to Exit 5 are nearing completion, the Town will see construction efforts get underway at Exit 4 in the near future. On the residential side, the Town has approved two new workforce housing projects that will add roughly 300+ new apartments including 200+ workforce units. Also on the residential side, housing for the over 55 community remains strong, with approved projects building out to completion. Since the 2010 Plan, the Town has approved the Planned Unit Development Master Plan for Woodmont Commons. This plan will guide development of a mixed use community in the vicinity of Exit 4 that will incorporate housing, commercial and development types not currently present in Londonderry. Full build out of the community will likely occur over the long term (20+ year) horizon.

On March 6, 2013, the Planning Board adopted a new Comprehensive Master Plan for the Town. This plan, drafted by the Master Plan Steering Committee, identified a new direction and implementation strategy for the town to develop within its new vision statement:

Londonderry is a close-knit, vibrant community, set in a landscape of protected forests and farms, that provides its residents, families and businesses with efficient services, inviting public spaces, a top-tier school system, and diverse options for housing, recreation, and transportation. These qualities attract knowledge-oriented businesses drawn to Londonderry's educated work force, access to commercial transport, and superior quality of life.

This Vision Statement led to community goals and the following six Guiding Principles:

- Stay Forever Green
- Promote Unique Activity Centers
- Emphasize Housing Choice and Diversity
- Increase Transportation Choice and Walkability
- Enhance the Municipal Advantage
- Excel in Education and Town Services

The 2013 Comprehensive Master Plan contains a Hazard Mitigation chapter that restates the goals of the 2010 Hazard Mitigation Plan and calls for an update. The Master Plan also notes an expressed need for information/notification of hazard events. Master Plan recommendations relative to hazard mitigation include reviewing flood regulations, reducing impervious surfaces and updating regulations regarding protective buffers/open spaces for stormwater retention, as part of an overall zoning update.

An Implementation Committee has been established to monitor the status recommendations and ideas that resulted from the plan. The Town has since taken the initiative to conduct an audit of its local land use regulations, which will serve as the basis for updating the codes. At the 2014 Town Meeting, voters approved funding to support a zoning overhaul.

The existing Londonderry Zoning Ordinance (LZO), Floodplain Development Ordinance, Stormwater Management Regulations, and Subdivision and Site Plan Regulations all work to minimize the impacts, if not eliminate, any development in the flood and steep slope hazard areas. Within the floodplain district, no new development is allowed, without a variance, which would increase flood levels during the occurrence of a 100-year flood event. Steep slopes in excess of 25 percent in residential zones and 33 percent in the Performance Overlay District are determined to be unsuitable for development. The Stormwater Regulations require that the post-development run-off rate not exceed the pre-development run-off rate. Additionally, surface run-off must be directed to managed systems prior to entering existing water bodies. These programs are further outlined in Section IV "Existing Mitigation Strategies and Proposed Improvements."

Due to the Town's effective on-going efforts in hazard mitigation over 10 years, the Town of Londonderry's vulnerability to the identified hazards has been reduced.

National Flood Insurance Program

Londonderry has been participating in the National Flood Insurance Program (NFIP) since November 5, 1980. The Flood Insurance Study and the Flood Insurance Rate Maps (FIRMS) has a current effective date of May 17, 2005. The two documents are used for flood insurance purposes and are on file with the Londonderry Planning and Building Departments. In addition the town has implemented the following actions related to continued compliance with NFIP:

- Participate in NFIP training offered by the State and/or FEMA (or in other training) that addresses flood hazard planning and management
- Address NFIP monitoring and compliance activities
- Revise/adopt subdivision regulations, erosion control regulations, board of health regulations, etc. to improve floodplain management in the community
- Prepare, distribute or make available NFIP, insurance and building codes explanatory pamphlets or booklets
- Identify and become knowledgeable of non-compliant structures in the community
- Inspect foundations at time of completion before framing to determine if lowest floor is at or above Base Flood Elevation (BFE), if they are in the floodplain
- Require the use of elevation certificates
- Enhance local officials, builders, developers, local citizens and other stakeholders' knowledge of how to read and interpret the FIRM
- Work with elected officials, the state and FEMA to correct existing compliance issues and prevent any future NFIP compliance issues through continuous communications, training and education

The Town will continue monitoring flood-prone properties through the application of its zoning code for projects located in designated flood zones. This Program is administered by the Town's Building and Code Enforcement Officers. The Town's GIS manager will also cooperate with FEMA engineers to provide supportive data for future map modernization program efforts.

The following number of buildings are located in the FEMA Flood Zone: 10 Commercial, 2 Industrial, 78 Residential and 1 Other. Approximately 150 persons live in the FEMA designated Flood Zone. According to FEMA's most recent Community Overview (September 15, 2014), there were 34 single family units, two 2-4 family units and 10 nonresidential units that have flood insurance policies in force.

The Town has 30 paid losses with NFIP since 1978 totaling \$407,693. According to the Londonderry Repetitive Loss properties information as of August 31, 2015, provided by the NH Office of Energy and Planning, there are currently five repetitive loss properties, all of which are single family homes. Three of the properties have federal flood insurance under the NFIP within the Town of Londonderry. Four of the five properties have experienced three flood losses and one property has had two flood losses. Since the August 31 Report, mitigation efforts have completed including the elevation of the property on Brookview Drive, and there are presently no “severe repetitive loss properties” in Londonderry. This area is considered mitigated.

Repetitive loss *areas* are mapped on the Past Hazards Map at the end of this chapter. The land use within this area is Agricultural-Residential.

The Town will continue to participate in the NFIP program in the future. Town staff will partner with FEMA in ongoing efforts to maintain/update the existing flood maps and will make data available as needed to improve the accuracy and information content of these critical maps.

Past and Potential Hazards

The Londonderry Hazard Mitigation Committee identified past hazard events, which include flooding, wind, wildfire, ice, snow, and seismic events. Other hazards include utility pipe failure, airport related hazards, drought, and extreme cold. These hazards were identified in a brainstorming session with the Committee. The HMPUC consulted State of New Hampshire Multi-Hazard Mitigation Plan, Update 2013, as well as other supporting information derived from the resources listed in Appendix C. The Identified Hazard Zones Map at the end of this section reflects the impact areas for each hazard.

Natural hazards which are *most* likely to affect Londonderry: riverine flooding, wildland fires / grass fires, heavy snowstorms and ice storms.

Natural hazards which *may* affect Londonderry: Hurricane and tropical storms, debris-impacted infrastructure / ice jams, erosion / mudslides, dam breach, downbursts, lightning, target hazard (wildfire), hailstorms earthquakes, landslides, utility pipe failure, airport related hazards, drought and extreme cold.

Natural hazards which are *less* likely to affect Londonderry: rapid snow melt, other water retention failure and isolated homes.

The Committee reviewed background information, areas at risk, and the probability for each hazard to occur, pose a risk to, or cause damage to structures, infrastructure or human life.

Probability is based on an objective appraisal of a hazard's likelihood of repeating, using information provided by relevant sources, observations and trends. Rankings are High, Moderate and Low. The probability is for a 10-year period. Tables 1 and 2 refer to this ranking system.

- **High** - Probability is 70 to 100 percent. The event is highly likely to occur with severe strength over a significant portion of the SNHPC region.
- **Moderate** - Probability is 35 to 70 percent. The event is somewhat likely to occur with some damage in parts of the region.
- **Low** - Probability is 0 to 35 percent. While the event is unlikely or highly unlikely to occur, the probability is low for significant damage.

Table 1 – Londonderry Hazard Identification and Probability

Category	Hazard Type	Sub-hazard Type	Probability
A	Flooding		
	1	Riverine flooding	High
	2	Hurricanes	Moderate
	3	Debris-impacted infrastructure and river ice jams	Moderate
	4	Erosion and mudslides	Moderate
	5	Rapid snow pack melt	Low
	6	Dam breach or failure	Moderate
	7	Other water retention facility failure	Low
B	Wind		
	1	Hurricanes	Moderate
	2	Tornadoes	Moderate
	3	Nor'easters	High
	4	Downburst	Moderate
	5	Lightning	Moderate
C	Wildfire		
	1	Wildland Fires/Grass Fires	High
	2	Target Hazard	Moderate
	3	Isolated Homes	Low
D	Ice and Snow Events		
	1	Heavy Snowstorms	High
	2	Ice Storms	High
	3	Hailstorms	Moderate
E	Seismic Events		
	1	Earthquakes	Moderate
	2	Landslides	Moderate
F	Other Hazards		
	1	Utility pipe failure	Moderate
	2	Airport related hazards	Moderate
	3	Drought	Moderate
	4	Extreme Cold	Moderate

Natural Hazards

A. Flooding

The Londonderry Hazard Mitigation Committee reviewed the following kinds of hazards related to flooding:

1. Riverine Flooding

"Typical riverine flooding involves the overflowing of the normal flood channels or 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." (APA PAS Report # 560, Hazard Mitigation Planning by James Schwab)

Riverine flooding is the most common and significant hazard event in the State of New Hampshire, as well as all of its municipalities.

Londonderry is prone to flooding at all points in the year from heavy thunderstorms, causing rapid run-off and flooding. Spring floods are typically due to rapid snowmelt and heavy rains in conjunction with ice jams. Fall floods are frequently caused by tropical storms and associated heavy rainfall.

From 1973 through 2010 there have been nine flood-related FEMA declared disasters in Rockingham County and seventeen in the State of New Hampshire. (FEMA, "Federally Declared Disasters by Calendar Year").

In 2005, 2006, 2007 and recently in 2010 Southern New Hampshire, including Londonderry, experienced significant flood events. The 2005, 2006, and 2007 events all exceeded 100 year flood recurrence intervals in some or all areas and the frequency of these events in the past five years is a major concern for the Town of Londonderry along with the rest of the State.

The most dramatic recent flood event occurred in May, 2006, referred to as the "Mother's Day Flood". DPW and First Responders mobilized for roughly 72 hours to clear roads and provide for safe travel and to monitor conditions during this historic flooding event. Additional shift coverage was enabled for emergency dispatch personnel. During the peak flood period, numerous roads were closed due to water overtopping the pavement and inhibiting passage. Persons were evacuated from the Brookview Drive neighborhood. Throughout the event, sections of the following roads were closed or were subject to temporary detour due to high water:

Adams Rd, Apple Blossom Rd, Auburn Rd, Boyd Rd, Brookview Dr,
Catamount Rd, Colonial Dr, Evergreen Cir, Forest St, Gilcreast Rd, Griffin

Rd, Grove St, Hall Rd, Hemlock St, High Range Rd, Industrial Rd, Kendall Pond Rd, Litchfield Rd, Millstone Rd, Parmenter Rd, Pillsbury Rd, Rindge Rd, Rocco Dr, South Rd, Spruce St, Stokes Rd, Timber St, West Rd, Whispering Pines and Wiley Hill Rd

During Hurricane Irene in 2011, flooding was evident in parking lots and 6 public streets were closed for at least one day. DPW personnel opened gates to Kendall Pond Dam to reduce the pond level in anticipation of heavy rain.³



Cohas Brook at Auburn Road

³ Note New Hampshire Dam Classification Schedule in Appendix B.

The HMPUC reviewed and updated the list of flood prone areas and updated the current status. The following areas in the Town of Londonderry have experienced recurring flood problems.

Area	Previous Damage	Severity	2015 Update
Brookview Drive	Road flooding, basement flooding of adjacent homes, in the SFHA, annual flooding. Several evacuations and recurring property damage since the 1970s. Fire and Police consistently mobilized to check on conditions and safety of residents.	Major	Study completed and flood prone homes mitigated as necessary. Problem addressed – requires continued monitoring.
South Road at Kendall Pond Dam	High water levels at the dam during historic storm events.	Minor	Historic water levels not realized since 2010 Plan. Town continues to monitor.
Intersection of NH Routes 28 and 128	Water running over NH Route 28 during high-water events.	Minor	Remains a problem – State road
Parmenter Road at NH Route 102	Road flooding/Inadequate culvert.	Minor	Remains a problem
High Range Road at NH Route 102	Road flooding/Inadequate culvert	Minor	Remains a problem –
Gilcreast Road at Beaver Brook	Road closed due to flooding during historic storm events or due to beaver dams.	Minor	Historic water levels not realized since 2010 Plan. Town continues to monitor.
Litchfield Road East of Misty Lane	Road flooding	Minor	Replaced culvert in 2010; completed.

Severity Definition:

Minor --- approximate or potential damage is less than \$10,000 and can normally be handled within the Town’s DPW budget

Intermediate– approximate or potential damage is between \$10,000 and \$75,000 and may qualify for grant assistance

Major - approximate or potential damage exceeds \$75,000 and will likely qualify for grant assistance



Cohas Brook at Auburn Road Mitigated

All special flood hazard areas (SFHAs) in the Town of Londonderry are potentially at risk in the event of riverine flooding. The SFHAs are located on the Identified Hazard Zones Map at the end of this section.

High probability for riverine flooding to occur and cause damage in Londonderry.

The HMPUC discussed flood occurrences, including repetitive loss zones, and determined that recent efforts on Brookview Drive to elevate flood-prone homes and efforts to improve drainage on Auburn Road, South Road and Litchfield Road have successfully mitigated the largest flood concerns at this time. Some minor roadway flooding continues. As an ongoing measure, the Town continues to actively monitor town-owned dams during high water events. Further, the Town is participating in the NFIP and has wetland buffers and other protective measures in place to forestall future development in the flood zones.

2. Hurricanes

Hurricanes develop from tropical depressions which form off the coast of Africa in the warm Atlantic waters. When water vapor evaporates, it absorbs energy in the form of heat. As the vapor rises, it cools within the tropical depression, and then condenses, releasing heat, which sustains the system. A tropical depression becomes a hurricane when its sustained recorded winds reach 74 mph.⁴

During a hurricane, top wind speeds could reach 250 miles per hour in a Category 5 hurricane, as measured on the Saffir-Simpson Hurricane Scale. The potential magnitude of a hazard event, also referred to as the extent, scale or strength of a disaster, provides a measurement of how large and significant a hazard can become. The Saffir-Simpson Hurricane Wind Scale measures the magnitude of wind events effects on property damage on a 1 through 5 rating basis. The Saffir-Simpson scale describes the Category 1 through 5 strengths

⁴ State of New Hampshire Multi-Hazard Mitigation Plan, Update 2013, pages 67 and 68.

with their respective threats to people, different types of homes, shopping centers, trees, power lines, water, and more as displayed in the table below.

Saffir-Simpson Hurricane Wind Scale

Category	Sustained Winds	Types of Damage Due to Hurricane Winds
1	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.
2	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.
3	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.
4	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.
5	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 possibly months. Most of the area will be uninhabitable for weeks or months.

Source: National Oceanic and Atmospheric Administration (NOAA)

From 1938 to 2013, there were 12 hurricanes or tropical storms in New Hampshire⁵. The September 1938 hurricane was a more notable flooding event to strike Londonderry and other municipalities in southern New Hampshire. Hurricanes Carol and Edna caused some damage in August and September 1954. Potential effects of a hurricane include flooding, run-off not handled adequately, and disrupted travel. More recent hurricanes were: September 1985 – Gloria, August 1991 – Bob, and September 1999 – Floyd.

More recently, between August 21 and 30th, 2011, during the effects of Tropical Storm Irene, DPW and First Responders mobilized to address storm related damage that included widespread power outages due to falling limbs,

⁵ Ibid page 69 and 70.

inaccessible roads due to downed power lines or debris and localized flooding resulting from heavy rain. The Town opened its emergency shelter for four days given widespread power outages (up to 70% of the town without power). During the height of the storm, 6 elderly residents were moved to the emergency shelter. Pre-event, senior housing and over-55 communities were notified of available services and offered assistance with preparations, as needed.

In October 2012, during the effects of Superstorm Sandy, DPW and First Responders mobilized to address power outages due to falling limbs and inaccessible roads due to downed power lines or fallen debris. Police, Fire and Public Works personnel responded to an elevated number of calls to address widespread power outages, building alarms, and downed wires and trees. The Town's emergency shelter was opened for showers only for three days till power was restored town-wide.

All areas of the Town of Londonderry are potentially at risk if a hurricane reaches Rockingham County, New Hampshire.

Moderate probability for hurricanes to occur and cause flood damage in Londonderry.

The HMPUC discussed hurricane probability and determined that the flooding/rainstorm results of hurricanes are appropriately addressed by the Town's participation in the NFIP. No further actions were deemed necessary. The Town will continue to support first responders to respond to hazards from hurricanes.

3. Debris-impacted infrastructure and river ice jams

The potential effects of flooding are increased when infrastructure is obstructed either by debris or ice formations. These obstructions compromise the normal stormwater flow, creating an artificial dam or narrowing of the river channel causing a backup of water upstream and forcing water levels higher. Debris obstructions can be caused from vegetative debris, silt, soils, and other riparian structures that have been forced into the watercourse. Ice jams are caused by ice formations "in riverbeds and against structures." Bridges, culverts, and related roadways are most vulnerable to ice jams and debris-impacted infrastructure.⁶

Historically, floods in Londonderry have been due to snow melt and heavy rains in conjunction with ice jams or debris-impacted infrastructure. If flooding occurs in the Town of Londonderry, there is the potential for debris-impacted infrastructure and ice jams to cause damage. In Londonderry, debris obstruction problems have occurred at South Road at the southern extents of Kendall Pond where there is a dam and a bridge crossing Beaver Brook.

⁶ Ibid page 28.

Most notably, during the “Mother’s Day Floods” on May 11th, 2006, the Town experienced the collapse of two culverts that required repair: Apple Blossom Road and Industrial Drive at Perimeter Rd. The latter is an arterial road servicing traffic to and from Manchester Airport. Traffic flow was detoured during the rebuilds of this critical piece of infrastructure.

All special flood hazard areas in the Town of Londonderry are potentially at risk if there is an ice jam or debris-impacted infrastructure. There is particular concern for bridges along the many brooks in Londonderry including Beaver, Todd, Little Cohas, and Shields Brooks.

Moderate probability for debris-impacted infrastructure or ice jams to occur and cause damage in Londonderry.

The HMPUC discussed debris impacted jams and determined that given the random nature of this hazard type and the fact of most water bodies are crossing private properties, there were no mitigation actions to be undertaken at this time.

4. Erosion and mudslides

The New Hampshire Department of Environmental Services (NHDES) defines erosion as "the process in which a material is worn away by a stream of liquid (water) or air, often due to the presence of abrasive particles in the stream (NHDES Watershed Management Bureau).⁷" As it relates to this *Plan*, erosion is the gradual or rapid wearing away of stream banks or shores, due to prevailing winds, natural water movement, and more catastrophic events. Additional causes of erosion are removal of vegetation and soil disturbance. Stream bank erosion may eventually result in mudslides.

Land which has at least a 15 percent slope, a vertical rise of 15 feet over a horizontal run of 100 feet, is scattered throughout Londonderry, usually occurring around the hills and stream banks.

The Committee was not made aware of a history of erosion or mudslides occurring in Londonderry, however the Committee agreed that potential exists at open construction sites.

Moderate probability for erosion and mudslides to occur and cause damage in Londonderry.

The HMPUC discussed erosion and mudslides. Given that there are few instance steep slopes, the highest probability of hazard events was during construction periods. The Committee felt that existing regulations regarding alteration of terrain and site development, including construction inspections, provide adequate protection and effectively mitigate threats.

⁷ NH Department of Environmental Services, Watershed Management Bureau, NH DES website.

5. Rapid snowpack melt

Rapid snowpack melt, much as its name suggests, is a "seasonal rapid melting of the snowpack coupled with warming temperatures and moderate to heavy rains." These events typically occur during the spring as temperatures are rising. Lower lying areas of the state may experience either flash flooding or inundation events accelerated by the rapid melting of the snowpack.⁸

Structures and improvements located on, along, or at the base of steep slopes are most vulnerable to rapid snowpack melt.

The Committee was not made aware of a history of flooding due to rapid snowpack melt in Londonderry.

All areas of steep slopes are potentially at risk in the event of rapid snowpack melt.

Low probability for rapid snowpack melt to occur and cause damage in Londonderry.

The HMPUC discussed rapid snowpack melt and determined that given the random nature of this hazard type and the fact of most water bodies are crossing private properties, there were no mitigation actions to be undertaken at this time.

6. Dam breach or failure

Dam failure results in rapid loss of water that is normally held by the dam. These kinds of floods are extremely dangerous and pose a significant threat to both life and property. The potential magnitude of a hazard event, also referred to as the extent, scale or strength of a disaster, provides a measurement of how large and significant a hazard can become. Dam breach is considered a Technological Hazard, a secondary hazard caused by flooding conditions. Dam breaches are a potential danger to people and property within the dam breach inundation area(s).

The SFHAs in proximity to Londonderry's dams as well as their designated floodways would be impacted by a dam breach.

Dams are routinely monitored by the Fire Department and DPW personnel during storm events with owners notified as necessary. The Town relies on the State's Dam Program for monitoring privately owned dams. In the instance of the Adam's Pond dam, water levels were recently lowered due to mitigate its potential breach.

⁸ State of New Hampshire Multi-Hazard Mitigation Plan, Update 2013.

All class S (Significant Hazard) and H (High Hazard) dams have the potential to cause damage if they breach or fail. The dam classes are identified in Appendix B.

Moderate probability for dam breach or failure to occur and cause damage in Londonderry.

The HMPUC discussed potential for dam breaches or failures. Where most of the dams are privately owned, the committee feels that the state inspections are adequate and that there are no additional actions they can take at this time. The Fire Department and Department of Public Works and Engineering monitor private dams during significant rainfall events and can provide evacuation notification to residents in areas downstream of privately owned dams in the event of failure.

7. Other water retention facility failure

Londonderry is home to one operational 2.3 million gallon water storage tank. Failure typically occurs in water storage tanks when a lateral force applied to the tower exceeds the structural capabilities of the tower. Examples of these sorts of events would be earthquakes or high force winds. Inadequate or weakened welds, insufficient reinforcement at beam-column connections, and the buckling of tall slender steel structural supports are other modes of failure. (U. Cal. Berkeley) Londonderry's water storage tank, owned by Manchester Water Works, is constructed using pre-stressed concrete and is designed to withstand seismic loading or forces.

If failure were to occur, potential impacts include high waves and flash floods and the surrounding environment torn up by debris carried with the waves. Secondary effects of water storage tank failures would include shortages of potable water and compromised fire services.

The Committee was not made aware of a history of water retention facility failures. The area near Vista Ridge and Josephine Drive, downstream of the Manchester Water Works Storage Tank would be impacted by a water storage tank failure.

Low probability for water facility failures to occur and cause damage in Londonderry.

The HMPUC discussed potential for failure of the water tank on Josephine Drive. The Committee feels that owner operation and maintenance inspections are adequate and that there are no additional actions to be taken at this time.

B. Wind

The Londonderry Hazard Mitigation Plan Update Committee reviewed the following kinds of hazards related to wind:

1. Hurricanes

Please see previous hurricane narrative on page 23. Severe hurricanes reaching south-central New Hampshire in the late summer and early fall are the most dangerous of the coastal storms that pass through New England from the south. As noted, strong winds from TS Irene (2011) and Superstorm Sandy (2012) caused several trees and power lines to fall. There was minimal structural damage.

All areas of Londonderry are at risk if a hurricane reaches Rockingham County, NH.

Moderate probability for hurricane force winds to occur and cause damage in Londonderry.

The HMPUC discussed hurricane probability and determined that the flooding/rainstorm results of hurricanes are appropriately addressed by the Town's participation in the NFIP. Heavy wind effects are best addressed by ongoing enforcement of building codes. The Town has an ongoing program to provide emergency shelter as needed, which should be updated. No further actions were deemed necessary. The Town will continue to support first responders to respond to hazards from hurricanes. The Town should also carry out educational programs to provide information on family preparedness.

2. Tornadoes

"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 one mile wide and 50 miles long." Originating from hurricanes and thunderstorms, tornadoes are formed when cold air overrides warm air, causing the warm air to rise rapidly. (FEMA, Understanding Your Risks, 2-20)

On average New Hampshire has 1.5 - 2 tornadoes per year (National Climatic Data Center.) Most of the tornadoes in New Hampshire are small and cause only localized damage. On July 24, 2008, there was a tornado in Deerfield which experienced damage. This was a F2 tornado touching down about 5 miles southwest of Northwood Narrows and moved northeast for a little over five miles before crossing into Merrimack County. Numerous trees were downed and many homes were damaged or destroyed. A woman was killed when the house she was in collapsed. This tornado cut a 50-mile path through five counties in southwest New Hampshire resulting in 1 fatality and damage to over 100 structures.⁹ It went through five New Hampshire counties and phone and electric service was cut off to over 12,500 customers. NOAA does not show any

⁹ U.S. tornado and Weather Extremes database of 1950-2010

tornadoes in Rockingham County since 2009. A tornado of that magnitude is a very rare occurrence in Rockingham County.

This Enhanced Fujita Tornado Damage Scale shows detailed wind in miles per hour in the following table.

Table 2 - Enhanced Fujita Tornado Damage Scale

FUJITA SCALE			DERIVED EF SCALE		OPERATIONAL EF SCALE	
F Number	Fastest 1/4-mile (mph)	3 Second Gust (mph)	EF Number	3 Second Gust (mph)	EF Number	3 Second Gust (mph)
0	40-72	45-78	0	65-85	0	65-85
1	73-112	79-117	1	86-109	1	86-110
2	113-157	118-161	2	110-137	2	111-135
3	158-207	162-209	3	138-167	3	136-165
4	208-260	210-261	4	168-199	4	166-200
5	261-318	262-317	5	200-234	5	Over 200

Source: NOAA

Between 1950 and 2008, there were 11 known tornadoes in Rockingham County. Two of these were F0, two were F1, six were F2 (August 1951, June 1957, June 1963, July 1961, May 2006 and July 2008), and one was F3 (June 1953). Nine out of the ten tornados (not including June 1963) totaled approximately \$358,000 in damages across the county.¹⁰ There are no known tornados that occurred in Londonderry in the last 20 years.

All areas of Londonderry are potentially at risk if a tornado reaches the Town.

Moderate probability for tornados to occur and cause damage in Londonderry.

The HMPUC discussed tornado probability and determined that the high wind generated by tornados is best addressed by the ongoing enforcement of Building Codes. No further actions were deemed necessary. The Town will continue to support first responders in their ability to respond to hazards from Tornados. The Town has an ongoing program to provide emergency shelter as needed.

¹⁰ NOAA National Climatic Data Center and Tornado Project, 2014

3. Nor'easters

A Nor'easter is a large weather system traveling from South to North, passing along or near the seacoast. As the storm approaches New England and its intensity becomes increasingly apparent, the resulting counterclockwise cyclonic winds strike the coast and inland areas from a Northeasterly direction. In the winter months, oftentimes heavy snow conditions accompany these events. Hazards from nor'easters include icing and heavy snows which cause downed trees and power lines.

Recent Nor'easters affecting Londonderry include:

- October 29 to 31, 2011 an early and severe snow storm, referred to as the "Halloween Storm," affected communities in central and southern NH. In Londonderry, DPW and First Responders mobilized to address heavy snowfall, downed power lines, limited power outages and widespread road closures during this early winter Nor'Easter. Work included traffic guidance, maintaining public roadways, resident assistance where power outage caused safety issues and continuation of town services. The Town opened its emergency shelter for four days to house persons without power. DPW and contract cleanup crews worked for weeks to collect, chip and remove woody debris from Town rights-of-ways. An estimated 3,500 cubic yards was collected following this storm. Also following the event, the Town's Drop-Off center was opened for a limited time public use.
- February 8-9, 2013, a Nor'easter, known as Winter Storm NEMO, struck the state of New Hampshire and brought almost three feet of snow to New England with wind gusts up to 75 mph. The Governor declared a State of Emergency. In Londonderry, DPW and First Responders mobilized for roughly 48 hours to clear roads and provide for safe travel during a snowstorm that coupled record snowfall coupled with freezing temperatures. DPW crews were continuously called out to clear snow and salt/sand roadways. Impacts were felt town-wide but were quickly mitigated.
- November 25-30, 2014 Thanksgiving Day snowstorm caused a significant number of power outages in southern and central NH. The storm was the 4th largest in number of power outages according to PSNH. In Londonderry, DPW and First Responders mobilized to address storm related damage that included widespread power outages due to falling limbs and inaccessible roads due to downed power lines from high winds and heavy rainfall. The Town's emergency shelter was opened for two days to house persons without power. Police, Fire and Public Works personnel responded to an elevated number of calls to address widespread power outages, building alarms, and downed wires and trees.

- January 24 through about February 21, 2015 a series of frequent heavy snowstorms taxed state and local government snow plowing efforts and caused the cancellations of schools and businesses. Ten (10) snow events during this period produced 96 inches of snow. The January 26, 2015 event which produced 28 inches of snow alone, was a presidentially declared disaster. DPW crews were called out continually over this period to clear public rights-of-ways to enable safe, local travel. There was no reported damage to public infrastructure. Emergency funds (app. \$47,000) were used to cover additional costs for removal of overwhelming amounts of snow.

Nor'easters are measured on the Dolan- Davis scale, as presented below.

Dolan-Davis Nor'easter Classification Scale				
Storm Class	% of Nor'easters	Avg. Return Interval	Avg. Duration (hours)	Impact
1- WEAK	49.7	3 days	8	No property damage
2- MODERATE	25.2	1 month	18	Modest property damage
3- SIGNIFICANT	22.1	9 months	34	Local-scale damage and structural loss
4- SEVERE	2.4	11 years	63	Community scale damage and structural loss
5- EXTREME	0.1	100 years	95	Extensive regional-scale damage and structural loss

Source: State of NH Hazard Mitigation Plan, Update 2013. NC Division of Emergency Management.

While not a Nor'Easter, on December 21st, 2009, First Responders were called out to address a major vehicle crash incident involving 59 cars on I-93 in Derry, south of Exit 4. The cause was considered to be icy conditions from a sudden snow squall that hit during rush hour. Over 100 persons were involved in the resulting accidents, which shut down I-93 for several hours during accident cleanup.

All areas of Londonderry are potentially at risk for property damage and loss of life due to nor'easters.

High probability for nor'easters to occur and cause wind damage in Londonderry.

The HMPUC discussed nor'easter probability and determined that the high wind, heavy snowfall and potential cold generated by Nor'easters are best addressed by the ongoing enforcement of Building Codes, provision of emergency shelters and ongoing support of first responders. The Town has an ongoing program to provide emergency shelter as needed. The Town should also carry out educational programs to provide information on family preparedness. No further actions were deemed necessary.

4. Downburst

A downburst is a severe localized wind blasting down from a thunderstorm. These 'straight line' winds are distinguishable from tornadic activity by the pattern of destruction and debris. Depending on the size and location of these events, the destruction to property may be devastating. Downbursts are capable of producing winds up to 175 mph and are life-threatening. 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.¹¹

The potential magnitude of a hazard event, also referred to as the extent, scale or strength of a disaster, provides a measurement of how large and significant a hazard can become. Downbursts often accompany thunderstorms, which are quite common during southern NH's hot weather months. Microbursts and macrobursts (wet) have been known to occur here in the region. Downbursts of both sizes are capable of producing strong wind shear, or large changes in wind speed and direction over a short distance. Downbursts typically originate from thunderstorm clouds, with air moving in a downward motion until it hits the ground level and then spreads outward in all directions. In fact, the wind pattern of a downburst is the opposite of a tornado's wind pattern. The National Oceanic and Atmospheric Administration (NOAA) National Weather Service and the National Weather Service Jetstream Online School for Weather have provided descriptions of downbursts. Downbursts can follow the Enhanced Fujita Scale for the tornado-like high winds they spawn. Downbursts are categorized into macrobursts and microbursts, and although there are wet and dry microbursts, NH only experiences wet microbursts. The Enhanced Fujita Scale shown on the table below measures the magnitude of wind speed for downbursts.

Characteristics of Downbursts: Macrobursts and Microbursts

Characteristics	Microburst (wet)	Macroburst (wet)
Wind Span	<2.5 miles	>2.5 miles
Time	2 to 5 minutes	5 to 20 minutes
Wind Speed	Up to EF 4 (166 mph)	Up to EF 3 (136 mph)
Example of Damages	Trees flattened; hazardous conditions for planes; building damage.	Not as strong as a microburst, but winds last longer.

All locations in Londonderry are at risk for property damage and loss of life due to downbursts.

Moderate probability for downbursts to occur and cause damage in Londonderry.

¹¹ 2013 State of New Hampshire Multi-Hazard Mitigation Plan.

The HMPUC discussed downburst probability and determined that the high wind generated by downbursts is best addressed by the ongoing enforcement of Building Codes. No further actions were deemed necessary. The Town will continue to support first responders in their ability to respond to hazards from downbursts.

5. Lightning

Lightning is a visible electrical discharge produced by a thunderstorm. The discharge may occur within or between clouds, between the cloud and air, between a cloud and the ground or between the ground and a cloud.¹² Average number of flashes in New Hampshire from 1997-2011 number 23,360.¹³ Lightning strikes can cause death, injury, and property damage. New Hampshire ranks 16th in the U.S. for casualties from lightning strikes.

The potential magnitude of a hazard event, also referred to as the extent, scale or strength of a disaster, provides a measurement of how large and significant a hazard can become. Severe storms such as thunderstorms are usually responsible for the lightning south NH region receives. Lightning fires are unpredictable and they are most dangerous when strikes occur in rural areas with limited fire suppression access. Using a Level system of 1 to 6 corresponding with storm development and the number of lightning strikes, the Lightning Activity level (LAL) measures the magnitude of lightning strikes.

Lightning Activity Level (LAL)

Level	LAL Cloud and Storm Development	Cloud to Ground Strikes per 5 Minutes	Cloud to Ground Strikes per 15 Minutes
LAL 1	No thunderstorms	n/a	n/a
LAL 2	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud to ground strikes in a five minute period.	1 to 5	1 to 8
LAL 3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a 5 minute period.	6 to 10	9 to 15
LAL 4	Scattered thunderstorms. Moderate rain is commonly produced. Lightning is frequent, 11 to 15 cloud to ground strikes in a 5 minute period.	11 to 15	16 to 25
LAL 5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 cloud to	>15	>25

¹² NOAA. National Weather Service. Glossary. <http://w1.weather.gov/glossary/index.php?letter=n>. 02-06-14.

¹³ These cloud-to-ground lightning flashes were measured by the National Lightning Detection Network® (NLDN®) over the land area inside state borders. The NLDN does not cover Alaska or Hawaii. The NLDN is owned and operated by Vaisala. http://www.lightningsafety.noaa.gov/stats/Table-Flashes_by_State_1997-2011.pdf. 02-06-14.

	ground strikes in a 5 minute period.		
LAL 6	Dry lightning (same as LAL 3 but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag Warning.	6 to 10	9 to 15

Source: National Weather Service

Historically Londonderry has experienced lightning strikes including limited damage, as follows:

- June of 1996 - Lightning struck a wire mounted to a house causing an attic fire that was quickly extinguished by firefighters; and
- August of 2001 - A direct strike to a garage causing extensive damage to the garage and vehicles parked inside. (NOAA National Climatic Data Center)

Lightning strikes occurred sporadically, most recently with strikes noted on Anthony Drive, Hall Road, Old Derry Road, Action Blvd., Sawgrass Circle, Edward Circle, and Estey Drive during two strong storms in July, 2014. No fires resulted from these strikes.

All areas of Londonderry are potentially at risk for property damage and loss of life due to lightning.

Moderate probability for lightning to occur and cause damage in Londonderry.

The HMPUC discussed the history of lightning strikes. Given the random nature of lightning strikes, the Committee did not feel any mitigation measures were needed at this time. They did not feel that any town buildings are more at risk than others.

C. Wildfires

The Londonderry Hazard Mitigation Plan Update Committee reviewed the following kinds of hazards related to fires:

1. Wildland Fires

Wildfire is defined as any unwanted and unplanned fire burning in forest, shrub or grass and are frequently referred to as forest fires, shrub fires or grass fires, depending on their location. They often occur during drought and when woody debris on the forest floor is readily available to fuel the fire. The threat of wildfires is greatest where vegetation patterns have been altered by past land-use practices, fire suppression and fire exclusion.

Historically, large NH wildfires run in roughly 50 year cycles. The increased incidence of large wildfire activity in the late 1940s and early 1950s is thought to be associated, in part, with debris from the Hurricane of 1938. Significant woody

'fuel' was deposited in the forests during that event.¹⁴ Present concerns are that the Ice Storm of 2008 has left a significant amount of woody debris in the forests of the region as may fuel future wildfires. The potential magnitude of a hazard event, also referred to as the extent, scale or strength of a disaster, provides a measurement of how large and significant a hazard can become.

The National Wildfire Coordinating Group (NWCG) Size Fire Classification Scale is depicted below.

National Wildfire Coordinating Group (NWCG) Size Fire Classification	
Class A	1/4th acre or less
Class B	More than 1/4 th acre, but less than 10 acres
Class C	10 acres or more, but less than 100 acres
Class D	100 acres or more, but less than 300 acres
Class E	300 acres or more, but less than 1,000 acres
Class F	1,000 acres or more, but less than 5,000 acres
Class G	5,000 acres or more

Source: NWCG

New Hampshire has 350-400 wildfires during an average year and 95 percent of these fires are caused by humans and five percent are caused by lightning¹⁵ (NH Hazard Mitigation Plan, 2013). The vast number of these fires occur in the most populated areas like Hillsborough and Rockingham Counties. These fires are suppressed quickly with an average fire size of less than one acre. The primary cause of wildfires in NH continues to be escaped debris burns, with miscellaneous causes (power lines, fireworks, etc.) and campfires being the top three. Average acres burned per year in NH are between 200-250 acres and months of April and May experience the highest number of fire starts with the period of October and November following with the highest number. These time periods are vulnerable because the predominant forest type is hardwood trees and in spring it is before they green up and the late fall the leaves have dropped. It normally only occurs with an extended period of hot, dry weather conditions. The total number of fire starts has decreased between 2006 and 2011.¹⁶

The Town of Londonderry has three fire stations, each equipped with a "first-run" engine company, ALS Ambulance, and forestry unit,. The David A. Hicks Central Fire Station also houses a command car, utility vehicle, and additional specialized equipment. It also provides dispatch services to both Londonderry and Hampsted. The following is a summary of data from the Londonderry Fire Department for the 5 year period 2010 to 2014. With the exception of 2012, the number of fires in Londonderry has declined on an annual basis.¹⁷

¹⁴ State of New Hampshire Multi-Hazard Mitigation Plan, Update 2013, pages 52 and 53. .

¹⁵ Ibid, page 53.

¹⁶ Ibid, page 53.

¹⁷ Londonderry Fire Department, June 2015.

Fire Type	Number of Responses				
	2014	2013	2012	2011	2010
Structure Fire	8	18	19	15	20
Tree, Brush, or Grass Fire	16	15	20	10	19
Vehicle Fire	7	5	14	6	10
Other Fires	13	11	19	13	28
Total Number of Fires	44	49	72	44	77

Londonderry Fire Department has frequently been dispatched to address forest fires in the Musquash Conservation Area. Since 2010, the Fire Department has extinguished ten forest, woods, or wildland fires. Committee Members noted the difficulties fire personnel had extinguishing these events with some requiring carrying in water by hand over long distances. Members noted that a large burn would be nearly impossible to put out short of bulldozing a fire wall, given poor access to thickly wooded areas.

In the Town of Londonderry, the following areas are susceptible to wildfires:

- New developments when trees are cut and soil dries, leaving dead grass; and
- Musquash Conservation Area from Wiley Hill Road to the PSNH right-of-way and Watts Brook.
- Westerly of Little Cohas Brook
- Jack’s Bridge Rd., northerly of Sanborn Rd.
- Auburn Rd Town Landfill Site

Wildland fires have been identified on the Identified Hazard Zones GIS map.

High probability for wild land fires to occur and cause damage in Londonderry.

The HMPUC discussed the history and potential for wildfires and has identified that the Musquash Conservation Area is an area of concern due to limited accessibility. The Committee feels that creating fire roads would enable greater penetration into the area and enable quicker response to fire and lessen potential damages.

2. Target Hazards

Target Hazards are facilities or areas of town that require a greater amount of pre-fire tactical planning to address emergencies larger than the average fire event. In the Town of Londonderry, there are several airport related and other industrial areas which have high concentrations of combustible or hazardous materials which, were a fire to occur, could increase the severity of the fire and possibly have catastrophic results.

In the Town of Londonderry, the following areas are susceptible to target hazard related fires:

- Airport area or northwestern most corner of the Town limits to Harvey Road at the east and to the southern extent of Industrial Drive;
- NH Route 102 east and west of I-93, a tier 2 reporting area and concentration of commercial and industrial development;
- All of I-93, NH Routes 28, 128 and 102 which are throughways for many vehicles carrying toxic or hazardous materials;
- Tennessee Gas line corridor; and
- AES Granite Ridge Power Plant

These areas have been identified as Target Hazards on the Identified Hazard Zones Map.

Moderate probability for target hazard related fires to occur and cause damage in Londonderry.

The HMPUC discussed the potential for Target Hazards and determining that the best approach is to support first responders, including studying and remedying known gaps in radio communications. The Town should review and update the Schools Emergency Response Plan. The Town should also carry out educational programs to provide information on family preparedness.

3. Isolated Homes

Isolated homes are more susceptible to the impacts of wildfire due to the challenges of reaching them with fire-fighting capabilities. Isolated homes are a concern for New Hampshire, as it is heavily forested and there has been an increase in the urban-wildlife interface as towns develop and grow.

In the Town of Londonderry, while there are areas with dead end streets with limited access, there are few areas with isolated residential developments.

Low probability for isolated homes to be damaged in Londonderry.

As the Committee decided there was a low probability for isolated homes, members did not discuss mitigation measures for this hazard type.

D. Ice and Snow Events

The Londonderry Hazard Mitigation Plan Update Committee reviewed the following kinds of hazards related to ice and snow events:

1. Heavy Snowstorms

A heavy snowstorm is considered to be one which deposits five or more inches of snow in a 12-hour period or seven or more inches of snow/sleet in a 24-hour period and / or enough ice accumulation to cause damage to trees or power lines and / or a life threatening or damaging combination of snow and/or ice accumulation with wind. A blizzard is a winter storm characterized by snow and/or blowing snow reducing visibility to ¼ mile or less for three hours or

longer and sustained winds of 35 mph or greater or frequent gusts to 35 mph or greater.¹⁸

Recent heavy snowstorms affecting Londonderry include:

- October 29 to 31, 2011 – the Halloween storm.
- February 8-9, 2013, a Nor'easter, known as Winter Storm NEMO
- November 25 – 30, 2014, Thanksgiving Day snowstorm
- January 26 through about February 16, 2015 series of frequent heavy snowstorms

The potential magnitude of a hazard event, also referred to as the extent, scale or strength of a disaster, provides a measurement of how large and significant a hazard can become. The National Climactic Data Center (NCDC) produces the Regional Snowfall Index (RSI) for the Northeast to categorize significant snowstorms. The RSI ranks snowstorm effects on a scale from 1 to 5. The RSKI is based on the spatial extent of the storm, the amount of snowfall, and the population. The Regional Snowfall Index (RSI) is displayed below in the table. This is a measurement of the magnitude of a snowstorm in the Northeast, which includes New Hampshire and Londonderry.

Regional Snowfall Index (RSKI) for the Northeast

Storm Category	RSI Value	Snow Description
1	1-3	Notable
2	3-6	Significant
3	6-10	Major
4	10-18	Crippling
5	18 +	Extreme

Source: National Climactic Data Center (NCDC), 2014

The National Oceanic and Atmospheric Administration's (NOAA's) National Operational Hydrologic Remote Sensing Center (NOHRSC) hosts an Interactive Snow Information site that produces daily Modeled Snow Depth Maps displaying inches of snow depth. These Maps measure the magnitude of snow depth during a chosen day for New Hampshire counties, although individual communities like Londonderry will recognize their municipal location.

Significant snowstorms since 1993:

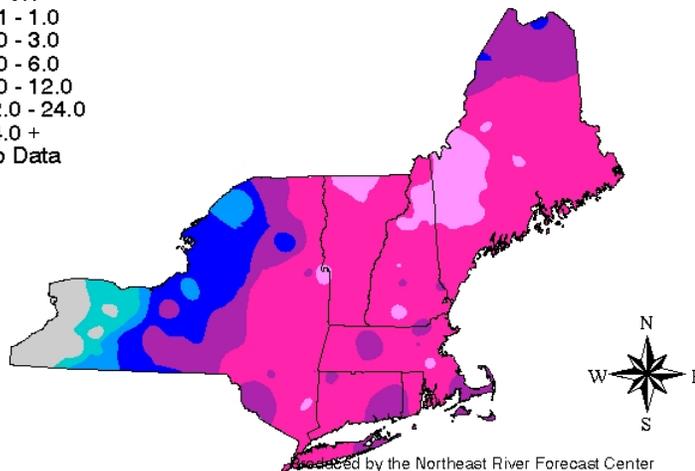
- March 16, 1993 - Statewide heavy snow;
- March, 2001 – Heavy statewide snow;
- February 17-18, 2003 - This storm accumulated approximately 11 inches of snow in Londonderry by 9 AM on February 18; this snow added to an existing base of snow for an approximate snow depth of 29 inches;

¹⁸ NOAA. National Weather Service. Definitions of Weather Watch, Warnings and Advisories. [http://www.erh.noaa.gov/lwx/Defined/index.htm#Blizzard Warning. 02-06-14.](http://www.erh.noaa.gov/lwx/Defined/index.htm#Blizzard%20Warning.02-06-14)

- March 11, 2003;
- December 6-7, 2003 - The storm accumulated approximately 20 inches of snow in the Londonderry area and winds were measured at up to 39 miles per hour;
- January 22 - 23, 2005 - 19.5 inches on top of six inches
- March 30, 2005 - Heavy snow and numerous power outages;
- October 29 to 31, 2011 - the Halloween snow storm;
- February 8-9, 2013 - Nor'easter, known as Winter Storm NEMO;
- November 25 - 30, 2014 - Thanksgiving Day snowstorm; and
- January 26 - February 16, 2015 - A series of frequent heavy snowstorms



Storm Total Snowfall
8 am 12/05/2003 thru 8 am 12/08/2003



Source: National Weather Service Forecast Office, http://www.erh.noaa.gov/er/gyx/storm_map_120503_120803.jpg

All areas of Londonderry are potentially at risk for property damage and loss of life due to heavy snows.

High probability for heavy snowstorms, blizzards, and nor'easters to occur and cause damage in Londonderry.

The HMPUC discussed heavy storm probability and determined that the effects are most similar to Nor'easters. The Town has an ongoing program to provide emergency shelter as needed. The Town should also carry out educational programs to provide information on family preparedness. No further actions were deemed necessary.

2. Ice Storms

An ice storm is used to describe occasions when damaging accumulations of ice are expected during freezing rain situations. Significant accumulations of ice pull down trees and utility lines resulting in loss of power and communication. These accumulations of ice make walking and driving extremely dangerous. Significant ice accumulations are usually accumulations of a ¼" or greater.¹⁹ The Sperry-Piltz Ice Accumulation Index, or SPIA Index, predicts the projected footprint, total ice accumulation, and resulting potential damage from approaching ice storms. It is a tool to be used for risk management and/or winter weather preparedness.²⁰

Figure 1 – SPIA Index

The Sperry-Piltz Ice Accumulation Index, or "SPIA Index" – Copyright, February, 2009

ICE DAMAGE INDEX	DAMAGE AND IMPACT DESCRIPTIONS
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 lasting only a few hours. Roads and bridges may become slick and hazardous.
2	Scattered utility interruptions expected, typically lasting 12 to 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 lasting 1 – 5 days.
4	Prolonged & widespread utility interruptions with extensive damage to main distribution feeder lines & some high voltage transmission lines/structures. Outages lasting 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.

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

Londonderry, the balance of New Hampshire and much of the Northeast, experienced an intense ice storm on December 11-12, 2008. A major disaster declared for all NH counties. The damage was widespread and approximately 400,000 residents of New Hampshire lost power from the storm. Restoring power to a majority of the State took approximately 14 days and in some extreme cases it took 17 days.

In Londonderry, DPW and First Responders mobilized to address downed power lines, major power outages and widespread road closures during this winter disaster. At peak, the entire Town suffered loss of power. Also at peak, a total of 128 roads were identified as partially or totally without power, with some neighborhoods not restored for as long as 9 days (generally south of Route

¹⁹ NOAA. National Weather Service. Glossary. <http://w1.weather.gov/glossary/index.php?letter=n>. 02-06-14.

²⁰Sidney K. Sperry, SPIDI Technologies, LLC. <http://www.spia-index.com/>. 03-26-14.

102, serviced by electric circuits from Hudson). Regarding public facilities, the Town's public works garage and sewage pump station also went without power for several days. The regional emergency shelter was opened through the entire period (10 days). At the height of the storm, over 100 residents were sheltered and over 200 took advantage of the site for food or showers. Road closures were temporary and were caused by downed power lines due ice weight or falling tree limbs. Resources from the Town's ALERT team and the American Red Cross were also involved in traffic management and staffing the emergency shelter. As part of the cleanup, the Town opened the drop-off center for residents to dispose of brush/tree limbs and contracted with cleanup crews to remove brush/limbs from public rights of ways. LFD personnel were also called out to pump flooded basements following the heavy rains of this event.

"It was absolutely unprecedented in devastation," stated a PSNH spokesman. The 2008 ice storm was the worst ice storm ever recorded in New Hampshire. Londonderry businesses and homeowners experienced several days without power and almost all the damage was related to utility line and pole damage. Icing occurred in during the November 2014 Thanksgiving Day storm.

All areas of Londonderry are potentially at risk for property damage and loss of life due to ice storms.



Stonehenge Road

High probability for ice storms to occur and cause damage in Londonderry.

The HMPUC discussed ice storm probability and determined that the effects are most similar to Nor'easters. The Town has an ongoing program to provide emergency shelter as needed. The Town should also carry out educational programs to provide information on family preparedness. No further actions were deemed necessary.

3. Hailstorms

Hailstorms are characterized by showery precipitation in the form of irregular pellets or balls of ice more than five mm in diameter, falling from a cumulonimbus cloud.²¹

Most hailstones are smaller in diameter than a dime, but, stones weighing more than a pound have been recorded. Details of how hailstones grow are complicated, but the results are irregular balls of ice that can be as large as baseballs, sometimes even bigger. While crops are the major victims, hail is also a hazard to vehicles and windows. Hail damage events can be severe to persons, property, livestock and agriculture.



Kendall Pond Road

The Hail Size Description Chart developed by the National Oceanic and Atmospheric Administration (NOAA) and enhanced by other National Weather Service local sites depicts the potential size of hail during a hurricane or severe storm event. Some examples from the Hail Size Description chart include “1/2” inch=Pea Size” and “2 inches=Hen Egg Size.”

Hail Size Description

Hailstone Diameter in Inches	Size Description
<1/4	Bb
1/4	Pea Size
1/2	Mothball Size
3/4	Penny Size
7/8	Nickel Size
Severe Criteria 1	Quarter Size
1 1/4	Half Dollar Size
1 1/2	Walnut or Ping Pong Ball Size
1 3/4	Golf Ball Size
2	Hen Egg Size
2 1/2	Tennis Ball Size
2 3/4	Baseball Size
3	Teacup Size

²¹ NOAA. National Weather Service. Glossary. <http://w1.weather.gov/glossary/index.php?letter=n>. 02 2014

3 4/5	Softball Size
4	Grapefruit Size
4 3/4	CD/DVD
Note: Hail size refers to the diameter of the hailstone.	

Sources: National Oceanic and Atmospheric Administration (NOAA), National Weather Service (NWS)

Between 1995 and 2015, the National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center (NCDC) online database recorded 6 hail storms in Londonderry. Storms occurred during the months of June, July, August and September. Hailstone diameters recorded ranged from .75 to 1.75 inches.

The Committee was not aware of any damaging historical hail storms, however the potential exists.

All areas of Londonderry are potentially at risk from this hazard.

Moderate probability for hailstorms to occur and cause damage in Londonderry.

Given the random nature and typically short duration of these events, the Committee did not discuss mitigation measures for this hazard type.

E. Seismic Events

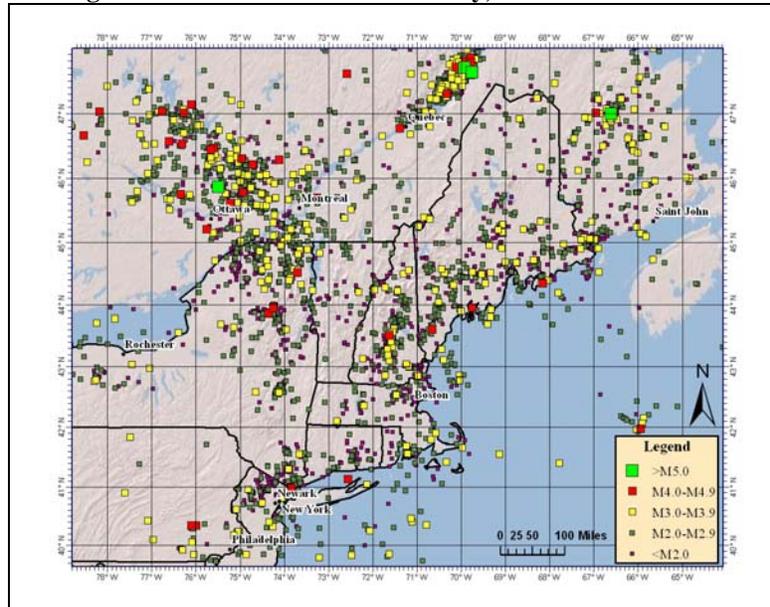
The Londonderry Hazard Mitigation Committee reviewed the following kinds of hazards related to seismic events:

1. Earthquakes

An earthquake is "a series of vibrations induced in the earth's crust by the abrupt rupture and rebound of rocks in which elastic strain has been slowly accumulating."²²

²² 2013 State of New Hampshire Multi-Hazard Mitigation Plan.

Figure 2 – Northeast Seismic Activity, 1975 – October 2013



Source: Weston Observatory, Boston College

In the State of New Hampshire, earthquakes are due to intraplate seismic activity, opposed to interpolate activity or shifting between tectonic plates as occurs in California. The causes of intraplate earthquakes have yet to be scientifically proved. One accepted explanation for the cause of intraplate "earthquakes in the Northeast are that ancient zones of weakness are being reactivated in the present-day stress field. In this model, pre-existing faults and/or other geological features formed during ancient geological episodes persist in the intraplate crust, and, by way of analogy with plate boundary seismicity, earthquakes occur when the present-day stress is released along these zones of weakness."²³

The size and extent of an earthquake is measured by the Richter scale. The Richter scale is a measurement of magnitude of the quake as calculated by a seismograph and does not measure damage. The Modified Mercalli scale denotes the intensity of an earthquake as it is perceived by humans, their reactions, and damage created. It is not a mathematically based scale but a ranking of perception. The following table gives intensities that are typically observed at locations near the epicenter of earthquakes of different magnitudes (USGS).

Magnitude	Typical Maximum Modified Mercalli Intensity
1.0 - 3.0	I
3.0 - 3.9	II – III

²³ Kafka, Alan. Why Does the Earth Quake in New England? August 24, 2011. https://www2.bc.edu/~kafka/Why_Quakes/why_quakes.html. 02-06-14.

4.0 - 4.9	IV – V
5.0 - 5.9	VI – VII
6.0 - 6.9	VII – IX
7.0 and higher	VIII or higher

One of New England’s more notable seismic zones runs from the Ossipee Mountain area of New Hampshire, through the Deerfield area, and continues south toward Boston, Massachusetts. This particular area has a mean return time of 408 years for a 6.0 Richter scale earthquake or a 39 percent probability of occurrence in 200 years. Additionally for a 6.5 Richter scale quake, there is a mean return time of 1,060 years or a 17 percent probability of occurrence in 200 years.²⁴ The most significant historic earthquakes in New Hampshire occurred December 20th and 24th, 1940 (epicenter just west of Ossipee, NH, 5.5 Richter scale magnitude).

In the past 35 years, Londonderry experiences a few minor tremors each year. Earthquakes are rare but not unheard of. A fall 2012 minor earthquake originating from the epicenter south of Portland, Maine (4.0 magnitude on the Richter scale) was felt as far away as Boston. No property damage was recorded in Londonderry. It is impossible to predict the earthquake events.

All areas of Londonderry are potentially at risk for property damage and loss of life due to earthquakes.

Moderate probability for earthquakes to occur and cause damage in Londonderry.

Given the random nature and broad, statewide scope of earthquakes, the Committee did not discuss mitigation measures for this hazard type.

2. Landslides

The term landslide includes a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows. Although gravity acting on an over-steepened slope is the primary reason for a landslide, there are other contributing factors:

- Erosion by rivers, glaciers, or ocean waves create over steepened slopes

²⁴ Pulli, Jay. Seismicity, Earthquakes Mechanisms, and Seismic Wave Attenuation in the Northeastern United States, PhD Dissertation Abstract. MIT, June 10, 1983. <http://erl.mit.edu/assets/Pulli-abstract.pdf>. 02-06-14.

- Rock and soil slopes are weakened through saturation by snowmelt or heavy rains
- Earthquakes create stresses that make weak slopes fail
- Earthquakes of magnitude 4.0 and greater have been known to trigger landslides
- Volcanic eruptions produce loose ash deposits, heavy rain, and debris flows
- Excess weight from accumulation of rain or snow, stockpiling of rock or ore, from waste piles, or from man-made structures may stress weak slopes to failure and other structures

Slope material that becomes saturated with water may develop a debris flow or mud flow. The resulting slurry of rock and mud may pick up trees, houses, and cars, thus blocking bridges and tributaries causing flooding along its path.

(Source: USGS, 2015)

A landslide occurs on areas of slope, and depending on where one occurs within a community and the risk factors involved, a landslide might cause no damage or material could sweep down to roadways or homes causing severe damage. There is presently no known widely-used scale measuring the magnitude of landslides. However, there are several resources which might be of use to characterize landslides and help identify the risks involved. The U.S. Geological Survey (USGS) Landslide Hazards Program identifies different types of landslides within the publication The Landslide Handbook - A Guide to Understanding Landslides 2008.

All areas of steep slopes in Londonderry are at risk for landslides.

The Committee was not aware of any damaging historical landslides, however the potential exists.

Moderate probability for landslides to occur and cause damage in Londonderry.

The HMPUC discussed landslides. Given that there are few instance steep slopes, the highest probability of hazard events was during construction periods. The Committee felt that existing regulations regarding alteration of terrain and site development, including construction inspections, provide adequate protection and effectively mitigate threats.

F. Other Hazards

The Londonderry Hazard Mitigation Plan Update Committee reviewed the following other kinds of hazards:

1. Utility pipe failure

Failure of utility pipe systems, including water, gas, and sewer, can be caused by joint leakage, contamination, pipe fracture or tuberculation. Pipe fractures are

the most costly and potentially damaging of the failure modes. (Makar 2) Fractures can be caused by blunt force (e.g. construction digging) or ground shifting caused by the natural expansion and contraction of freezing and thawing soil during the winter months or from earthquakes. Pipe blocks in sewer systems can cause a buildup of harmful gasses and lead to explosions. (SCWA)

Potential effects of water main failures can include immediate loss of water supply in the surrounding area, flooding, and road collapse. Sewer main failures can cause sewage backups, effluent leakage, and exposure to harmful bacteria. Leaks in gas mains can lead to fires or explosions if there is either an ignition source or pressure built up in the pipe. Explosions occurring in underground pipes can create craters, and possibly result in death, injuries, and property damage. (NTSB, "Pipeline Accidents")

There are approximately 39 miles of sewer, 90 miles of water, seven miles of Tennessee Gas mains, and 36 miles of Keyspan natural gas delivery lines in Londonderry. Water mains range in diameter from four to 30 inches. Manchester Water Works maintains 231 fire hydrants, 186 fire services (4 to 12 inch diameter pipes), and 481 domestic services (¾ to 16 inch pipes) in Londonderry. Additionally, Pennichuck Water Works maintains 194 fire hydrants, 77 fire services (2to 8 inch diameter pipes), and 1,519 domestic services serving a population of 4,086 (¾ to 2 inch pipes) in Londonderry. (Londonderry Hazard Mitigation Committee)

Manchester Water Works main breaks occur at an approximate frequency of .06 breaks per mile, compared to the national average of .20 breaks per mile.

All areas of Londonderry should be considered at risk for utility system failures. The Tennessee Gas Pipeline bisects the Town, running north to south. Particular concern should be given to the center of Town, where the gas pipeline passes the high school, middle school, and an elementary school.

The pipeline company provides annual continuing education and safety records to the Londonderry Fire Department. The Fire Department is in constant communication with the pipeline managers and receives annual training.

Moderate probability for utility system failures to occur and cause damage in Londonderry.

The HMPUC discussed potential utility pipe failure. The Committee feels that owner operation and maintenance inspections are adequate and that there are no additional actions to be taken at this time.

2. Airport related hazards

Typically, airport related hazards are the result of aircraft mechanical malfunctions. Collisions can occur in flight with other aircraft, birds, structures

such as buildings, lights, or towers, or with the terrain. While major commercial aircraft disasters are infrequent, when they do occur the majority are off airfield and nearly three-quarters of these accidents occur on either approach or departure. Less frequently, aircraft and airport disasters can be the result of terrorism. This may include hijackings, bombings, or intentional collisions with selected targets.

Events addressed by the Manchester Airport Emergency Plan include:

- bomb threats;
- structural fires within airport buildings;
- fires at fuel farms and fuel storage facilities;
- severe weather and natural disasters;
- hazardous materials incidents;
- sabotage and other unlawful interferences to civil aviation;
- power failures;
- medical emergencies; and
- disabled aircrafts obstructing active runways.

The Manchester Airport, departure and final approach paths to the airport which over-fly Londonderry, as defined by FAR Part 77, may pose a risk for airport related hazards in Londonderry.

Moderate probability for airport related hazards to occur and cause damage in Londonderry.

The HMPUC discussed airport related hazards and determined that ongoing cooperation/coordination between first responders and the airport, and adherence to the Manchester Airport Emergency Plan provide adequate tools for mitigation of this hazard type.

3. Drought

A drought is a natural hazard that evolves over months or even years and can last as long as several years or as short as a few months. Droughts are rare in New Hampshire and in the last fifteen years, the southern region of the state had two droughts, 2001 and 2010.²⁵ While a drought is not as devastating as some other hazards, low water levels can have a negative effect on existing and future home sites, especially those which depend on groundwater for water supply. Additionally, the dry conditions of a drought may lead to an increase wildfire risk. The economic cost of the drought may be born most heavily by large water users including industrial and or agricultural uses. Homeowners will also be affected through potential failing well water supplies.

²⁵ 2013 State of New Hampshire Multi-Hazard Mitigation Plan.

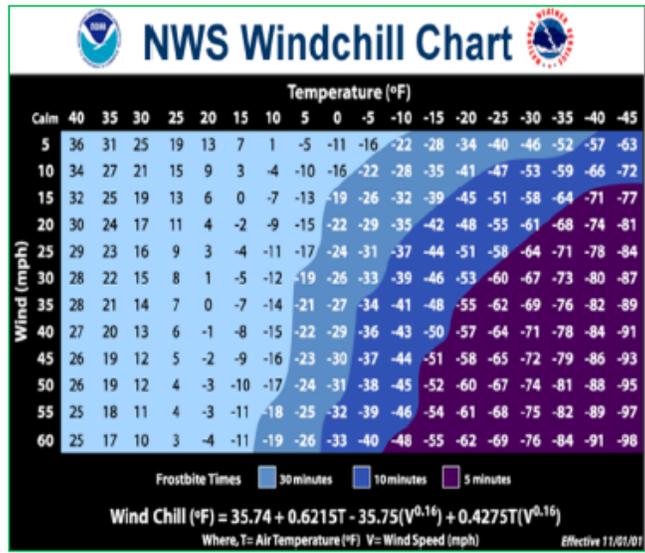
All areas of Londonderry would be affected by a drought.

Moderate probability for drought to occur and cause damage in Londonderry.

The Committee did not feel they needed to pursue mitigation strategies for drought due to most water sources being managed by either private parties or other public entities, including Manchester Water Works and Pennichuck Water Works.

4. Extreme Cold

While most New Hampshire residents are familiar with extreme cold situations in the State, this is not a section identified in the State of New Hampshire Natural Hazards Mitigation Plan, 2013. Periods of extreme cold, generally considered prolonged periods of below freezing temperatures, pose a potentially life-threatening situation for Londonderry’s residents. With the rising costs of heating fuel and electric heat, many low-income citizens are not able to adequately heat their homes, exposing themselves to cold related medical emergencies or death. The following National Weather Service Chart shows wind chill as a result of wind and temperature.²⁶



In Concord (closest National Weather Reporting Station), there are on average 21 days below 32 degrees Fahrenheit in November, 29 days in December, 30 days in January, 27 days in February, and 26 days in March. The coldest temperatures recorded for each month were -5 degrees Fahrenheit in November, -22° in December, -33° in January, -37° in February, and -16° in March.²⁷

All areas of Londonderry would be affected by extreme cold. Particular areas and populations at a greater risk are:

²⁶ National Weather Service: <http://www.nws.noaa.gov/om/windchill/>

²⁷ Northeast Regional Climate Center, 2015.

- elderly populations and day care centers;
low income populations

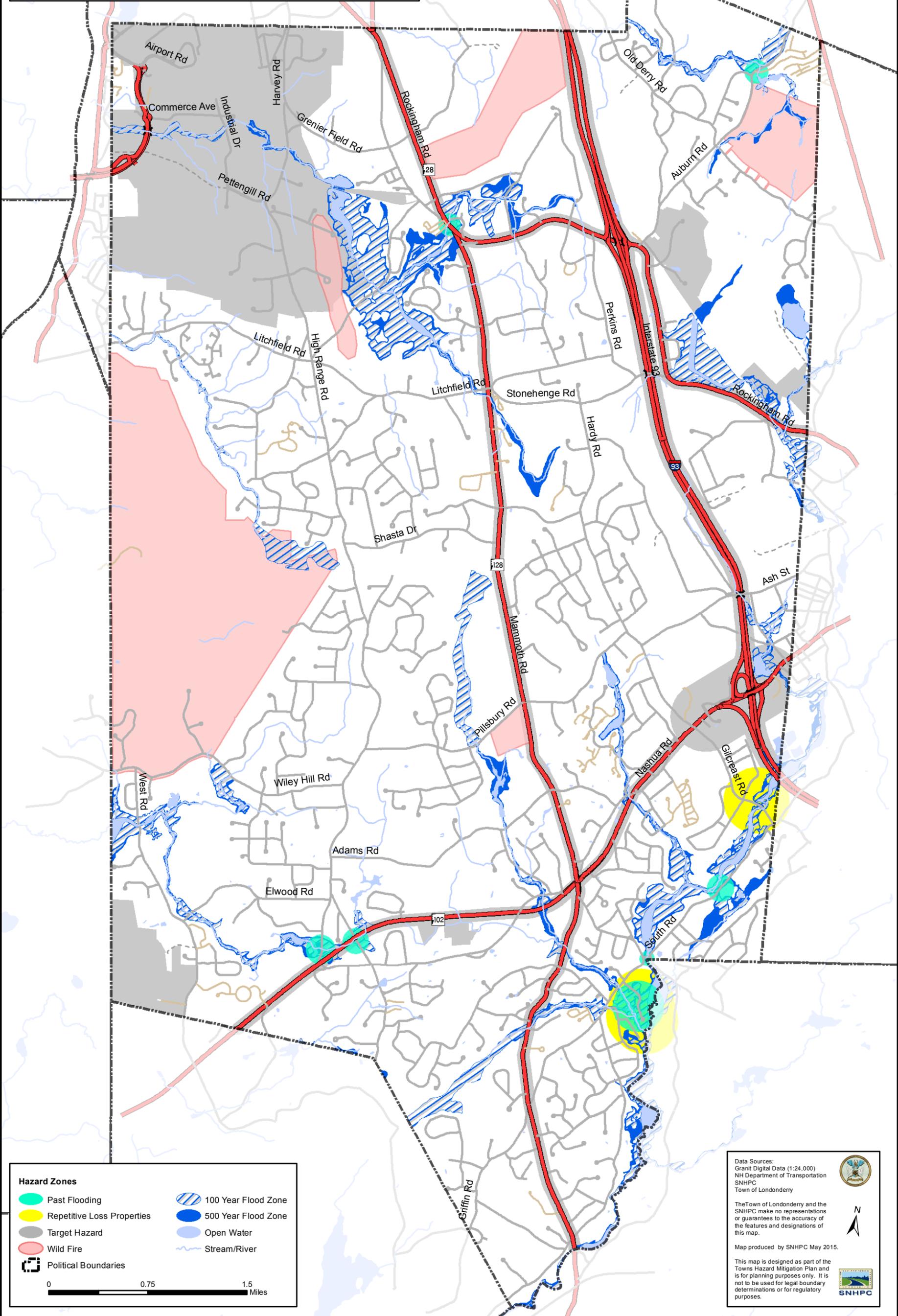
Moderate probability for extreme cold to occur and cause damage in Londonderry.

The Committee discussed extreme cold events and felt that there was adequate mitigation measure in place. The Town has an ongoing program to provide emergency shelter as needed. The Town should also carry out educational programs to provide information on family preparedness. No further actions were deemed necessary.

Map of Identified Hazard Zones

A GIS-generated map, following this page, was prepared to illustrate the Identified Hazard Zones.

Identified Hazard Zone Londonderry, NH



Hazard Zones

Past Flooding	100 Year Flood Zone
Repetitive Loss Properties	500 Year Flood Zone
Target Hazard	Open Water
Wild Fire	Stream/River
Political Boundaries	

0 0.75 1.5 Miles

Data Sources:
 Grant Digital Data (1:24,000)
 NH Department of Transportation
 SNHPC
 Town of Londonderry

The Town of Londonderry and the SNHPC make no representations or guarantees to the accuracy of the features and designations of this map.

Map produced by SNHPC May 2015.

This map is designed as part of the Towns Hazard Mitigation Plan and is for planning purposes only. It is not to be used for legal boundary determinations or for regulatory purposes.

SECTION III
VULNERABILITY ASSESSMENT

Disaster Risk and Vulnerability Assessment

Based on the hazards outlined in Section II, the following is an estimate of damage, in dollars, that may result if a natural hazard occurs in the Town. These estimates were calculated using FEMA’s *Understanding Your Risks: Identifying Hazards and Estimating Losses*, August 2001. The publication’s methodology was modified for this *Plan* based on the data available. The vulnerability estimates utilize available NFIP data, 2014 Town valuation, and identified essential facilities. The following calculations used available current or historical data, associated risks and summary of assets considered in the estimation process.

Human losses were not calculated during this exercise, but could be expected to occur depending on the type and severity of the hazard. The estimates typically represent only structural loss, unless sufficient data was available to incorporate contents, structure use, or function loss. The current valuation of the Town is:²⁸

Land Use Classification	2014 Assessed Valuation		
	Land	Buildings	Total
Current Use	\$613,569		\$613,569
Discretionary Easement	\$305,600	\$60,991	\$366,591
Residential	\$678,087,580	\$1,605,157,690	\$2,283,245,270
Manufactured Housing		\$15,492,400	\$15,492,400
Commercial/Industrial	\$185,594,520	\$437,434,141	\$623,028,661
Utilities		\$656,385,688	\$656,385,688
	Total Assessed Valuation		\$3,584,542,048
	2014 Equalized Valuation		\$3,294,598,079

Source: NH Department of Revenue, website, 2015

Flooding

\$1.3 - \$4.9 million

The following numbers of buildings are located in the Town of Londonderry FEMA Flood Zone: 10 Commercial, 2 Industrial, 78 Residential and 1 Other. Approximately, 150 persons live in the FEMA designated Flood Zone. The average residential house sale price is \$283,000²⁹. Two scenarios were considered with a low estimate assuming damage to 25 percent of the structures with a one-foot flood depth and a high estimate assuming damage to 50 percent of the structures with a four-foot flood depth. These estimates also assume the residential structures are one- or two-story homes with basements and the non-residential structures are two-story without basements. Standard values for percent damage, functional downtime and displacement time were used from

²⁸ NH Department of Revenue Administration, 2014 Tables by County

²⁹ Average of single and multi-family structures sold, 2014, NHHFA Purchase Price Trends data

FEMA's *Understanding Your Risks: Identifying Hazards and Estimating Losses*; and its "Worksheet 4- Estimate Losses" was used to determine the actual estimates.

The low estimate was \$726,750 in structural damages, \$545,063 in contents loss, and \$56,685 in structure use and function loss. The total low estimate loss was \$1,330,497. The high estimate was \$2,713,200 in structural damages, \$2,034,900 in contents loss, and \$145,874 in structure use and function loss. The total high estimate loss was \$4,893,974.

Infrastructure damage could be extensive, including roads, bridges, utilities, towers, et cetera. If a devastating flood were to occur, the damage to properties located within the floodplain could exceed this estimated amount. Since 2010, the Town has upgraded several culverts which has reduced the potential for flood losses that might occur during a major flood event.



Cohas Brook at Auburn Road

Hurricanes, Downbursts

Up to \$30 million

Most of the damage from hurricanes or downbursts is caused by high water and strong winds. While Londonderry is less vulnerable to hurricanes than coastal areas, significant damage could be expected, particularly in areas with manufactured homes. Assuming a community-wide assessed structural valuation, adjusted to market value, of approximately \$3.3 billion, damaging 1 percent of these structures could result in losses of up to \$33 million. This does not include other damages expected to occur on public property within the community.

Debris-Impacted Infrastructure and River Ice Jams

\$10,000 to \$5 million

Damage from these two hazards could be expected to occur not only to privately owned structures, but also to infrastructure such as roads, bridges, and culverts. An estimate of damage, in dollars, from this type of hazard can range widely depending on the nature and severity of the hazard. Past debris-impacted infrastructure damage, in Londonderry, has been minimal. Therefore, it is difficult to separate actual damages to represent this type of hazard. A small-to-

medium-sized event could be expected to produce a loss from \$10,000 to \$5 million.

Erosion, Mudslides and Rapid Snowpack Melt **up to \$125,000**

Erosion, mudslides, and rapid snowpack melt damage usually affects infrastructure such as roads and bridges, but can also affect individual structures and businesses. The inventory of essential facilities located in the areas of steep slopes was used to prepare an estimate of this type of damage, since a complete inventory was not available. There are no value estimates for two cell towers, five public water suppliers, and one historic facility that would be vulnerable to these hazards. However, data is available for the remaining structures in the hazard zone. For a moderate event, assuming from 1 percent to 5 percent structural damages, and from .5 percent to 2.5 percent content loss, damages could be expected between \$25,000 and \$125,000. Since this hazard has not been widespread in Londonderry, damages from this hazard should be minimal.

Dam Breach or Failure **\$300,000 to \$3.7 million**

Londonderry has no Class S dams that could cause serious failure damage. The nine Class L dams have a low potential for causing damage in the surrounding areas. Damage estimates could be expected to be about 25-75 percent of the flooding estimate, or \$300,000 to \$3.7 million.

Water Retention Facility Failure **\$62,612 to \$1.15 million**

Minimal information is available on the fiscal impacts of this type of event. Damages would be inflicted if the one 2.3 million gallon water tower failed. No past water retention facility failures have occurred in Londonderry to base an estimate of potential losses on. Therefore, damages are estimated to impact from 1 to 20 houses, depending on the surrounding residential density and path of the resulting water path. Assuming basement flooding equal to two feet below the first floor elevation, structural and contents damages could amount to \$62,612 to \$1.15 million.

Tornados **\$500,000 to \$15 million**

The Fujita Scale is used to determine the intensity of tornados. Most tornados are in the F0 to F2 Class, in a range that extends to F5 Class. Building to modern wind standards provides significant property protection from tornados. The design wind speed in Londonderry is 100 miles per hour, Exposure Category B, in accordance with the 2014 International Building Code. While it is difficult to assess the monetary impact a tornado may have on a community, as there are no existing standard loss estimation models, the dollar range shown above indicates an approximation of what might be expected. Tornados rarely occur in New Hampshire, so damage from this hazard would be uncommon.

Heavy Snowstorms, Nor'easters, Ice Storms, Hailstorms **\$10,000 to \$3 million**

Damage from heavy snowstorms, nor'easters, ice storms and hailstorms vary greatly depending on the amount of snow and ice that accumulates during the

storm. The ice storm of 2008 caused much damage to power lines, structures, and the agricultural economy in northern New England and is said to be the most damaging ice storm on record. Icing also occurred in late November 2014. The Town experienced heavy snowstorms and Nor'easters during the last four years. These types of storms in Londonderry could be expected to cause damage ranging from several thousand dollars to several million, depending on the severity of the storm.

Lightning **\$1,000 - \$15,000**

Damage from lightning is typically minimal and occurs in isolated events without record of actual costs incurred. Incidences throughout the region, occurring to municipal facilities, have incurred damages ranging between \$1,000 and \$15,000.

Wild Land Fires **\$300,000 to \$2.7 million**

A fire can strike at any time, but may be expected to occur during years of drought and particularly in the spring and fall months. From 2010 to 2014, with the exception of 2012, the number of wildland fires / grass fires has declined.

Grass or wild land fires can spread more rapidly between structures due to the increased intensity and size of the fire. Presuming a small-to-medium-sized fire that destroys from one to 20 homes, damage from this hazard could be expected to range from \$342,000 to \$2,736,000. Other damage, such as to utilities, was not included in this estimate.

Earthquakes **\$16 million**

Assuming a moderate earthquake occurs in Londonderry, where structures are not built to a high seismic design level and are mostly of wood frame construction, it is estimated that about 1 percent of the community-wide assessed structural valuation adjusted to market value could be lost, including both partial and total damage.

Landslides **Up to \$100,000**

Losses due to landslide can include property damage to structures or utilities limited in scope to the area affected. No areas in Londonderry were identified as threats of landslide due to low relief throughout Town.

Utility Pipe Failure **\$200,000 to \$40 million**

No information on water or gas main failures is available for specific properties in Londonderry. Other communities in the SNHPC region have incurred damages of \$200 to \$40,000 from water and sewer main leaks or breaks. The Tennessee Gas Pipeline does run behind three of Londonderry's schools making these three essential facilities vulnerable despite increased safety precautions designed into this length of pipeline.

Airport Related Disasters

\$5,000 to \$462.4 million

Since there is a wide range in the type, magnitude, and cost of airport or aircraft related disasters, it is difficult to provide an accurate estimate. Most accidents or incidences at the Manchester Airport, as outlined in the previous section, involved minor damages to the aircraft itself, with no other damages or human casualties. Incidences like these could generate \$5,000 or more in damages.

More tragic accidents or plane crashes, which have not previously occurred at the Manchester Airport, could involve the destruction of one major airliner or even two in the event of a collision. Commercial jets range in price from \$40 million to \$400 million. Additionally, if a crash occurred in a residential or populated area there is the potential for the loss of lives and the destruction of one to five homes. The replacement cost of these homes and contents would be \$424,500 to \$2,122,500. Given these values damages, not including human lives, the damage could range from \$40 million (one home and one smaller commercial craft) to \$410 million (five homes and two larger commercial crafts).

Non-financial Losses

Drought

No major damage is known to have occurred in the Town of Londonderry related to drought. However, Londonderry's agricultural and landscape related businesses could be impacted due to reduced crop yields or lower demand for services. Other impacts due to drought could include higher risk of forest fires. No potential loss estimates have been prepared for these categories.

Extreme Cold

While difficult to document, extreme cold events have a direct correlation to public health. Prolonged exposure to extreme cold could trigger hypothermia. Additionally, heating systems could become overburdened and heating fuels could be depleted during extreme cold events.

Note: The above figures are estimates only. The amount of damage from any hazard will vary from these figures depending on the time of occurrence, severity of impact, weather conditions, population density, building construction at the exact event local, and the triggering of secondary events.

Critical Facilities

The following are summary tables of the critical facilities located in each of the five identified hazard zones within the Town. For the purposes of this *Plan* a critical facility is defined as a building, structure or location which:

- is vital to the hazard response effort;
- maintains an existing level of protection from hazards for the Town; and
- Would create a secondary disaster if a hazard were to impact it.

These summaries were queried from a database of all essential facilities created for this *Plan*.³⁰ The Hazard Mitigation Committee, based on its knowledge of the Town, Town of Londonderry Department of Public Works and GIS Manager, and SNHPC, using various directories, were the primary sources for the Critical Facilities listing. The assessed values presented are the total building values and do not include the cost of land or building contents. Assessments were conducted during 2010 and at the time of this *Plan* are assumed to be 100 percent of the full market value.

³⁰All facilities' proximity to the various hazard zones was identified using GIS as follows:

- Special Flood Hazard Zones and Steep Slopes- intersecting or within 100 feet of the mapped area
- Wild Land Fires and Target Hazards- intersecting the mapped area

The 100 foot buffer was applied to allow for mapping accuracies of +/- 200 feet and to include buildings mapped only by a point that are partially located within the specified hazard zone. The other two zones are acknowledged to be approximate locations as mapped.

CRITICAL FACILITIES

Londonderry, NH

Legend

Facility Type

- Town/School Offices
- Aviation Support
- Post Office
- Police Station
- Fire Station
- EOC
- Military
- Public Works Garage
- Emergency Fuel
- Emergency Shelter
- Airport
- Wireless Towers
- Public Water System
- Water Pump/Booster
- Water Storage Tank
- Sewage Pump Station
- Electrical Substations
- Gas Pump Station

Hazard Zones

- Past Flooding
- Repetitive Loss Properties
- Target Hazard
- Wild Fire
- 100 Year Flood Zone
- 500 Year Flood Zone
- Open Water
- Stream/River

Utility Lines

- Gas Pipeline
- Power Transmission Line
- Water Service Area
- Londonderry Gravity Mains
- Private or Other Gravity Mains
- Sewer Force Mains
- Political Boundaries

0 2,800 5,600 8,400 11,200 Feet

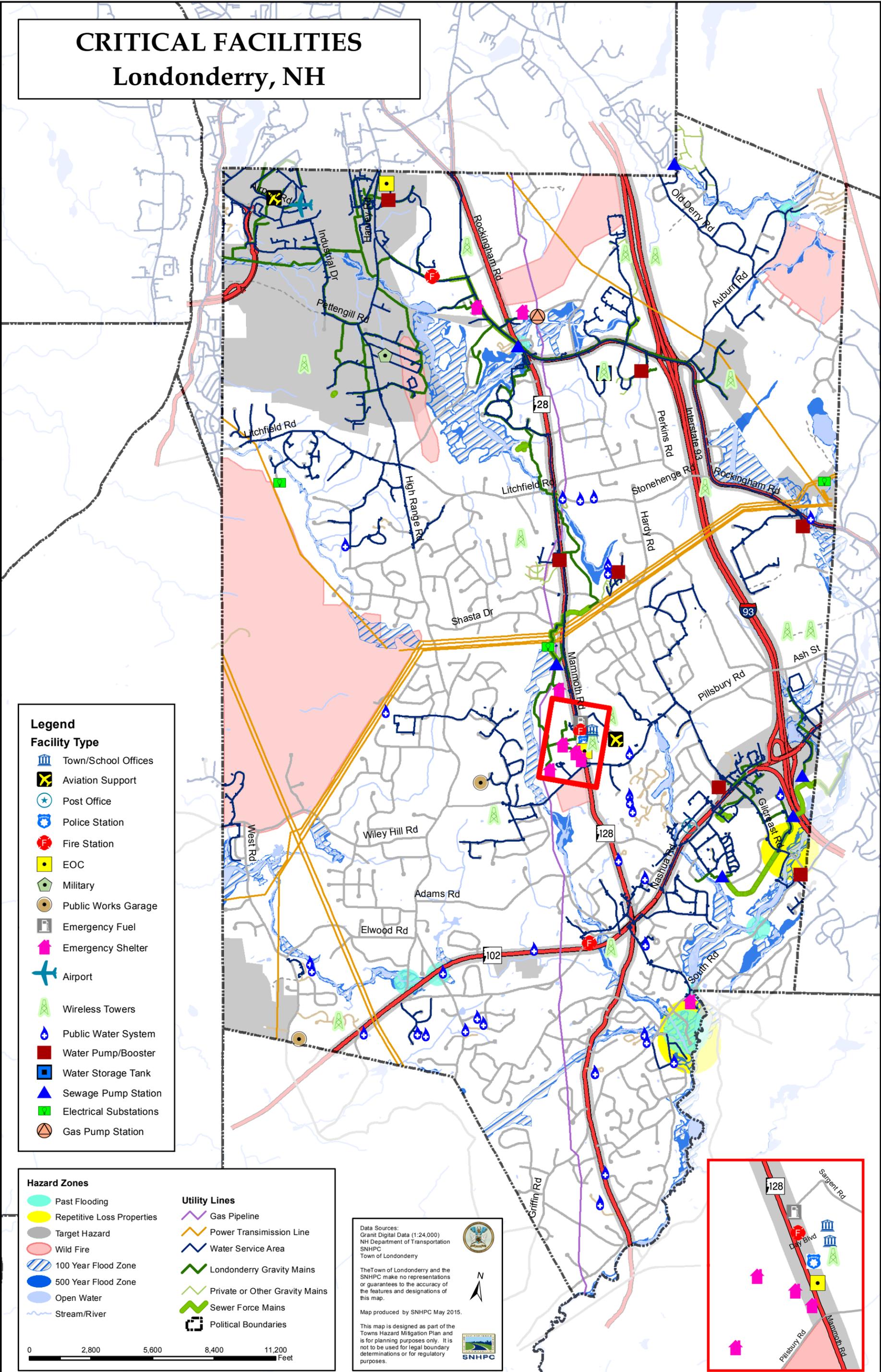
Data Sources:
 Granit Digital Data (1:24,000)
 NH Department of Transportation
 SNHPC
 Town of Londonderry

The Town of Londonderry and the SNHPC make no representations or guarantees to the accuracy of the features and designations of this map.

Map produced by SNHPC May 2015.

This map is designed as part of the Towns Hazard Mitigation Plan and is for planning purposes only. It is not to be used for legal boundary determinations or for regulatory purposes.

Inset map showing a zoomed-in view of the central area of Londonderry, NH, highlighting critical facilities and hazard zones. The inset map shows a red box around the central area, with labels for Sargent Rd, Day Blvd, Pillsbury Rd, and Mammoth Rd. It also shows various facility icons like a fire station, police station, and emergency shelter, along with hazard zones like wild fire and flood zones.



Critical Facilities

The following are emergency equipment or areas that are *needed* to respond at the time of a natural disaster. Applicable hazard areas for each Critical Facility are keyed in parenthesis.

Key

- (F) Located within the Special Flood Hazard Area and/or prone to flooding and damage due to 100-year floodplain events, ice jams, debris impacted infrastructure, hurricanes or rapid snow pack melt.
- (S) Located on or adjacent to a Steep Slope and susceptible to damage in the event of erosion, mudslides or landslides.
- (X) Located in or near a known past or potential wildfire location
- (T) Susceptible to Town wide hazard risks such as wind damage from hurricanes, tornados, nor'easters, downbursts, lightning, heavy snow or ice storms or hailstorms, target.

Airport & Aviation Support

- Manchester-Boston Regional Airport, 1 Airport Rd. (T)
- Federal Aviation Administration, 104 Nelson Rd.
- TSA, 8 Ammon Dr. (T)

Electrical Power

- Eversource (formerly PSNH) Power Station, 7A Brewster Rd. (T)
- Eversource Substation, 20 Rear Mammoth Rd.
- AES Granite Ridge Cogeneration Facility, 21 Teton Dr.

Emergency Fuel Facilities

- Emergency Fuel Storage (T)

Emergency Operations Center

- Manchester-Boston Regional Airport EOC, 4 Technology Dr. (T)
- Emergency Operations Center, 268A Mammoth Rd. (T)

Emergency Shelter

- Matthew Thornton School, 275 Mammoth Rd.
- Londonderry Senior Center (Mayflower Grange), 535 Mammoth Rd.
- South Londonderry Elementary School, 88 South Rd.
- Londonderry High School, 295 Mammoth Rd.
- Moose Hill School, 150 Pillsbury Rd.
- Police Dept. Community Room (cooling/warming), 268A Mammoth Rd. (T)
- Londonderry Middle School, 313 Mammoth Rd.
- North Elementary School, 19 Sanborn Rd.

Emergency Response

- Londonderry Fire Dept.- Central Station, 280 Mammoth Rd. (T)

- Londonderry Fire Dept.- South Station, 17 Young Rd.
- Londonderry Fire Dept.- North Station, 20 Grenier Field Rd.
- Londonderry Police Dept., 268A Mammoth Rd. (T)

Gas Pump Station

- Tennessee Gas Pump Station, 26 Sanborn Rd. (F)

Military

- U.S. Armed Forces Reserve Center, 64 Harvey Rd. (T)

Post Office

- U.S. Post Office, 84 Nashua Rd.

Public Water System

- Community Well (Adventures in Learning Daycare), 18 Rockingham Rd. (T)
- Community Well (Stonehenge Trust Apts.), 17-35 Stonehenge Rd.
- Community Well (Wagon Wheels Tenant Coop), 2 Stonehenge Rd.
- Community Well (Ministerial Hills), Meetinghouse Dr.
- Community Well (Londonderry Country Club), 46 Kimball Rd.
- Community Well (Southview Condos), 100 Pillsbury Rd.
- Community Well (PEU/NESENKEAG), Jewell Ct.
- Community Well (Boumil Grove Condos), 1 Charleston Ave. (T)
- Community Well (Century Village Condos), Winding Pond Rd.
- Community Well (Midridge Condos), Midridge Circle (T)
- Community Well (28 Buttrick Rd. Property), 28 Buttrick Rd.
- Community Well (Kendalwood Condo Assoc.), Kendal Pond Rd.
- Community Well (Londonderry Rest Area), Rte. 102 (T)
- Community Well (Town Square Prof. Condo), 12 Parmenter Rd. (T, F)
- Community Well (PEU/ Harvest Village), Rainbow Dr.
- Community Well (Ponderosa MHP), South Rd. (F)
- Community Well (Rolling Meadows Condos), Bayberry Ln.
- Community Well (PEU/ Pinehaven Water Trust), Pleasant Dr.
- Community Well (PEU/ Avery Estates), Rossini Rd. (T)
- Community Well (Olde Country Village...), Olde Country Village Rd.
- Community Well (Sapatis Flea Market), Rte. 102 (T)
- Community Well (Victory Christian School), 42 Mammoth Rd. (T)
- Community Well (Oakridge Condos), Mammoth Rd.

Public Works Garage

- Town of Londonderry Highway Garage, 120 High Range Rd.
- NH DOT District 5 Maintenance Shed, 4 West Rd.

Sewage Pump Station

- Action Equipment Pump Station, 8 Action Blvd. (T)
- Plaza 28 Pump Station, 501 Mammoth Rd. (F, T)
- Mammoth Rd. Interceptor Pump Station, 323A Mammoth Rd.
- Charleston Ave. Pump Station, 19 Charleston Ave. (T)

- Tokanel Drive Pump Station, Tokanel Dr.
- Mill Pond Sewage Pump Station

Town Offices

- Londonderry Town Hall, 268 B Mammoth Rd.
- Londonderry School District Office, 268 Mammoth Rd.

Water Pump or Booster Station

- Springwood Hills Booster Station, 7 Coteville Rd.
- Mountain Home Estates Pump Station, 201 Fieldstone Dr. (T)
- Ministerial Heights Pump Station, 1 Meetinghouse Rd.
- Gilcreast Rd. Booster Station, Gilcreast Rd. (T)
- South Rd. Booster Station, 182 South Rd.
- Manchester Water Works Pump Station, 4 Akira Way (T)
- Manchester Water Works Pump Station, Vista Ridge Dr.

Water Storage Tank

- Manchester Water Works Storage Tank, 14 Josephine Dr.

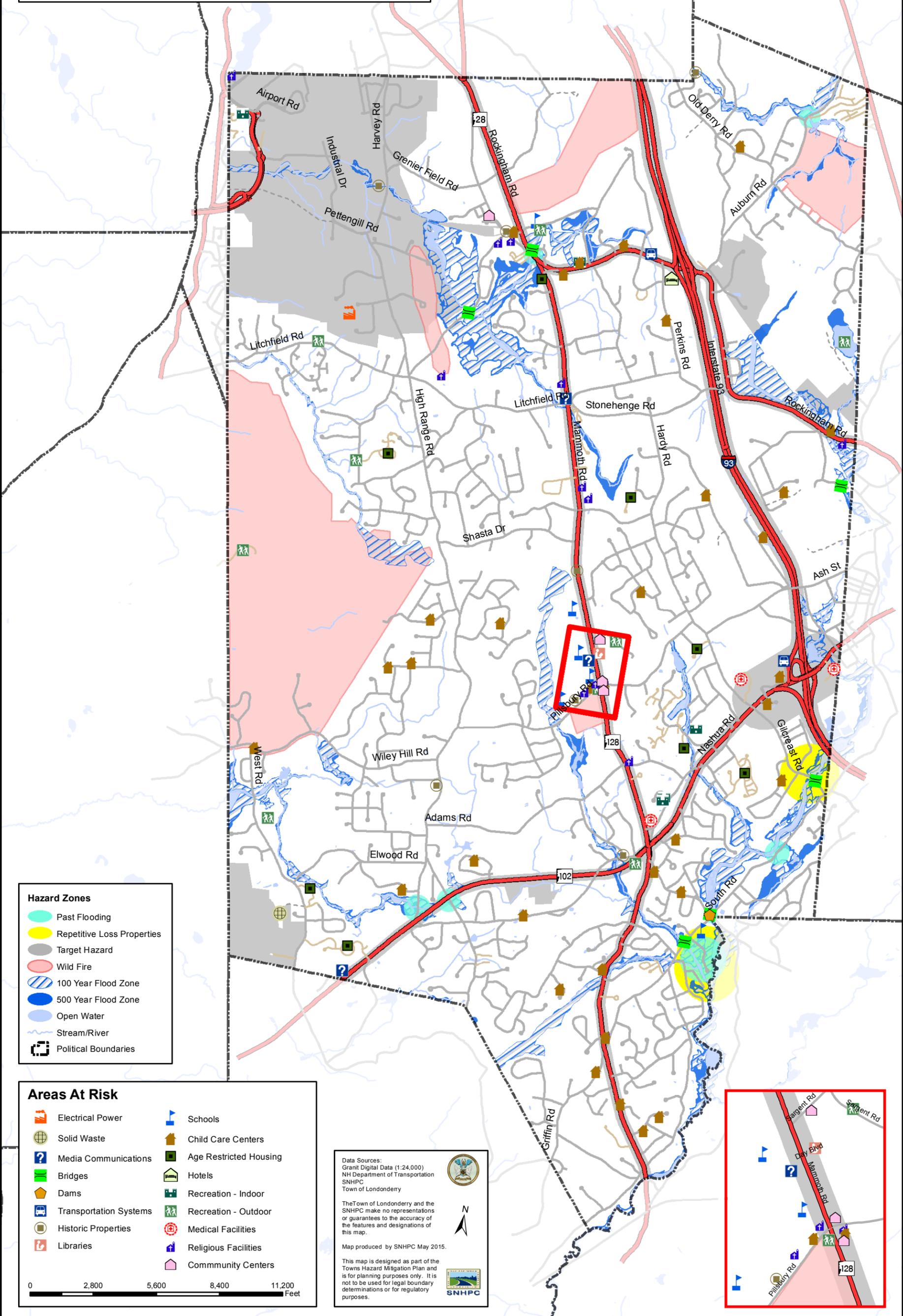
Radio Towers

- Wireless Tower, 13 Wilson Rd.
- Wireless Tower, Manchester Water Works, 14 Josephine Dr.
- Wireless Tower, 15 Independence Dr. (T)
- Wireless Tower, 29 and 45 Madden Rd.
- Wireless Tower, Nelson Fields Tower, 19 Sargent Rd.
- Wireless Tower, 58 Stonehenge Rd. (T)
- Wireless Tower, Jacks Bridge Rd.
- Wireless Tower, Remi Fortin, 572 Mammoth Rd.
- Wireless Tower, Hickory Woods, 21 Black Forest Circle
- Wireless Tower, 187A Pillsbury Rd.
- Wireless Tower, FAA Radio Tower, off N. Wentworth Ave. (T)
- Wireless Tower, Mammoth Green, off NH 102, map 3-130
- Wireless Tower, Londonderry Police Tower, 268 Mammoth Rd.
- Wireless Tower, 28 Kelley Rd.

The five identified hazard zones are:

- **Town Wide Hazards** include hurricanes, tornados, nor'easters, downbursts, lightning, heavy snow, ice storms, hailstorms, earthquakes, , utility pipe failure, drought, or extreme cold;
- **Special Flood Hazard Areas** include riverine flooding, hurricanes, debris-impacted infrastructure, ice jams, rapid snowpack melt, or dam breach;
- **Steep Slopes** include erosion, mudslides, or landslides;
- **Wild Land Fires** include wild land fire hazards; and
- **Target Hazards** include target hazards.

AREAS AT RISK Londonderry, NH



Hazard Zones

- Past Flooding
- Repetitive Loss Properties
- Target Hazard
- Wild Fire
- 100 Year Flood Zone
- 500 Year Flood Zone
- Open Water
- Stream/River
- Political Boundaries

Areas At Risk

<ul style="list-style-type: none"> Electrical Power Solid Waste Media Communications Bridges Dams Transportation Systems Historic Properties Libraries 	<ul style="list-style-type: none"> Schools Child Care Centers Age Restricted Housing Hotels Recreation - Indoor Recreation - Outdoor Medical Facilities Religious Facilities Community Centers
--	---

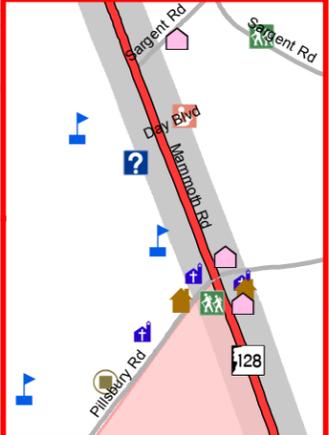
0 2,800 5,600 8,400 11,200
Feet

Data Sources:
 Grant Digital Data (1:24,000)
 NH Department of Transportation
 SNHPC
 Town of Londonderry

The Town of Londonderry and the SNHPC make no representations or guarantees to the accuracy of the features and designations of this map.

Map produced by SNHPC May 2015.

This map is designed as part of the Towns Hazard Mitigation Plan and is for planning purposes only. It is not to be used for legal boundary determinations or for regulatory purposes.



Summary of Critical Facilities by Hazard Zones

Areas at Risk

The following are summary tables of the areas at risk located in each of the five identified hazard zones within the Town. For the purposes of this *Plan* an area at risk is defined as emergency equipment or areas not needed to respond at the time of a natural disaster, but which could still be threatened if a natural disaster were to occur. These include:

- critical facilities not utilized for emergency response;
- people and facilities to be protected in the event of a disaster; and/or
- potential resources for services or supplies in the event of a disaster.

These summaries were queried from a database of all essential facilities created for this *Plan*.³¹ Resources for the Areas at Risk database entries included the Committee, SNHPC, NH Department of Environmental Services GIS data, NH Office of Energy and Planning GIS data, UNH GRANIT GIS data, and the National Register of Historic Places.

The five identified hazard zones are:

- **Town Wide Hazards** include hurricanes, tornados, nor'easters, downbursts, lightning, heavy snow, ice storms, hailstorms, earthquakes, utility pipe failure, drought, or extreme cold;
- **Special Flood Hazard Areas** include riverine flooding, hurricanes, debris-impacted infrastructure, ice jams, rapid snowpack melt, or dam breach;
- **Steep Slopes** include erosion, mudslides, or landslides;
- **Wild Land Fires** include wild land fire hazards; and
- **Target Hazards** include target hazards.

³¹All facilities' proximity to the various hazard zones was identified using GIS as follows:

- Special Flood Hazard Zones and Steep Slopes- intersecting or within 100 feet of the mapped area
- Wild Land Fires and Target Hazards- intersecting the mapped area

The 100 foot buffer was applied to allow for mapping accuracies of +/- 200 feet and to include buildings mapped only by a point that are partially located within the specified hazard zone. The other two zones are acknowledged to be approximate locations as mapped.

Essential Facilities at Risk

The following are emergency equipment or areas *not needed* to respond at the time of a natural disaster, but which could still be threatened and may warrant emergency services if a natural disaster were to occur. Applicable hazard areas for each Critical Facility are keyed in parenthesis.

Key

- (F) Located within the Special Flood Hazard Area and/or prone to flooding and damage due to 100-year floodplain events, ice jams, debris impacted infrastructure, hurricanes or rapid snow pack melt.
- (S) Located on or adjacent to a Steep Slope and susceptible to damage in the event of erosion, mudslides or landslides.
- (X) Located in or near a known past or potential wildfire location
- (T) Susceptible to Town wide hazard risks such as wind damage from hurricanes, tornados, nor'easters, downbursts, lightning, heavy snow or ice storms or hailstorms, target.

Age Restricted Housing

- Cohas Landing, 491 Mammoth Rd. (T)
- Hickory Woods, Hickory Woods
- Harvest Village, West Rd.
- Buttrick Village, Winding Pond Rd.
- Parrish Hills, 5 Parish Rd.
- The Nevins, Mercury Rd.
- Forrest Hills, Sawgrass Circle
- Sugar Plum Hill

Bridge

- South Road, Todd Brook (Repetitive Loss)
- South Road, Beaver Brook (F)
- Gilcreast Road, Beaver Brook (F)
- Stokes Road, Little Cohas Brook (F, T)
- Hall Road, Little Cohas Brook (F)
- Coteville Road, Shields Brook (F)

Child Care

- Ms. Dariene Early Learning Center, 10 Kendall Pond Rd.
- Alphabet Soup Child Care, 2 Merlin Pl. (T)
- Children's World Learning Center, 10 Mohawk Dr.
- Trisha's Day Care, 31 Royal Ln.
- Kids by the Common, 128 Pillsbury Rd.
- Londonderry Learning Academy, 28 Buttrick Rd.
- Country Kids Day Care, 48 Old Nashua Rd.
- Wee Bern Day Care, 13 Acropolis Ave.

- Play and Learn Day Care, 96 Old Derry Rd.
- Jacob's Ladder Learning Center, 258 Mammoth Rd. (T)
- Mylene's Day Care, 22 Royal Ln. (T)
- Donna's Den, 113 Wiley Hill Rd. (X)
- Pixie Preschool, 29 Kendall Pond Rd.
- St. Mark's Nursery School, 1 South Rd. (T)
- South Londonderry Kindergarten, 12 Griffin Rd.
- Adventures in Learning, 18 Rockingham Rd. (T)
- The Children's Terrace, 8 Robin Hood Dr.
- Family Room Day Care, 16 Robin Hood Dr.
- Miss Sylvia's, 10 Cheshire Ct.
- Londonderry Preschool, 9 Severance Dr.
- Brown's Day Care, 11 Ross Dr. (F)
- Applewood Learning Center, 2 Hampton Dr. (T)
- Londonderry's Peace of Mind, 12 Summer Dr.
- Cozy Kid's Child Care, 3 Sanborn Rd.
- Chestnut Hill Preschool, 12 Chestnut Hill Dr.
- Debra Cloutier, 9 King Arthur Dr.
- Kindercare Learning Center, 7 Garden Ln. (T)
- Creative Little Angels Child Care, 40 Mammoth Rd. (T)
- YMCA of Gr. Londonderry Schools, 206 Rockingham Rd. (T)
- World of Discovery, 182 Rockingham Rd. (T)
- First Friends Day Care, 221 Rockingham Rd. (T)
- Home Grown Kids, 49 Perkins Rd.
- Honey Bear Day Care, 44 Sherwood Rd.
- Bright House Family Day Care, 79 Hovey Rd.
- Little Orchard Family Day Care, 34 Trolley Car Ln. (T)

Community Center

- Grange Hall, 260 Mammoth Rd. (T)
- Londonderry Lion's Club, 256 Mammoth Rd.
- American Legion Post #27, 4 Sargent Rd.
- Londonderry Senior Center (Mayflower), 535 Mammoth Rd.

Communication

- Comcast, 322 Nashua Rd.
- Londonderry Local Access Television, 281 Mammoth Rd.
- Londonderry Times, 2 Litchfield Rd. (T)

Dam

- Kendall Pond, Beaver Brook (F)

Electrical Power

- AES Granite Ridge Cogeneration Facility, 21 North Wentworth Ave. (T)

Historic

- Annis Grain Mill, 516 Mammoth Rd.

- Town Pound, Mammoth Rd. (T)
- Manter Mill, 14 Old Derry Rd. (F)
- Stone Arch Railroad Bridge, Harvey Rd. (F, T)
- Elwood House, 77 High Range Rd.
- Morrison House Museum, Pillsbury Rd.
- Gen. Mason J. Young House, 4 Young Rd.

Hotel

- Sleep Inn, 70 Perkins Rd.

Library

- Leach Library, 276 Mammoth Rd. (T)

Medical Facility

- Elliot Medical Center, 40 Buttrick Rd.
- Dialysis, 1F Commons Dr. (T)
- Dialysis, 1 Action Blvd. (T)

Recreation - Indoor

- Nutfield Community YMCA, 206 Rockingham Rd. (T)
- Workout Club and Wellness Center, 18 Orchard View Dr.
- Spectrum Gymnastics Academy, 26 Buttrick Rd.
- House of the Samurai, 28 Buttrick Rd.
- Executive Health and Sports Center, 1 Highlander Way

Recreation - Outdoor

- West Road Fields, 94 West Rd.
- Londonderry Rail Trail (F)
- Scobie Pond, Brewster Rd. (F)
- Lucky Seven Stables, 154 Litchfield Rd.
- Londonderry Country Club, 57 Kimball Rd.
- Londonderry Fish & Game, Reserve Dr. (X)
- Nelson Rd. Recreation Area, 104 Nelson Rd.
- Londonderry Town Common, 295 Mammoth Rd. (X, T)
- Mammoth Green Driving Range, 135 Nashua Rd. (T)

Religious Facility

- Bethany Chapel, 54 Newbury Rd. (T)
- Victory Baptist Church, 78 Litchfield Rd.
- St. Jude Parish, 438 Mammoth Rd. (T)
- Londonderry Baptist Church, 368 Mammoth Rd.
- Londonderry Christian Church, 372 Mammoth Rd.
- Londonderry United Methodist Church, 258 Mammoth Rd. (T)
- Manchester Slavik Baptist Church, 517 Mammoth Rd.
- St. Mark's Church, 1 South Rd. (T)
- Christian Fellowship Baptist, 5 Rockingham Rd. (T)
- St. Peter's Episcopal Church, 1 Peabody Row (T)

- Orchard Christian Church, 136 Pillsbury Rd.
- Manchester Slavik Baptist Church, 7 Hall Rd.
- Londonderry Presbyterian Church, 126 Pillsbury Rd. (T)

School

- Londonderry Middle School, 313 Mammoth Rd.
- Londonderry High School, 295 Mammoth Rd.
- Matthew Thornton Elementary School, 277 Mammoth Rd.
- Moose Hill School, 150 Pillsbury Rd.
- South Elementary School, 88 South Rd. (F)
- North Elementary School, 19 Sanborn Rd.

Solid Waste

- Londonderry Drop Off Center, 13 Recovery Way

Transportation

- NH DOT Park & Ride and Concord Trailways, 4 Symmes Dr. (T)
- NH DOT Park & Ride and Concord Trailways, 26 Nashua Rd. (T)

Commercial Economic Impact Areas

The following is a summary table of the commercial-economic impact areas located in each of the five identified hazard zones within the Town. For the purposes of this *Plan*, a commercial economic impact area includes organizations and businesses with more than 20 employees. These are facilities that are vital to the community's economic well-being.

This summary was queried from a database of all essential facilities created for this *Plan*.³² The facilities were taken from a database of employers developed by the Town of Londonderry Planning and Economic Development Department and were mapped by SNHPC by a combination of GIS automated address matching and manual placement using tax map and lot locations.

The five identified hazard zones are:

- **Town Wide Hazards** include hurricanes, tornados, nor'easters, downbursts, lightning, heavy snow, ice storms, hailstorms, earthquakes, utility pipe failure, drought, or extreme cold;
- **Special Flood Hazard Areas** include riverine flooding, hurricanes, debris-impacted infrastructure, ice jams, rapid snowpack melt, or dam breach;
- **Steep Slopes** include erosion, mudslides, or landslides;
- **Wild Land Fires** include wild land fire hazards; and
- **Target Hazards** include target hazards.

Commercial Economic Impact Areas		
Hazard Zone	Number of Employers	Number of Employees
Town Wide	132	7,830
Flood Hazard Zones	5	317
Special Flood Hazard Areas	1	30
Steep Slopes	5	372
Wild Land Fires	0	0

(reference)

³²All facilities' proximity to the various hazard zones was identified using GIS as follows:

- Special Flood Hazard Zones and Steep Slopes- intersecting or within 100 feet of the mapped area
- Wild Land Fires and Target Hazards- intersecting the mapped area

The 100 foot buffer was applied to allow for mapping accuracies of +/- 200 feet and to include buildings mapped only by a point that are partially located within the specified hazard zone. The other two zones are acknowledged to be approximate locations as mapped.

Hazardous Materials Facilities

The following is a summary table of the hazardous materials facilities located in each of the five identified hazard zones within the Town. For the purposes of this *Plan*, hazardous materials facilities include active hazardous waste generators, underground storage tanks, and above-ground storage tanks. As defined by the N.H. Department of Environmental Services, active hazardous waste generators may include businesses that produce household hazardous waste, or treat, store, or dispose of hazardous waste, or be a waste handler or used oil marketer.

This summary was queried from a database of all essential facilities created for this *Plan*.³³ The listing of Hazardous Materials Facilities was created from the NH Department of Environmental Services GIS data layers for hazardous waste generators, above ground, and underground storage tanks.

Number of Hazardous Material Facilities within the Hazard Zones			
Hazard Zone	Hazardous Waste Generators	Above Ground Storage Tank Sites	Underground Storage Tank Sites
Town Wide	203	21	79
Flood Hazard Zones	13	1	4
Special Flooding Areas	4	0	1
Steep Slopes	4	0	1
Wildfires	1	0	0

³³All facilities' proximity to the various hazard zones was identified using GIS as follows:

- Special Flood Hazard Zones and Steep Slopes- intersecting or within 100 feet of the mapped area
- Wild Land Fires and Target Hazards- intersecting the mapped area

The 100 foot buffer was applied to allow for mapping accuracies of +/- 200 feet and to include buildings mapped only by a point that are partially located within the specified hazard zone. The other two zones are acknowledged to be approximate locations as mapped.

SECTION IV

EXISTING MITIGATION STRATEGIES AND PROPOSED IMPROVEMENTS

Description of Existing Programs

The Town of Londonderry has adopted several programs and ordinances for hazard mitigation. Below are brief descriptions of these programs and how they aid in hazard mitigation.

Emergency Operations Plan

Londonderry maintains an Emergency Operations Plan. The plan is currently being updated in 2016. The plan coordinates the Town Departments' actions and responses before, during, and after a disaster. Events planned for range from aircraft disasters and hazardous materials incidents to flooding and snowstorms. The plan was prepared to conform to guidelines by the Federal Emergency Management Agency, U.S. Nuclear Regulatory Commission, Federal Energy Regulatory Commission, New Hampshire Homeland Security and Emergency Management and the NH Emergency Operations Plan. The plan establishes the Emergency Operations Center (at the Central Fire Station). The Emergency Operations Plan addresses shelters, evacuation procedures, emergency notification, and health and medical services. Additionally, it includes a section on weapons of mass destruction and a domestic terrorism contingency plan.

Floodplain Development Ordinance (Zoning Ordinance)

Floodplain district regulations apply to all lands designated as special flood hazard areas by FEMA in its *Flood Insurance Study for the Town of Londonderry, N.H.* and Flood Insurance Rate Maps (FIRMs) dated May 17, 2005. Encroachments, including fill, new construction, substantial improvements to existing structures, and other development are prohibited unless certification by a registered professional engineer is provided by the applicant demonstrating that such encroachment will not result in any increase in flood levels during the occurrence of the 100-year base flood. The building inspector shall review all building permit applications for new construction or substantial improvements to determine whether proposed building sites will be reasonably safe from flooding. In 2005, the Town of Londonderry adopted new Digital FIRMs and Flood Insurance Study, effective May 17, 2005, produced under FEMA's Map Modernization Program.

Elevation Certificates

An Elevation Certificate is required when a structure is built or substantially improved within a known flood zone, or if the flood map shows a part of the lot within the flood zone and the certified foundation plan shows the house is located within the flood zone. The land surveyor must supply the footing elevation.

Conservation Overlay District (Zoning Ordinance)

The Conservation Overlay District, contained within the Zoning Ordinance, requires setbacks ranging from 50 to 150 feet from the edge of a wetland or the centerline of a stream dependent on the water body's classification. The primary objectives of this ordinance are to mitigate any development that may negatively interfere with these water systems' natural functions and reduce any potential financial impacts that may be caused by the inappropriate use of these lands.

Airport Zoning Regulation and Noise Overlay Zoning (Zoning Ordinance)

The Airport Zoning Regulation mitigates potential disasters related to the operation of the Manchester Airport, sited on land in both Londonderry and Manchester. The ordinance regulates against the creation of any potential obstructions to aerial approach, radio system functioning, and visibility. The zone is defined as all areas within a 100,000-foot radius of the Airport Reference Point. The Noise Overlay District establishes soundproofing requirements for varying land uses.

Manufactured Housing (Zoning Ordinance)

Regulations are established to provide suitable and affordable living environments in manufactured home parks and on individual lots in the Agricultural-Residential (AR) District. Minimum standards are set regulating densities and available utilities and construction and safety standards in order to protect the occupants and reduce the homes' vulnerability to natural disasters.

Steep Slopes (Zoning Ordinance)

Londonderry's Zoning Ordinance excludes any slopes greater than 25 percent from the calculation of "Usable Land" in the Multi-Family Residential and Elderly Housing Districts. All other residential zones use soil based lot sizing to determine buildable lot area and permitted density. One input factor in making the lot size determination is slope, acting as constraint on the buildable area. Within the Performance Overlay District, steep slopes of 33 percent are regulated to mitigate hazards associated with the development of these areas.

Londonderry Building Codes (Chapter V, Zoning Ordinance)

The Londonderry Building, Health and Zoning Department enforces the *International Building Code* 2009 edition, *International Plumbing Code* 2009 edition, the *International Residential Code* 2009 edition, and the *National Electrical Code* as in the State Building Code with certain additions, insertions, deletions and changes. Building codes set minimum safety standards for occupants utilizing structural, fire and life safety provisions, wind loads and design, seismic design, flood proofing, and egress design.

Excavation Regulations

Earth removal regulations minimize safety hazards created by open excavations; safeguard the public health and welfare; preserve the natural assets of soil, water, forests and wildlife; maintain aesthetic features of the environment; prevent land and water pollution; and promote soil stabilization. Excavation regulations are maintained within the Londonderry Zoning Ordinance.

Stormwater Regulations

The Town of Londonderry has had extensive stormwater regulations in place to address run-off from development sites. These regulations require that the post-development run-off rate not exceed the pre-development runoff rate. Additionally, surface run-off shall be directed to managed systems prior to entering existing water bodies.

Erosion, Drainage and Flood Control (Subdivision and Site Plan Regulations)

Londonderry's Subdivision and Site Plan Regulations set development standards requiring erosion controls as are consistent with New Hampshire Best Management Practices. The regulations set minimum standards for storm drainage throughout the Town and in the Special Flood Hazard Areas (SFHAs). Additional SFHA specific requirements include mandated planning board review, base flood elevations, and proposals be designed to mitigate any potential damages from run-off or flooding.

Road Design Standards (Subdivision and Site Plan Regulations)

Londonderry maintains road design regulations as part of the Town's Subdivision and Site Plan Regulations. The Subdivision Regulations specifically cite the following standards and specifications as applicable to all improvements in the Town:

- Manual on Drainage Design for Highways, State of New Hampshire, Department of Public Works and Highways, current edition;
- Manual on Uniform Traffic Control Devices (MUTCD), U.S. Department of Transportation, Federal Highway Administration, current edition;
- Standard Specifications for Road and Bridge Construction, State of New Hampshire, Department of Transportation, 1997 or latest revision;
- Highway Design Manual, State of New Hampshire, Highway Design Division, current edition; and
- A Policy on Geometric Design of Highways and Streets, AASHTO - 1990.

Snow Emergency Regulations

The Snow Emergency Regulations allow the Public Works Department to declare snow emergencies triggering parking bans to expedite the flow of traffic and snow removal.

Fire Codes

The Town of Londonderry Fire Code, as adopted by the Town Council in 2010, includes sections of the *2009 International Fire Code, NFPA*, and the *2009 International Building Code* to protect residents from fire hazards in residential and non-residential facilities. Single family residences are required to have all gas and oil fired systems inspected by the Fire Department prior to receiving a certificate of occupancy. Commercial and industrial structures must have inspections reviewing sprinkler, mechanical, and fire alarm systems, structural components including firewalls. Additionally, site plans must be reviewed by the fire inspector to ensure proper hydrant placement and adequate access is provided for fire and emergency vehicles.

Hazardous Materials Regulations

The Town of Londonderry enforces state regulations regarding hazardous materials. Londonderry's Fire Department participates in the Southeastern New Hampshire Hazardous Materials Mutual Aid District (SNHHMMAD). SNHHMMAD provides technical expertise during an emergency on decontamination, rescue, and control, as well as hazardous materials mitigation. The district is composed of 15 member communities incorporating over 140,000 residents and 400 square miles.

Town Radio System

Each of the Fire, Police, and Public Works Departments maintain separate, but interoperable, radio networks for day-to-day operations. These systems are comprised of base stations and individual mobile radios. The systems can also interface with regional mutual aid and state agencies.

Police

The Chief of Police is charged with preserving public peace, preventing riots and disorder, and receiving and issuing emergency warnings. During fires the police are to prevent theft and further unwarranted destruction of property.

Manchester Water Works Emergency Operations Manual

This manual establishes an action plan for the department and its employees in the event of a natural or man-made disaster. Specific response plans are outlined for each hazard type as it pertains to the individual Water Works divisions. The manual also includes emergency contact lists, a list of Manchester Water Work's

buildings and structures, emergency action and notification forms, and additional information on the hazards.

Pennichuck Water Works Londonderry Water Supply System Emergency Response Plan

This plan provides a description of the water system, emergency contacts and the chain of command during an emergency, emergency response protocols and a section on pre-emptive planning. Hazard events have been grouped together into three tiers and individual response plans have been established for each of the tiers. Additionally, the appendices provide supplemental information on standard operation procedures for isolating system components, EPA multi-tiered treat advisory system, public notification guide and forms, news release guide, and water efficiency practices.

State Dam Program

The 19 Class 'NM' dams and 9 Class 'L' dams in Londonderry are maintained in compliance with the State Dam Program. Town staff inspects the Town owned dams are inspected on a regular basis. Inspections look for seepage, erosion, animal burrows, spalling, cracking, vegetation growth, and security issues. Preventive maintenance is conducted as needed.

New Hampshire Shoreland Water Quality Protection Act

The Shoreland Water Quality Protection Act (formally Comprehensive Shoreland Protection Act), enacted in 1991 and last updated in 2008, establishes minimum standards for the future subdivision, use, and development of all shore lands within 250 feet of the ordinary high water mark. When repairs, improvements, or expansions are proposed to existing development, the law requires these alterations to be consistent with the intent of the Act. The N.H. Department of Environmental Services is responsible for enforcing the standards within the protected shoreland, unless a community adopts an ordinance or shoreland provisions that are equal to or more stringent than the Act.

Best Management Practices

The State has established Best Management Practices (BMPs) for erosion and sediment control. These BMPs are methods, measures, or practices to prevent or reduce water pollution including, but not limited to, structural and nonstructural controls, operation and maintenance procedures, and other requirements and scheduling and distribution of activities. Usually, BMPs are applied as a system of practices rather than a single practice. BMPs are selected because of site-specific conditions that reflect natural background conditions.

Existing Protection Matrix

The Londonderry Hazard Mitigation Committee has developed a summary matrix of existing strategies that support hazard mitigation efforts, which is presented on the following pages. This matrix, a summary of the preceding information, includes the existing protection program (column 1), description & area of town covered (column 2), effectiveness rating (column 3), implementation/monitoring department or agency (column 4), the identified improvements or changes needed and funding sources (column 5), and the 2015 update (column 6).

Existing Protection Policies, Programs and Proposed Improvements for the Town of Londonderry

Existing Protection Program	Description & Area of Town Covered	Effectiveness Rating	Responsible Department / Commission	Improvements or Changes Needed	2015 Update
Emergency Operations Plan	Describes Town department and personnel duties and equipment available during an emergency; Last updated 2002. Applies town-wide to all hazards.	Good	<ul style="list-style-type: none"> Emergency Management Director; Fire Department; Police Department 	Currently under review with Update expected early 2016. (Funding Emergency Management Performance Grant from the State of NH, NH HSEM)	To be updated in 2016
Floodplain Development Ordinance (Zoning Ordinance)	Guides development in the floodplain to mitigate risk to existing buildings and limit construction of new facilities. Ordinance applies to SFHA's as mapped in most current FIRMS This ordinance limits development in floodplain areas.	Good	<ul style="list-style-type: none"> Planning Board Planning & Economic Development Building Department 	Adopt new Digital FIRMS (FEMA Map Modernization Program) as they become available	No changes since 2010.
Floodplain Mitigation	Incorporated Flood Mitigation in Local Planning including floodplain management in comprehensive planning	Good	Planning Board	No changes identified at this time.	Floodplains and other natural hazards are included in the Comprehensive Master Plan and part of the forthcoming zoning overhaul

Effectiveness Ratings:

Poor... The policy, plan or mutual aid system does not work as it should and often falls short of meeting its goals.

Fair... The policy, plan or mutual aid system does not work as well as it should and sometimes fails short of meeting its goals.

Good... The policy, plan or mutual aid system works very well and is achieving its goals.

Excellent... The policy, plan or mutual aid system works and often exceeds its goals.

Existing Protection Program	Description & Area of Town Covered	Effectiveness Rating	Responsible Department / Commission	Improvements or Changes Needed	2015 Update
Preserve Floodplains as Open Space	An open space acquisition, reuse, and preservation plan targeting hazard areas.	Good	Conservation Commission	No changes identified at this time.	Ongoing effort, included the recent acquisition of the Estey easement that served to limit development in the headwaters of a flood-prone stream and reduce the rate of runoff in this heavily developed watershed
Improve Flood Risk Assessment	Digital floodplain and topographic data into GIS systems, in conjunction with Hazus, to assess risk GIS is actively maintained by the Town. Staff is trained in Hazus software. Topo/floodplain information readily made available upon request.	Good	Planning Staff	No changes identified at this time.	Ongoing
Continue Compliance with NFIP	Participating in NFIP	Good	Building Department/Planning Board		The Town is a participant in the NFIP. The Town has been audited by NH OEM Flood representative, as recently as 2013. Town has adopted ordinances meeting Federal and State requirements and requires/maintains elevation

Effectiveness Ratings:

Poor... The policy, plan or mutual aid system does not work as it should and often falls short of meeting its goals.

Fair... The policy, plan or mutual aid system does not work as well as it should and sometimes fails short of meeting its goals.

Good... The policy, plan or mutual aid system works very well and is achieving its goals.

Excellent... The policy, plan or mutual aid system works and often exceeds its goals.

Existing Protection Program	Description & Area of Town Covered	Effectiveness Rating	Responsible Department / Commission	Improvements or Changes Needed	2015 Update
					certificates for all new and improved buildings located in floodplains. Ongoing program
Elevation Certificates	Records first floor elevations for new construction or substantial improvements to properties in SFHA. Applies to SFHA areas only. Serves as preventative measures for Riverine Flooding.	Good	<ul style="list-style-type: none"> • Building Department 	No changes identified at this time.	No changes since 2010.
Conservation Overlay District (Zoning Ordinance)	Applies restricted, limited development buffer to named wetlands, or wetlands greater than ½ acre in size. Applies as conditions warrant, as determined by wetlands scientist. The Town Zoning Ordinances also requires a green space requirement which often includes preservation of upland adjacent to stream	Good	<ul style="list-style-type: none"> • Planning Board • Conservation Commission • Planning & Economic Development 	No changes identified at this time.	No changes since 2010.

Effectiveness Ratings:

Poor...The policy, plan or mutual aid system does not work as it should and often falls short of meeting its goals.

Fair... The policy, plan or mutual aid system does not work as well as it should and sometimes fails short of meeting its goals.

Good... The policy, plan or mutual aid system works very well and is achieving its goals.

Excellent...The policy, plan or mutual aid system works and often exceeds its goals.

Existing Protection Program	Description & Area of Town Covered	Effectiveness Rating	Responsible Department / Commission	Improvements or Changes Needed	2015 Update
	corridors or wetlands. This ordinance limits development in floodplain areas.				
Acquisition of Open Space	Established an informal "Green Infrastructure" program to link, manage and expand existing parks, preserves, greenways, etc	Good	<ul style="list-style-type: none"> • Conservation Commission 	No changes identified at this time.	Town continues to use 2010 Open Space Plan Green Infrastructure mapping in plan review and reviewing potential acquisitions.
Airport Zoning Regulation and Noise Overlay Zoning (Zoning Ordinance)	Overlay districts that minimize navigational disturbances, set height limitations to prevent airspace obstructions and mitigate adverse impacts of noise on surrounding development. District applies as determined by elevation studies. This ordinance serves as preventative measures for Airport Related Hazards.	Good	<ul style="list-style-type: none"> • Planning & Economic Development • Airport Authority • FAA 	No changes identified at this time.	No changes since 2010.
Manufactured Housing	Sets minimum standards for densities,	Good	<ul style="list-style-type: none"> • Planning Board • Planning & Economic 	No changes identified at this	No changes since 2010.

Effectiveness Ratings:

Poor... The policy, plan or mutual aid system does not work as it should and often falls short of meeting its goals.

Fair... The policy, plan or mutual aid system does not work as well as it should and sometimes fails short of meeting its goals.

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Excellent... The policy, plan or mutual aid system works and often exceeds its goals.

Existing Protection Program	Description & Area of Town Covered	Effectiveness Rating	Responsible Department / Commission	Improvements or Changes Needed	2015 Update
(Zoning Ordinance)	utilities, construction, and safety standards. Applies to all parks or individual lots in the Agricultural - Residential (AR 1) Zone.		Development • Building Department	time.	
Steep Slopes (Zoning Ordinance)	Steep slopes of 25 percent or greater are excluded from the calculation of usable land in the multi-family residential and elderly housing districts; other residential districts use soil based lot sizing incorporating slope into the calculation; slopes of 33 percent or more are regulated in the Performance Overlay District. Applies as conditions warrant. Provides preventative measures for erosion and mudslides.	Good	• Planning Board • Planning & Economic Development	No changes identified at this time.	No changes since 2010.
Londonderry Building Codes	Regulates construction of buildings and fire protection; sets a	Good	• Building Department	No changes identified at this time.	The Town has adopted Building Codes as part of the Zoning Ordinance and regularly enforces

Effectiveness Ratings:

Poor...The policy, plan or mutual aid system does not work as it should and often falls short of meeting its goals.

Fair... The policy, plan or mutual aid system does not work as well as it should and sometimes fails short of meeting its goals.

Good... The policy, plan or mutual aid system works very well and is achieving its goals.

Excellent...The policy, plan or mutual aid system works and often exceeds its goals.

Existing Protection Program	Description & Area of Town Covered	Effectiveness Rating	Responsible Department / Commission	Improvements or Changes Needed	2015 Update
	minimum standard of protection to building occupants. Applies town-wide preventative measures to all hazards.				said codes during all inspections. No changes since 2010.
Excavation Regulations (Zoning Ordinance)	Minimize safety hazards created by open excavations. Applies to open pit activities. Provides preventative measures for erosion and mudslides.	Good	<ul style="list-style-type: none"> • Planning Board • Planning & Economic Development • Department of Public Works 	No changes identified at this time.	No changes since 2010.
Stormwater Regulations (In Subdivision & Site Plan Review Regulations)	Mandates all run-off from new development not exceed pre-development rates. Applies to new development or substantial improvements to existing sites. Requires a drainage study with new development	Good	<ul style="list-style-type: none"> • Planning Board • Department of Public Works 	No changes identified at this time.	No changes since 2010.
Erosion, Drainage and Flood Control (Subdivision and Site Plan)	Sets standards for erosion and flood controls consistent with the State Best Management Practices	Good	<ul style="list-style-type: none"> • Planning Board • Department of Public Works 	No changes identified at this time.	No changes needed at this time.

Effectiveness Ratings:

Poor... The policy, plan or mutual aid system does not work as it should and often falls short of meeting its goals.

Fair... The policy, plan or mutual aid system does not work as well as it should and sometimes fails short of meeting its goals.

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Excellent... The policy, plan or mutual aid system works and often exceeds its goals.

Existing Protection Program	Description & Area of Town Covered	Effectiveness Rating	Responsible Department / Commission	Improvements or Changes Needed	2015 Update
Regulations)	and the Town's Floodplain Development Ordinance. Applies to new development or substantial improvements to existing sites.				
Road Design Standards (Subdivision and Site Plan Regulations)	Standards for design and engineering to ensure visibility and safety. Applies to new public or private roads.	Good	<ul style="list-style-type: none"> • Planning Board • Department of Public Works 	No changes identified at this time.	No changes needed at this time.
Protect Infrastructure	Elevate roads or improve drainage systems .	Good	<ul style="list-style-type: none"> • DPW 	No changes identified at this time.	The Town has made drainage improvements to Auburn Road, Litchfield Road, and South Road.
Snow Emergency Regulations	Provisions regulating parking during winter months to expedite traffic flow and ease of snow removal. Applies town-wide.	Good	<ul style="list-style-type: none"> • Department of Public Works • Fire Department • Police Department • Town Council 	No changes identified at this time.	No changes needed at this time.
Conduct Winter Weather Risk Awareness Activities	Inform the public about severe winter weather impacts and encourage homeowners to install carbon monoxide monitors and alarms.	Good	<ul style="list-style-type: none"> • Fire Department 	No changes identified at this time.	The Fire Department provided continuing education on CO monitors and severe weather preparedness through safety workshops/press releases. Fire Personnel regularly provided

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Existing Protection Program	Description & Area of Town Covered	Effectiveness Rating	Responsible Department / Commission	Improvements or Changes Needed	2015 Update
					extinguisher training. CO monitors and alarms are inspected during regular fire inspections of public buildings.
Londonderry Fire Codes	Adopts the International Fire Code, NFPA, and International Building Code; protection for building occupants from fire hazards including, design suppressant and alarm systems. Applies town-wide.	Good	<ul style="list-style-type: none"> • Fire Department 	No changes identified at this time.	No changes needed at this time.
Hazardous Materials Regulations	State hazardous materials regulations are enforced; Londonderry participates in the Southeastern NH HazMat Mutual Aid District. Applies town-wide.	Good	<ul style="list-style-type: none"> • Fire Department 	No changes identified at this time.	Continue to work on regional emergency planning committee
Town Radio System	Mobile radio and dispatch system for fire, police and public works personnel. Applies	Fair	<ul style="list-style-type: none"> • Fire Department • Police Department • Public Works 	Limited dead zones; upgrade radio communications.	Need to study radio propagation, identify solution to dead zones.

Effectiveness Ratings:

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Existing Protection Program	Description & Area of Town Covered	Effectiveness Rating	Responsible Department / Commission	Improvements or Changes Needed	2015 Update
	town-wide				
Police	Police to preserve public peace, prevent riots and disorder, prevent destruction of property during fires, and investigate criminal acts. Applies town-wide.	Good	<ul style="list-style-type: none"> Police Department 	Update operating policy. (Operating Budget)	No changes needed at this time.
Manchester Water Works Emergency Operations Manual	Emergency response plans for each MWW division based on hazard types. Applies to water service areas identified on Critical Facilities maps.	Excellent	<ul style="list-style-type: none"> Manchester Water Works 	No changes identified at this time.	No changes needed at this time.
Pennichuck Water Works' Londonderry Water Supply System Emergency Response Plan	Emergency response plans for PWW service to Londonderry including chain of command and response actions. Applies to water service areas identified on Critical Facilities maps.	Good	<ul style="list-style-type: none"> Pennichuck Water Works 	No changes identified at this time.	No changes needed at this time.
NH State Dam Program	Maintenance of dams in coordination with the State Dam Program.	Good	<ul style="list-style-type: none"> NHDES Public Works 	No changes identified at this time.	No changes needed at this time.

Effectiveness Ratings:

Poor... The policy, plan or mutual aid system does not work as it should and often falls short of meeting its goals.

Fair... The policy, plan or mutual aid system does not work as well as it should and sometimes fails short of meeting its goals.

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Excellent... The policy, plan or mutual aid system works and often exceeds its goals.

Existing Protection Program	Description & Area of Town Covered	Effectiveness Rating	Responsible Department / Commission	Improvements or Changes Needed	2015 Update
	Applies to all dams noted in critical facilities section.				
NH Shoreland Water Quality Protection Act	Standards for all protected shorelands within 250 feet of the ordinary high water mark of state public waters	Good	<ul style="list-style-type: none"> • NHDES • Planning Board • Planning & Economic Development 	No changes identified at this time.	No changes needed at this time.
Best Management Practices (BMPs)	State guidelines for sediment and erosion control; protection of natural environment; and prevention of potential damage due to poor construction methods. Applies to all non-residential sites.	Good	<ul style="list-style-type: none"> • State of NH • Public Works • Planning Board • Planning & Economic Development 	No changes identified at this time.	No changes needed at this time.

Effectiveness Ratings:

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Fair... The policy, plan or mutual aid system does not work as well as it should and sometimes fails short of meeting its goals.

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Excellent... The policy, plan or mutual aid system works and often exceeds its goals.

Summary of Recommended Improvements to Existing Programs

Improvements to existing programs were reviewed, and keyed below, for their ability to reduce hazard impacts to both existing and future buildings and infrastructure, as well as the Town's ability to respond to disasters. The HMPUC recommends the following improvements to existing mitigation programs [1]:

- Complete update to the 2010 Emergency Operations Plan
- Continue to work on regional emergency planning committee for Hazardous Materials regulations
- Adopt new Digital FIRMs (FEMA Map Modernization Program) as they become available
- Conduct radio propagation study, identify solution to dead zones

SECTION V
NEWLY IDENTIFIED MITIGATION STRATEGIES AND CRITICAL EVALUATION

Status - 2010 Prioritized Hazard Mitigation Action

Action #	Mitigation Action	Who (Leadership)	When (Status)	How (Funding)	2015 Update
1	Update School Emergency Plan	SAU 12 FD, PD, EMD NH HSEM	Deferred	NH HSEM SAU 12	Update in-progress! handled by SAU; on Update 2015 list
2	Continue public outreach during emergencies	Townwide - FD, PD, EMD, P&ED	Deferred	NH EMHS Town budget	Outreach ongoing through available means as needed; on Update 2015 list, to be consolidated with actions 8 and 10 as part of a comprehensive hazard mitigation public education outreach effort
3	Local Sheltering Plan	EMD, FD, ARC SAU 12	Deferred	NH EMHS Town budget	Topic addressed in pending Emergency Operations Plan; on Update 2015 list
4	Aquifer & GW protection strategies - WRMP	P&ED	Deferred	Town budget	Lack of time and resources; HMPUC did not find this strategy to be a priority
5	Upgrade culverts	DPW	Completed	Town budget, NH HSEM	
6	Brookview Drive Study	DPW, P&ED ACoE	Completed	Town budget, NH HSEM	
7	Warnings - Kendall Pond	DPW	Completed	Town budget	
8	Educational materials for isolated areas - emergency preparedness, response et cetera	PD, FD	Deferred	Town budget	Lack of time and resources; on Update 2015 list, to be consolidated with actions 2 and 10 as part of a comprehensive hazard mitigation public education outreach effort
9	Prioritize & upgrade Class VI roads	DPW	Completed	Private developments	
10	Educational materials for flood prone areas - emergency preparedness, response et cetera	DPW, P&ED, Building,	Deferred	NH HSEM Town budget	Town distributes FEMA produced materials on request; on Update 2015 list, to be consolidated with actions 2 and 8 as part of a comprehensive hazard mitigation public education outreach effort
11	FAA/ Airport Noise Overlay code	P&ED	Completed	Town budget	
12	Public water system	Town Council, P&ED, MWW, PWW	Deferred	Town budget MWW, PWW	Ad-hoc discussions with development community on Update 2015 list
13	Mobile truck safety inspections	PD, FD, NH DOT, NH SP	Completed	Town budget NH DOT SP	

Summary of New Strategies

The Londonderry Hazard Mitigation Plan Update Committee (HMPUC) reviewed the previous projects contained in the 2010 Plan. In that process, the HMPUC decided to consolidate public outreach, education materials for isolated areas, and education materials for flood prone areas into a comprehensive hazard mitigation public outreach effort, with emphasis on family preparedness. Additionally, the HMPUC did not find the Aquifer & GW protection strategies to be a priority for the Plan Update. The Londonderry Hazard Mitigation Plan Update Committee identified the following new or ongoing mitigation strategies that are carried forward as recommendations for the tenure of this Plan.

- Update the Schools' Emergency Plan
- Conduct a comprehensive hazard mitigation public education outreach effort with emphasis on family preparedness
- Develop a Local Sheltering Plan
- Encourage the extension of public water in Town
- Construct fire lanes specifically targeted for the Musquash Conservation area.
- Conduct a radio propagation analysis and upgrade capabilities to repeater or microwave links. The cell tower on Kelly Street was noted as a problem area for the Fire Department.

Summary of Critical Evaluation

Committee members reviewed each of the 13 newly identified mitigation actions using the following 14 STAPLEE derived criteria³⁴. Scores were assigned to each criterion based on (1) for Poor, (2) for Average, and (3) for Good. Total average scores range from a minimum of 2.14 to a maximum of 3.0. Each Committee member individually scored all projects and then all scores were averaged to obtain the results presented in this plan. The 14 criteria were:

- *Social* - Is the project socially acceptable?
- *Social* - Any effect on segment of population?
- *Technical* - Is the project technically feasible/potentially successful?
- *Technical* - Is it a long-term solution?
- *Administrative* - Are there staffing and maintenance provisions?
- *Administrative* - Is there funding allocated for this project?
- *Political* - Does the project have support of the governing body?
- *Political* - Does it help achieve other community objectives?
- *Legal* - Does the project conform to State and local laws?
- *Legal* - Is there a chance the project will be legally challenged?
- *Economic* - Is it economically beneficial- benefits outweigh the costs?
- *Economic* - Does the project reduce future disaster damages?

³⁴ Explanation of STAPLEE is provided in Appendix E along with the individual scoring for each project.

- *Environmental* - What are the impacts on land, water, animals and plants?
- *Environmental* - Does the project conform to State and local regulations?

Preliminary Prioritization

The Londonderry Hazard Mitigation Committee assigned the following scores to each of the six action items for their effectiveness related to the critical evaluation factors listed above. The following lists the strategies by the type of protection offered, in order of highest to lowest priority score:

<u>Score</u>	<u>Action</u>	<u>Hazard(s)</u>
Preventative		
3.00	Update the Schools Emergency Plan	<i>All</i>
2.93	Conduct the multiple hazard mitigation educational public outreach effort	<i>All</i>
3.00	Develop a Local Sheltering Plan	<i>All</i>
2.64	Encourage the extension of public water in Town	<i>All</i>
2.14	Construct emergency service access targeted for the Musquash Conservation area	<i>Fire</i>
3.00	Conduct a radio propagation analysis and upgrade capabilities to repeater or microwave links.	<i>All</i>

Implementation Strategy for Priority Mitigation Actions

The Londonderry Hazard Mitigation Plan Update Committee created the following prioritized schedule for implementation of new mitigation strategies. The cost of these strategies is minimal when compared with the savings in both property and lives. The timeframe begins when the plan is adopted.

Ranking and Priority Mitigation Actions

Rank	STAPLEE Score	Problem	Mitigation Action	Leadership	Est. Cost & Funding	Timeframe
1	42	Emergency preparedness for schools.	Update the School's Emergency Plan	Londonderry SAU NH HSEM, Fire Department, Police Department	<\$10,000 SAU Budget	Short Term
2	42	Sheltering preparedness	Develop a Sheltering Plan	NH HSEM, Fire, Police, ALERT and in coordination with Red Cross	<\$10,000 EMD budget, FEMA	Medium Term
3	42	Improved radio /microwave communication	Radio propagation analysis and upgraded capabilities.	Fire Dept, Police, and Public Works Depts	>\$100,000 Fire, Police budgets; FEMA	Medium Term
4	41	Improved public education for	Develop educational outreach to	NH HSEM, Fire, Police, Planning & Economic	<\$10,000 Town, HS – EM	Medium Term

		hazard mitigation	provide hazmit info	Development, Red Cross		
5	37	Public water for public safety	Extend water	Manchester Water Works Pennichuck Water Works	>\$100,000 MWW, PWW, developer	Long Term
6	30	Access to conservation areas for fire-fighting	Construct fire lanes	Fire Dept, ConCom, P& ED	>\$100,000 Town, FEMA	Medium Term

Time frame	
Short Term	1 year or less
Medium Term	2 to 3 years
Long Term	4 to 5 years

The Town of Londonderry will research additional funding sources as required to successfully implement the above mitigation actions. Grants will be particularly researched on a project by project basis to search out the best suited grant match.

Summary of Acronyms in the Prioritized Implementation Schedule:

- CE = Code Enforcement
- CERT = Comprehensive Emergency Response Team
- ConCom = Conservation Commission
- CRS = Community Rating System
- DPW= Department of Public Works
- FD = Fire Department
- EM = Emergency Management
- EMD = Emergency Management Director
- FEMA= Federal Emergency Management Agency
- FMAP= Flood Mitigation Assistance Program (see Appendix F)
- IT = Information Technology
- MWW = Manchester Water Works
- PWW = Pennichuck Water Works
- PB = Planning Board
- P&ED = Planning and Economic Development
- PD = Police Department
- PDM= Pre-Disaster Mitigation Program (see Appendix F)
- P&Z = Planning and Zoning
- NH DOT = New Hampshire Department of Transportation
- NH HSEM= New Hampshire Homeland Security and Emergency Management

SECTION VI
PRIORITIZED IMPLEMENTATION SCHEDULE AND FUNDING SOURCES

Implementation Strategy for Priority Mitigation Actions

The Londonderry Hazard Mitigation Plan Update Committee created the following prioritized implementation schedule for the 6 identified mitigation actions. Some modifications were made to the original list of 13 projects, identified in 2010 including removing projects that had been classified as completed. The result is a refined prioritized implementation schedule of 6 projects. All agency and grant source acronyms are listed at the end of this section.

Rank	Action		
Cost	<i>Leadership</i>	<i>Time Frame</i>	<i>Funding</i>
Statement of Benefits and Costs			
1	Update the schools' emergency plan, created through in cooperation with State and Federal agencies and add new provisions for emergency prevention. The plan also serves to identify weaknesses and security vulnerabilities and to develop appropriate responses.		
	<i>Londonderry SAU NH HSEM, Fire Department, Police Department</i>	<i>Short term</i>	<i>NH HS EM, SER&CMP, School Operating Budget</i>
	NH Homeland Security and Emergency Management provides emergency management training through at no cost to schools and municipalities. A completed plan may help to save lives in the event of an emergency.		
2.	Develop a Local Sheltering Plan		
	<i>NH HSEM, Fire, Police, ALERT and in coordination with Red Cross</i>	<i>Medium Term</i>	<i>Town operating budget, NH HS EM</i>
	Work with ALERT and the Red Cross to develop sheltering policies and to determine needs for local shelters in response to emergency and disaster situations.		
3	Develop multiple educational outreach campaigns to provide information on hazard mitigation		
	<i>NH HSEM, Fire, Police, Planning & Economic Development, Red Cross</i>	<i>Medium Term</i>	<i>Town operating budget, NH HS EM</i>
	An inexpensive way to educate residents on hazard mitigation planning activities along with emergency response activities.		
4	Extend the public water system to unserved residential and commercial areas.		
	<i>Manchester Water Works Pennichuck Water Works</i>	<i>Long term</i>	<i>Manchester Water Works Pennichuck Water Works</i>
	Public water is needed to assist with public safety and water quality.		
5	Construct new emergency access lanes into conservation areas with emphasis on the Musquash Conservation area.		

	<i>Fire Dept, ConCom, P& ED</i>	<i>Long term</i>	<i>Town, FEMA</i>
	Improved access to remote conservation areas.		
6.	Conduct a radio propagation analysis and upgrade capabilities to repeater or microwave links. Foster communication interoperability for all departments.		
	<i>Fire Dept, Police, and Public Works Depts</i>	<i>Medium Term</i>	<i>Town Operating Budget, NH HSEM</i>
	Work collaboratively to upgrade the Town's radio and microwave communication systems.		

Additional funding sources will be researched by the Town of Londonderry as required to successfully implement the mitigation actions. Grants will be particularly researched on a project-by-project basis to search out the best grant match.

Summary of Grant Acronyms

SER&CMP = School Emergency Response ad Crisis Management Plan Discretionary Grant Program

NH HSEM New Hampshire Homeland Security and Emergency Management

Additional grant related information is in Appendix D.

SECTION VII
ADMINISTRATIVE PROCEDURES REGARDING
ADOPTION, EVALUATION AND MONITORING OF THE PLAN

"Incorporating hazard mitigation considerations into the thought processes and decision making that comprise local planning reinforces community sustainability and strengthens community planning programs. It ensures that the community survives natural disasters so that it can grow and develop as it was envisioned."

– Michael J. Armstrong, Associate Director for Mitigation, FEMA

Adoption

Upon notification that FEMA has conditionally approved this *Plan*, a public hearing will be held and the Londonderry Town Council will formally adopt the *Londonderry Hazard Mitigation Plan Update 2015* as an official statement of Town policy. In the future, this *Plan* may constitute a new section of the Londonderry Master Plan, in accordance with RSA 674:2. The public hearing shall be properly posted and advertised by the Town in accordance with New Hampshire state law. Documentation that the Londonderry Town Council has formally adopted the *Plan* will be included in the Appendix H.

Adoption of the *Londonderry Hazard Mitigation Plan Update 2015* demonstrates the Town's commitment to hazard mitigation. It also qualifies the municipality for federal, state, and local funding and prepares the public for what the community can be expected to do both before and after a natural hazard disaster occurs.

Following adoption, the Hazard Mitigation Committee and the Town Council shall seek to incorporate the mitigation actions identified in the Prioritized Implementation Schedule of Section VI of the *Plan* into other planning mechanisms, including the Town's Master Plan and Capital Improvement Program (CIP).

Monitoring, Evaluating and Updates

The *Londonderry Hazard Mitigation Plan Update 2015* shall be monitored and evaluated annually to track progress in implementing the mitigation strategies and actions as well as updating the goals and objectives of the *Plan*. The Londonderry Town Planner in coordination with the Emergency Management Director shall be responsible for initiating this review and scheduling an annual meeting of the Hazard Mitigation Committee. In addition to reviewing Hazard Mitigation Committee members' progress

on projects, the strategy for the following year will be reviewed and new projects will be selected for implementation at the annual meeting.

The Londonderry Town Planner will conduct updates in coordination with the Emergency Management Director and Londonderry Town Council. Updates should be made to the *Plan* every three to five years³⁵ to accommodate for actions that have failed or are not considered feasible after a review for their consistency with STAPLEE, the timeframe, the community's priorities, and funding resources. Priorities that were not ranked high, but identified as potential mitigation strategies, should be reviewed as well during the monitoring and update of this *Plan* to determine feasibility of future implementation. Also, at that time any other items identified during the annual meetings will be updated in the *Plan*, including, but not limited to, goals, objectives, identification of past hazard events, and updating the inventory of Town assets vulnerable to hazards.

Keeping with the process of adopting the *Londonderry Hazard Mitigation Plan Update 2015*, a public hearing to receive comment on the *Plan* maintenance and updating shall be held during the review period, and the Town Council will adopt the final product.

Continued Public Involvement

The public will continue to be invited and encouraged to be involved during this process at monitoring, evaluation and update meetings. All meetings involving implementation or updates of the *Plan* shall be open to the public as is required by RSA 91-A and notice of the meeting will be posted at least 24 hours in advance in a minimum of two locations such as the Town Offices and library as well as electronically on the town website. The meetings may also be publicized on the local access television station, town website or local newspaper. To gain additional public involvement, draft copies of the amended *Hazard Mitigation Plan* will be made available at two public locations for review and comment. The document should be left for a minimum of two weeks and then all comments will be considered in drafting final revisions. The Town will maintain the Hazard Mitigation Committee (HMPUC) page on its website under the section on "Boards and Committees."

³⁵ FEMA Disaster Mitigation Act of 2000 44 CFR Part 201.6(d)(3) mandates "Plans must be reviewed, revised if appropriate, and resubmitted for approval within five years to continue to be eligible for HMGP project grant funding." (Federal Register Vol. 36, No. 38, Feb 26, 2002, Rules and Regulations, p8852)

APPENDICES

APPENDIX A

DEFINITIONS

Areas at Risk: Emergency equipment or areas not needed to respond at the time of a natural disaster, but which could still be threatened if a natural disaster were to occur. These include critical facilities not utilized for emergency response, people and facilities to be protected in the event of a disaster, and/or potential resources for services or supplies in the event of a disaster. Examples include schools, parks, commercial resources, day care facilities, and senior housing.

Critical Facilities: Any building, structure, or location that is vital to the hazard response effort, maintains an existing level of protection from hazards for the Town, and would create a secondary disaster if a hazard were to impact it. Examples include emergency medical services, law enforcement, electric generators, and emergency shelters.

Commercial Economic Impact Areas: These areas include organizations and businesses with more than 20 employees. These are facilities that are vital to the community's economic well-being.

Emergency Operations Plan: A jurisdiction's emergency operations plan is typically designed to establish the procedures that will take place during an emergency and designate who will be responsible to perform those procedures.

Essential Facilities: All critical facilities, areas at risk, commercial economic impact areas, and hazardous material locations.

GIS: Geographic Information Systems includes a form of mapping that enables users to easily locate physical attributes of a community such as dams, bridges, wetlands, steep slopes, etc. Much of the data for these maps is maintained by Complex Systems Research Center in Durham, N.H.

Hazard Mitigation: The practice of reducing risks to people and property from natural hazards. FEMA defines hazard mitigation as "any action taken to reduce or eliminate the long-term risk to human life and property from hazards."

Hazardous Materials Facilities: These facilities include active hazardous waste generators, underground storage tanks, and above-ground storage tanks.

Hazardous Waste Generators: Defined by the New Hampshire Department of Environmental Services, these are businesses that produce household hazardous waste, or treat and store or dispose of hazardous waste, or be a waste handler or used oil marketer.

APPENDIX B

NEW HAMPSHIRE DAM CLASSIFICATION SCHEDULE

DAMS IN THE TOWN OF LONDONDERRY:

PUBLIC:

KENDALL POND BROOK AT BEAVER BROOK

PRIVATE:

Common Name	River	Owner
KENDALL POND DAM	Beaver Brook	TOWN OF LONDONDERRY
BEAVER BROOK DAM	Beaver Brook	MS KATHRYN BUCKLESS
LITTLE COHAS BROOK DAM	Little Cohas Brook	NH DOT
BRANCH COHAS BROOK DAM	Branch Cohas Brook	WHISPERING PINES MOBILE HOME VILLAGE
BLACK BROOK DAM	Black Brook	MACK APPLES
WINDING BROOK ROAD DAM	Unnamed Stream	CENTURY COMM ASSOC
CENTURY VILLAGE DAM	Unnamed Stream	CENTURY COMM ASSOC
MANCHESTER AIRPORT DET POND DAM	Tr To Little Cohas Brook	MANCHESTER BOSTON REGIONAL AIRPORT
EAYERS RANGE DR ROADWAY EMB DAM	Runoff	GILCREAST REALTY HOLDINGS II LLC
SCOBIE POND DAM	Beaver Brook	MS RITA O'BRIEN
WHEELER POND DAM	Branch Beaver Brook	CRACKER BARREL OLD COUNTRY STORE
TR BEAVER BROOK	Tr Beaver Brook	WOODMONT ORCHARDS INC
RECREATION POND DAM	Wheeler Brook	MR ROGER FAUCHER
FARM POND	Unnamed Brook	MR HERBERT HAUSER
COUNTRY CLUB POND DAM	Wheeler Brook	MR THOMAS KIMBALL
THE HIGHLANDER DET POND	Runoff	HIGHLANDER GREEN ASSOC
BROOKS RECREATION POND DAM	Unnamed Brook	MR JOHN A BROOKS
HIGH SCHOOL IRR POND DAM	Runoff	LONDONDERRY SCHOOL DISTRICT
HARVEY RD INDUST PRK DET PND	Runoff	HTS REAL ESTATE TRUST
ELWOOD IRRIGATION POND DAM	Unnamed Stream	WAYLAND ELWOOD
AF RES DET POND DAM	Runoff	94TH US ARMY REGIONAL SUPPORT
MINISTERIAL HEIGHTS NO 2 DAM	Runoff	ARMO REALTY INC
ORCHARD VIEW FARMS DAM	Unnamed Stream	TYLER ROAD DEVELOPMENT CORP

VICENTE DAM	Nesenkeag	MS MARGARET VICENTE
VISTA RIDGE DET POND	Runoff	MR JEAN GAGNON
FERROTEC PARK	Runoff	FERROTEC INTERNATIONAL
FEDEX DETENTION POND DAM	Runoff	SCHONINGER CO LLC
NEVIS DRIVE DET POND DAM	Runoff	GILCREAST REALTY HOLDINGS II LLC
EXIT 5 PARK AND RIDE DET POND	Runoff	NH DOT
STG REALTY LLC DETENTION POND DAM	Runoff	STG REALTY ASSOCIATES LLC

Non Menace (NM) structure means a dam that is not a menace because it is in a location and of a size that failure or misoperation of the dam would not result in probable loss of life or loss to property, provided the dam is:

- Less than six feet in height if it has a storage capacity greater than 50 acre-feet; or
- Less than 25 feet in height if it has a storage capacity of 15 to 50 acre-feet.

Low Hazard (L) structure means a dam that has a low hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in 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 impassable or otherwise interrupt public safety services.
- The release of liquid industrial, agricultural, or commercial wastes, septage, Or contaminated sediment if the storage capacity is less than two-acre-feet and is located more than 250 feet from a water body or water course.
- Reversible environmental losses to environmentally-sensitive sites.

Significant Hazard (S) structure means a dam that has a significant hazard potential because it is in a location and of a size that failure or misoperation of the dam would result in any of the following:

- No probable loss of lives.
- Major economic loss to structures or property.
- Structural damage to a Class I or Class II road that could render the road impassable or otherwise interrupt public safety services.
- Major environmental or public health losses, including one or more of the following:
- Damage to a public water system, as defined by RSA 485:1-a, XV, which will

take longer than 48 hours to repair.

- The release of liquid industrial, agricultural, or commercial wastes, septage, sewage, or contaminated sediments if the storage capacity is 2 acre-feet or more.
- Damage to an environmentally-sensitive site that does not meet the definition of reversible environmental losses.

High Hazard (H) means a 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 probable 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, which is occupied under normal conditions.
- Water levels rising above the first floor elevation of a habitable residential structure or a commercial or industrial structure, which is occupied under normal conditions when the rise due to dam failure is greater than one foot.
- Structural damage to an interstate highway, which could render the roadway impassable or otherwise interrupt public safety services.
- The release of a quantity and concentration of material, which qualify as "hazardous waste" as defined by RSA 471-A:2 VI.
- Any other circumstance that would more likely than not cause one or more deaths.

APPENDIX C BIBLIOGRAPHY, AGENCIES, WEBSITES

I. BIBLIOGRAPHY

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II. AGENCIES

New Hampshire DOS, Homeland Security - Emergency Management		271-2231
Federal Emergency Management Agency		617-223-4175
NH Regional Planning Commissions		
	Central NH Regional Planning Commission	796-2129
	Lakes Region Planning Commission	279-8171
	Nashua Regional Planning Commission	883-0366
	North Country Council	444-6303
	Rockingham Planning Commission	778-0885
	Southern New Hampshire Planning Commission	669-4664
	Southwest Region Planning Commission	357-0557
	Strafford Regional Planning Commission	742-2523
	Upper Valley Lake Sunapee Regional Planning Commission	448-1680
NH Executive Department		
	Governor's Office of Planning and Energy	271-2611
		271-2155
NH Department of Cultural Affairs		271-2540
	Division of Historical Resources	271-3483
NH Department of Environmental Services		271-3503
	Air Resources	271-1370
	Waste Management	271-2900
	Water Resources	271-3406
	Water Supply and Pollution Control	271-3504
	Rivers Management and Protection Program	271-1152
	Bureau of Dams	271-3503
NH Fish and Game Department		271-3421
NH Department of Resources and Economic Development		271-2411
	Natural Heritage Inventory	271-3623
	Division of Forests and Lands	271-2214
	Division of Parks and Recreation	271-3255
NH Department of Transportation		271-3734
US Department of Commerce		
	National Oceanic and Atmospheric Administration	
	National Weather Service; Gray, Maine	207-688-3216
US Department of the Interior		
	US Fish and Wildlife Service	225-1411
	US Geological Survey	225-4681
US Department of Agriculture		
	Natural Resource Conservation Service	868-7581

III. WEBSITES

<i>Sponsor</i>	<i>Internet Address</i>	<i>Summary of Contents</i>
Natural Hazards Research Center, U. of Colorado	http://www.colorado.edu/litbase/hazards/	Searchable database of references and links to many disaster-related web sites.
Atlantic Hurricane Tracking Data by Year	http://wxp.eas.purdue.edu/hurricane	Hurricane track maps for each year, 1886 – 1996
National Emergency Management Association	http://nemaweb.org	Association of state emergency management directors; list of mitigation projects.
NASA – Goddard Space Flight Center "Disaster Finder:	http://www.gsfc.nasa.gov/ndrd/disaster/	Searchable database of sites that encompass a wide range of natural disasters.
NASA Natural Disaster Reference Database	http://ltpwww.gsfc.nasa.gov/ndrd/main/html	Searchable database of worldwide natural disasters.
U.S. State & Local Gateway	http://www.statelocal.gov/	General information through the federal-state partnership.
National Weather Service	http://nws.noaa.gov/	Central page for National Weather Warnings, updated every 60 seconds.
USGS Real Time Hydrologic Data	http://h20.usgs.gov/public/realtime.html	Provisional hydrological data
Dartmouth Flood Observatory	http://www.dartmouth.edu/artsci/geog/floods/	Observations of flooding situations.
FEMA, National Flood Insurance Program, Community Status Book	http://www.fema.gov/fema/csb.htm	Searchable site for access of Community Status Books
Florida State University Atlantic Hurricane Site	http://www.met.fsu.edu/explores/tropical.html	Tracking and NWS warnings for Atlantic Hurricanes and other links
National Lightning Safety Institute	http://lightningsafety.com/	Information and listing of appropriate publications regarding lightning safety.
NASA Optical Transient Detector	http://www.ghcc.msfc.nasa.gov/otd.html	Space-based sensor of lightning strikes
LLNL Geologic & Atmospheric Hazards	http://www-ep.es.llnl.gov/www-ep/ghp.html	General hazard information developed for the Dept. of Energy.
The Tornado Project Online	http://www.tornadoroject.com/	Information on tornados, including details of recent impacts.
National Severe Storms Laboratory	http://www.nssl.uoknor.edu	Information about and tracking of severe storms.
Earth Satellite Corporation	http://www.earthsat.com/	Flood risk maps searchable by state.
USDA Forest Service Web	http://www.fs.fed.us/lan	Information on forest fires and land management.

APPENDIX D
TECHNICAL AND FINANCIAL ASSISTANCE FOR HAZARD MITIGATION

This matrix provides information about key all-hazards grant programs from the Departments of Homeland Security, Justice, Transportation, Health and Human Services, and Education under which state, local, and tribal governments, first responders, and the public are eligible to receive preparedness, response, recovery, mitigation, and prevention assistance.

Agency	Office/ Directorate	Program	Purpose	Funding Beneficiaries
Programs to prepare the Nation to address the consequences of natural and man-made disasters and emergencies.				
NH Homeland Security and Emergency Management	<i>Border and Transportation Security Directorate</i>	State Homeland Security Grant Program www.ojp.usdoj.gov	This core assistance program provides funds to build capabilities at the state and local levels and to implement the goals and objectives included in state homeland security strategies and initiatives in the State Preparedness Report.	State governments
	<i>Emergency Preparedness and Response Directorate</i>	Emergency Management Performance Grants www.fema.gov http://www.fema.gov/government/grant/index.shtm	To assist State and local governments in enhancing and sustaining all-hazards emergency management capabilities.	States with pass through to local emergency management organizations
	<i>Emergency Preparedness and Response Directorate</i>	Assistance to Firefighters Grant Program www.usfa.fema.gov/grants http://www.firegrantsupport.com/afg/	The primary goal of the Assistance to Firefighters Grants (AFG) is to meet the firefighting and emergency response needs of fire departments and nonaffiliated emergency medical services organizations.	Local, State, and Regional Fire Departments and agencies.
	<i>Emergency Preparedness and Response Directorate</i>	State and Local Emergency Operation Centers (EOCs) www.fema.gov http://www.fema.gov/government/grant/index.shtm	To improve emergency management and preparedness capabilities by supporting flexible, sustainable, secure, and interoperable Emergency Operations Centers (EOCs) with a focus on addressing identified deficiencies and needs.	States; local governments may be sub-grantees of the State
	<i>Emergency Preparedness and Response Directorate</i>	Citizen Corps www.citizen corps.gov	To bring community and government leaders together to coordinate community involvement in emergency preparedness, planning, mitigation, response and recovery.	States with a pass through to local governments

Agency	Office/ Directorate	Program	Purpose	Funding Beneficiaries
NH Homeland Security and Emergency Management	<i>Emergency Preparedness and Response Directorate</i>	National Fire Academy Training Grants www.fema.gov	To provide financial assistance to State Fire Training Systems for the delivery of a variety of National Fire Academy courses/programs.	State fire training organizations
	<i>Emergency Preparedness and Response Directorate</i>	Emergency Management Institute Training Assistance www.fema.gov	To defray travel and per diem expenses of State, local and tribal emergency management personnel who attend training courses conducted by the Emergency Management Institute, at the Emmitsburg, Maryland facility; Bluemont, Virginia facility; and selected off-site locations. Its purpose is to improve emergency management practices among State, local and tribal government managers, in response to emergencies and disasters. Programs embody the Comprehensive Emergency Management System by unifying the elements of management common to all emergencies: planning, preparedness, mitigation, response, and recovery.	State, local, and tribal emergency managers
	<i>Emergency Preparedness and Response Directorate</i>	Hazardous Materials Assistance Program (CERCLA Implementation)	Provide technical and financial assistance through the States to support State, local and tribal governments in oil and hazardous materials emergency planning and exercising. To support the Comprehensive Hazardous Materials (HAZMAT) Emergency Response – Capability Assessment Program (CHER-CAP) activities.	State, local, and tribal governments, state emergency response committees, local emergency planning commissions
	<i>Emergency Preparedness and Response Directorate</i>	Interoperable Communications Equipment Grant http://www.fema.gov/government/grant/index.shtm	To provide governance, planning, training and exercise, and equipment funding to States, Territories, and local and tribal governments to carry out initiatives to improve interoperable emergency communications, including communications in collective response to natural disasters, acts of terrorism, and other man-made disasters.	N/A

Agency	Office/ Directorate	Program	Purpose	Funding Beneficiaries
NH Homeland Security and Emergency Management	<i>Emergency Preparedness and Response Directorate</i>	Chemical Stockpile Emergency Preparedness Program www.fema.gov	A cooperative agreement to enhance emergency preparedness capabilities of the States and local communities at each of the eight chemical agent stockpile storage facilities. The purpose of the program is to assist States and local communities in efforts to improve their capacity to plan for and respond to accidents associated with the storage of chemical warfare materials.	State and local governments and the general public in the vicinity of the eight chemical agent stockpile storage facilities.
	<i>National Preparedness Directorate</i>	Metropolitan Medical Response System http://www.fema.gov/mmrs	To provide contractual funding to the 124 largest metropolitan jurisdictions to sustain and enhance the integrated medical response plans to a WMD terrorist attack.	Local governments
Department of Justice	<i>Office of Domestic Preparedness</i>	State Domestic Preparedness Equipment Support Program http://www.ojp.usdoj.gov/odp/equipment.htm	Funding will be provided to enhance first responder capabilities, and to provide for equipment purchases and exercise planning activities for response to Weapons of Mass Destruction (WMD) domestic terrorist incidents.	State and local governments
	<i>Office of Community Oriented Police Services (COPS)</i>	COPS Interoperable Communications Technology Program www.cops.usdoj.gov	To facilitate communications interoperability public safety responders at the state and local level.	Tribal, State, and local law enforcement agencies
Department of Health and Human Services		Public Health and Social Services Emergency Fund www.hhs.gov	To continue to prepare our nation's public health system and hospitals for possible mass casualty events, and to accelerate research into new treatments and diagnostic tools to cope with possible bioterrorism incidents.	Individuals, families, Federal, State, and local government agencies and emergency health care providers
	<i>Health Resources and Services Administration</i>	State Rural Hospital Flexibility Program www.ruralhealth.hrsa.gov	To help States work with rural communities and hospitals to develop and implement a rural health plan, designate critical access hospitals (CAHs), develop integrated networks of care, improve emergency medical services and improve quality, service and organizational performance.	States with at least one hospital in a non-metropolitan region

Agency	Office/ Directorate	Program	Purpose	Funding Beneficiaries
Department of Health and Human Services	<i>Health Resources and Services Administration</i>	EMS for Children www.hrsa.gov	To support demonstration projects for the expansion and improvement of emergency medical services for children who need treatment for trauma or critical care. It is expected that maximum distribution of projects among the States will be made and that priority will be given to projects targeted toward populations with special needs, including Native Americans, minorities, and the disabled.	State governments and schools of medicine
	<i>National Institute of Health</i>	Superfund Hazardous Substances Basic Research and Education www.nih.gov	To establish and support an innovative program of basic research and training consisting of multi-project, interdisciplinary efforts that may include each of the following: (1) Methods and technologies to detect hazardous substances in the environment; (2) advance techniques for the detection, assessment, and evaluation of the effects of hazardous substances on humans; (3) methods to assess the risks to human health presented by hazardous substances; and (4) and basic biological, chemical, and physical methods to reduce the amount and toxicity of hazardous substances.	Any public or private entity involved in the detection, assessment, evaluation, and treatment of hazardous substances; and State and local governments
	<i>Centers for Disease Control</i>	Immunization Research, Demonstration, Public Information and Education www.cdc.gov	To assist States, political subdivisions of States, and other public and private nonprofit entities to conduct research, demonstrations, projects, and provide public information on vaccine-preventable diseases and conditions.	States and nonprofits organizations
	<i>Centers for Disease Control</i>	Surveillance of Hazardous Substance Emergency Events www.atsdr.cdc.gov	To assist State health departments in developing a State-based surveillance system for monitoring hazardous substance emergency events. This surveillance system will allow the State health department to better understand the public health impact of hazardous substance emergencies by developing, implementing, and evaluating a State-based surveillance system.	State, local, territorial, and tribal public health departments

Agency	Office/ Directorate	Program	Purpose	Funding Beneficiaries
Department of Health and Human Services	<i>Centers for Disease Control</i>	Human Health Studies, Applied Research and Development www.atsdr.cdc.gov	To solicit scientific proposals designed to answer public health questions arising from situations commonly encountered at hazardous waste sites. The objective of this research program is to fill gaps in knowledge regarding human health effects of hazardous substances identified during the conduct of ATSDR's health assessments, consultations, toxicological profiles, and health studies, including but not limited to those health conditions prioritized by ATSDR.	State health departments
Department of Education	Office of Safe and Drug free Schools (OSDFS)	Readiness and Emergency Management for Schools http://www.ed.gov/programs/dvpemergencyresponse/index.html/	This grant program supports efforts by LEAs to improve and strengthen their school emergency operations plan, including training school personnel and students in emergency management procedures; communicating with parents about emergency plans and procedures; and coordinating with local law enforcement, public safety, public health, and mental health agencies.	School Districts
Department of Transportation	<i>Pipeline and Hazardous Materials Safety Administration (PHMSA)</i>	Hazardous Materials Emergency Preparedness Training and Planning Grants http://phmsa.dot.gov/hazmat/grants	Increase state, local, territorial, and Native American tribal effectiveness to safely and efficiently handle HazMat accidents and incidents; enhance implementation of the Emergency Planning and Community Right-to-Know Act of 1986; and encourage a comprehensive approach to emergency planning and training by incorporating response to transportation standards.	States, local, territorial, tribal governments.
Programs to coordinate Federal response efforts and to assist states, localities, and tribes in responding to disasters and emergencies.				
NH Homeland Security and Emergency Management	<i>Emergency Preparedness and Response Directorate</i>	Urban Search and Rescue www.fema.gov	To expand the capabilities of existing Urban Search and Rescue Task Forces.	28 existing US&R Task Forces

Agency	Office/ Directorate	Program	Purpose	Funding Beneficiaries
Programs to provide assistance to States, localities, tribes, and the public to alleviate suffering and hardship resulting from Presidentially declared disasters and emergencies caused by all types of hazards.				
NH Homeland Security and Emergency Management	<i>Emergency Preparedness and Response Directorate</i>	Individuals and Households Program http://www.fema.gov/assistance/process/guide.shtm	To provide assistance to individuals and families who have been affected by natural or man-made Presidentially declared disasters. Funding provided from the Disaster Relief Fund.	Individuals and Families
	<i>Emergency Preparedness and Response Directorate</i>	Public Assistance http://www.fema.gov/government/grant/pa/index.shtm	To provide assistance to states, localities, tribes, and certain non-profit organizations affected by natural or man-made Presidentially declared disasters. Funding provided from the Disaster Relief Fund	State, local and tribal governments; private non-profit organizations
	<i>Emergency Preparedness and Response Directorate</i>	Fire Management Assistance Grant Program http://www.fema.gov/government/grant/fmagp/index.shtm	Provide funds to States, local, and tribal governments for the mitigation, management, and control of wildland fires posing serious threats to improved property.	State, local and tribal governments
Small Business Administration	<i>Office of Disaster Assistance</i>	Disaster Loan Program http://www.sba.gov/services/disasterassistance/	To offer financial assistance to those who are trying to rebuild their homes and businesses in the aftermath of a disaster.	Individuals, families, private sector
Department of Justice	<i>Office for Victims of Crime</i>	Antiterrorism and Emergency Assistance Program http://www.ojp.usdoj.gov/ovc/publications/infores/terrorism/	To provide assistance programs for victims of mass violence and terrorism occurring within and outside the United States and a compensation program for victims of international terrorism.	Public and private nonprofit victim assistance agencies
Programs to reduce or eliminate future risk to lives and property from disasters.				
NH Homeland Security and Emergency Management	<i>Emergency Preparedness and Response Directorate</i>	Hazard Mitigation Grant Program http://www.fema.gov/government/grant/hmgp/index.shtm	To provide assistance to states, localities, and tribes to fund projects that will reduce the loss of lives and property in future disasters. Funding is provides from the Disaster Relief Fund and administered by the states according to their own priorities.	State, local, and tribal governments

Agency	Office/ Directorate	Program	Purpose	Funding Beneficiaries
	<i>Emergency Preparedness and Response Directorate</i>	Pre-Disaster Mitigation Program http://www.fema.gov/government/grant/pdm/index.shtm	This program provides funding for mitigation activities before disaster strikes. In recent years it has provided assistance for mitigation planning. In FY03, Congress passes a competitive pre-disaster mitigation grant program that will include project funding.	State, local, and tribal governments
NH Homeland Security and Emergency Management	<i>Emergency Preparedness and Response Directorate</i>	Flood Mitigation Assistance Program (FMA) http://www.fema.gov/government/grant/fma/index.shtm	The FMA program was created as part of the National Flood Insurance Reform Act (NFIRA) of 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). FEMA provides FMA funds to assist States and communities implement measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the National Flood Insurance Program.	State, local and tribal governments
	<i>Emergency Preparedness and Response Directorate</i>	Map Modernization http://www.fema.gov/plan/prevent/fhm/mm_main.shtm	This funding provides assistance to develop digital flood maps, support flood-mapping activities and expand the Cooperating Technical Partners Program to communities and regional entities.	State, local and tribal governments
Programs to interdict potentially hazardous events from occurring				
Department of Health and Human Services	<i>Centers for Disease Control</i>	Immunization Grants www.cdc.gov	To assist States and communities in establishing and maintaining preventive health service programs to immunize individuals against vaccine-preventable diseases.	States
Other				
Department of Housing and Urban Development	<i>NH Office of Energy and Planning</i>	Community Development Block Grant (CDBG) Program http://www.hud.gov/offices/cpd/communitydevelopment/programs/	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.	State, local and tribal governments

Mitigation Programs of Other NH State Agencies

The following agencies of the state of New Hampshire are directly or indirectly involved in activities that include Hazard Mitigation Planning and/or program implementation:

- *NH Department of Transportation Bureau of Repair and Maintenance*
- *NHOEP/NFIP Program*
- *NHOEP Coastal Program*
- *NHDRED Division of Forests and Lands*
- *NHDES Water Resources Division – Dam Safety Program*
- *NHDES Wetlands Program*
- *NHDES Shoreline Protection*

APPENDIX E

STAPLEE AND PROJECT EVALUATION

STAPLEE is an acronym for a general set of criteria common to public administration officials and planners. It stands for the Social, Technical, Administrative, Political, Legal, Economic, and Environmental criteria for making planning decisions. Questions to ask about suggested actions include:

- ***Social:*** Is the proposed action socially acceptable to the community? Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- ***Technical:*** Is the proposed action technically feasible and will it work? Is it a long term solution?
- ***Administrative:*** Can the community implement the action? Is there someone to coordinate and lead the effort? Are there funding sources already allocated or available for this project?
- ***Political:*** Is the action politically acceptable? Does the project help to achieve other community objectives?
- ***Legal:*** Is the community authorized to implement the proposed action? Is there a clear legal basis of precedent for this project or is there chance of legal challenge?
- ***Economic:*** What are the costs and benefits of this action? Does the cost seem reasonable for the size of the problem and the likely benefits? Does the project reduce potential future damages from disasters?
- ***Environmental:*** How will the action impact the environment, i.e. land, water, animals, plants? Will the action need and meet environmental regulatory approvals?

The following table shows the results of the STAPLEE ranking process:

SCORING:
1- Poor
2- Average
3- Good

Project	S		T		A		P		L		E		E		TOTAL
	Social		Technical		Administrative		Political		Legal		Economic		Environmental		
	Socially Acceptable (by community)	Effect on segment of population	Technically Feasible/ Potentially Successful	Is it a long-term solution?	Administratively Feasible- Staffing and Maintenance	Is there funding allocated for this project?	Politically Acceptable- has support	Does it help achieve other community objectives	Conforms to State & local law	Low Potential to be legally challenged	Economically Beneficial- Benefits outweigh Costs	Does the project reduce future disaster damages?	Environmental impacts on land, water, animal, plants is slight or none	Conforms to State, Local, & Federal Regs	
Update School's Emergency Plan	3	3	3	3	3	3	3	3	3	3	3	3	3	3	42
Multiple Educational Outreach Campaign Projects	3	3	3	3	3	2	3	3	3	3	3	3	3	3	41
Develop Local Sheltering Plan	3	3	3	3	3	3	3	3	3	3	3	3	3	3	42
Extend Public Water System	3	3	2	3	2	1	3	3	3	3	2	3	3	3	37
Construct Fire Lanes	2	3	2	3	1	1	2	2	2	3	1	3	2	3	30
Increase / improve Radio Communications	3	3	3	3	3	3	3	3	3	3	3	3	3	3	42

APPENDIX F

HMPUC MEETING AGENDAS, MINUTES AND EXAMPLE ATTENDANCE SHEET

Londonderry Hazard Mitigation Committee Meeting
January 30, 2015
MINUTES (Corrected based on comments rec d 2/26/15 and 3/26/15)

Attendees: Karen Mattor, Senior Planner, Southern New Hampshire Planning Commission (SNHPC)
 John Balfe, Intern, SNHPC
 Al Sypek, Planning Board
 Tim Jones, Londonderry Police Department
 John Vogl, GIS Manager/Comprehensive Planner, Town of Londonderry Planning Department
 Richard Canuel, Senior Building Inspector
 John Trottier, Assistant Director of Public Works and Engineering, Town of Londonderry

The meeting started at 9:30 a.m.

I. Overview of Hazard Mitigation Process

Ms. Mattor and Mr. Balfe from SNHPC introduced themselves to the Committee members and explained how the SNHPC assists towns with their Hazard Mitigation Plans. After the draft update is complete in a few months it will continue on to the State for its review and then to FEMA for their review and approval. After this time it will be adopted by the Town of Londonderry. The Committee will meet monthly for about 5 months and then the Plan should be ready for submission to the State.

Ms. Mattor handed each committee member a copy of the FEMA Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards (2013) and explained how the discussion of mitigation measures would come at a later meeting. She also gave each member a copy of the 2009 Town of Londonderry Hazard Mitigation Plan for them to work with and see what areas needed to be updated. Ms. Mattor explained the FEMA requirements for public participation and notification and the Committee decided to put a public service notice on the local television station, Londonderry Access Center Television (603-432-1147), SNHPC and Mr. Vogl will work together to create the Power Point slide for advertising.

II. Identify/Update Past and Potential Hazards

The Committee went through the section of past hazard events in Londonderry in the former Plan and then updated the Map noting any changes in the last five years.

The Committee went over Section II, Hazard Identification, to discuss any recent hazards and determine what information was still valid. Mr. Vogl will assemble the current land use development trends in Londonderry and identify the current ordinances on page 15. Ms. Mattor will work with Mr. Canuel to update the recent flood prone areas and current NFIP information.

The Committee went over the list of flood prone areas and updated it as follows:

Area	Type of Damage	Severity	Update 2015
Brookview Drive	Road flooding, basement flooding of adjacent homes, in the SFHA,	Severe	Still a problem but mitigated some houses.

	annual flooding		
South Road at Kendall Pond (dam at southern Kendall Pond and bridge over Beaver Brook) South Road	High water levels at the dam, debris obstruction at dam and bridge, road flooding	Minor	Still a problem
South Road	Road flooding/Inadequate culvert	Minor	Replaced culvert, no longer a problem (2011)
Auburn Road at Whispering Pines	Road flooding/Inadequate culvert	Minor	Upgraded, no longer a problem (2012)
Intersection of Routes 28 and 128	Road flooding	Minor	Still a problem
Parmenter Road at Route 102	Road flooding/Inadequate culvert	Minor	Still a problem
Intersection of Route 102 and High Range Road	Road flooding/Inadequate culvert	Minor	Still a problem
Gilcreast Road at Beaver Brook	Road flooding-during the fall of 1996 moderate flooding, bridge rebuilt in 1998 to mitigate future impacts	Minor	Still a problem
Litchfield Road East of Misty Lane	Road flooding/Inadequate culvert	Minor	Replaced culvert, no longer a problem (2010)

The Town has a LOMA Letter of Map Amendment exceeding FEMA requirements for the localized floodplain. Ms. Mattor will contact the State to get a list of the current dams in the Town of Londonderry. In the 1990s there was a tornado half mile from Elwood Orchard. There was lightning at the Central Fire Station. Battalion Chief Jim Rogers should be able to provide the current wildfire information needed for the update.

The Target Hazard was discussed since two-thirds of the airport is in Londonderry which is why this is considered a Hazard. Interstate 93 evacuation corridor also applies to the Town and has been used in the past for a Seabrook Evacuation location. In regard to the Isolated Home Hazard (which will become part of the Wildfire Hazard) the types of roads needs to be identified, and if they are a Class 6 road, which is not maintained by the town. The recent Ice Storms will be added. There was a 1985 earthquake that affected the central boiler. Utility pipe failure is an important hazard because there is a pipe going through town; the Tennessee Gas Line runs north and south through town. Mr. Vogl will get more information about this. There is a Plan of Action and easements such as by Fire Pond and around fire hydrants and cisterns. And there are sprinklers.

There have been more accidents at the Manchester Airport so Mr. O'Brien, Fire Chief, and Lt. Jones, Police Department, should be able to provide the Committee with this information. Two-thirds of homeowners are on private wells and so drought is an issue. Pennichuck Water also

provides water to the town. There are cooling centers at the Senior Center, High School Gym, Community Room of the Police Department. The Town received grant money to install generators at the High School and Senior Center. The Town is applying for grant money to upgrade the EOC.

The Committee started to go over Section III, Vulnerability Assessment and the Town Assessor will be consulted by John Vogl to get residential valuation, etc. including total assessed building valuation on the Summary of Critical Facilities by Hazard Zone section on page 43. Mr. Vogl will also get the number of employees for the Commercial Economic Impact Area chart on page 50. Ms. Mattor will consult NHDES for the hazardous materials facilities and Amy Kiask of SNHPC will be working on the maps for this.

At the next meeting the different hazards will be listed and ranked as to their severity.

III. **Identify/Update Critical Facilities / Areas of Risk / Identified Hazard Zones**

The Committee went through the section of Critical Facilities and Areas at Risk and then updated the Map noting any changes in the last five years.

- The sewer and water service will have to be updated and possibly the Pennichuck Water Service areas remapped. There is a current 2015 map.
- There is a new wireless tower on Kelly Road.
- Emergency Shelters are at High School, Senior Center, South School, Police Station
- Public Water System includes wells and there is a list of them. Amy Kiask might have them.
- Water Pump at Rain Tree?
- Telephone facility at Junction?
- Media Communication Access Center. (Icon? Media...it is actually a house of former editor), There is a Technology Center, Comcast
- TSA Command Center by Airport?
- Bridges, some were red listed but maybe they were rebuilt by DOT
- There is an Orchard Community Christian Church
- Dams have to be updated
- Medical Facilities – Ask Amy. Elliot?
- New bus facility at Exit 5
- Child Care, there are changes
- Adult Care - changes identified
- Community Facilities include Senior Center, Lions Hall, and American Legion
- Age restricted Housing has changed
- Wildfire areas-maybe Conservation land should be added and S. Pillsbury Town Forest
- Steep slopes
- The 100 and 500 flood zones need to be determined.
- Past flooding has occurred at Whispering Pines, Brookview, Gilcreast, and High Range at 102. Misty Lane has been fixed and Whispering Pines has been fixed.
- The repetitive loss properties have been located.
- Target areas include roads, airport and east of Everett Turnpike. The roadway bridges are included.

- No Railroad tracks are being used by trains anymore but there is a railway trail being created.
- Will inquire with Pam as to what roads are Class 5 or Class 6.
- Federal areas include the Army Forces, Reserve Center on Harvey Road, Military, Army Beacon
- South Station Fire Station moved west

The Committee marked up the changes on the map so the GIS person would know what changes needed to be made:

Areas at Risk

- Dialysis Area on Garden Street, near 93 and Garden Lane, Hudson/Derry Road
Actually 2 of them off Mammoth Street noted.
- Group wanted to know what constitutes a medical/health facility.
- Flea Market is no longer there on Mammoth Road by border on Mammoth Road/102
- There is now an Orchard Community Christian Church on Pillsbury Road
- There is a historical site, a Pound, off Route 28.
- Bridge Statuses in general? On freeways and Coteville Road?
- New Park and Ride off Exit 5
- No Adult Care Center anymore near exit on Freeway
- Media Communications symbol on Hardy Road is the editor of paper.

Critical Facilities

- Difference with wastewater pumps and sewer pump status?
- Not sure of water pump/booster on Jewell Court
- New Tower off Mammoth Road/Route 28
- Emergency Shelter off Route 28, near RR to be relocated to Senior Center

Identified Hazard Zones

- Railroads not used anymore but for recreation
- Page Road – Class V from Route 28 to Lucas
- Airport area extended
- Whispering Pines – make into wildfire area??
- Misty Lane – no longer flooding?

IV. **Next Meeting**

It was decided to have the meetings on the last Thursday of every month and the next meeting will be on Thursday, February 26th at 9:30 a.m. Then, it will be March 26th and April 30th.

**DRAFT Londonderry Hazard Mitigation Committee Meeting
February 26, 2015
MINUTES Meeting # 2**

Attendees: Gerald Coogan, Consultant, SNHPC
Karen Mattor, Senior Planner, SNHPC
John Balfe, Intern, SNHPC
Al Sypek, Planning Board
James Roger, Battalion Chief, Technician Team Leader, Londonderry Fire Dept
John Vogl, GIS Manager/Comprehensive Planner, Town of Londonderry
Richard Canuel, Senior Building Inspector
John Trottier, Assistant Director of Public Works and Engineering, Town of Londonderry

The meeting started at 9:30 a.m.

Preliminary: James Roger reviewed target hazards and volunteered to update the wildfire and other sections. He noted the need to reference the Town's Emergency Operations Plan (EOP). The Committee made the following changes to the meeting minutes of January 30, 2015:

- Page 1 – Clarified sentence regarding flood prone areas and NFIP.
- Page 2 – Corrected title of Battalion Chief Roger.
- Page 2 – Delete reference to Class 5 roads.
- Page 2 – Corrected typo “Utility Pipe failure”
- Page 2 – delete “which is run by Key Span utilities
- Page 2 – Mr. O’Brien Fire Chief and Lt. Jones
- Page 2 – Pennichuck Water
- Page 3 – a generator at the Community Center
- Page 3 1st paragraph - delete the sentence starting “... would like ..” and adding “The Town has successfully obtained grant money to install generators at the High School and Senior Center. The Town is applying for grant money to upgrade the EOC.”
- Page 3 – Updated Critical Facilities / Areas at Risk, Critical Facilities and identified Hazard Zones sections.

I. Complete Updates to Past and Present Hazards

The Committee reviewed the past hazards from the 2010 HMP and made the following changes below. John Vogl summarized land use changes in the Town which include three new industrial uses in Pettengill Road area, five multifamily developments with a potential for approximately 900 units in various development stages, the widening of Interstate – 93 and the new uses at Exit 5. All agreed it was too early to address the Woodmont Commons PUD in this plan.

The Committee reviewed and updated the list of flood prone areas:

Area	Type of Damage	Severity	Update 2015
Brook view Drive	Road flooding, basement flooding of adjacent homes, in the Special Flood Hazard Area (SFHA), annual flooding	Severe	Still a problem but mitigated some houses.
South Road at Kendall Pond (dam at southern Kendall Pond and bridge over Beaver Brook) South Road	High water levels at the dam, debris obstruction at dam and bridge, road flooding	Minor	Still a problem
South Road	Road flooding/Inadequate culvert	Minor	Replaced culvert – No longer a problem
Auburn Road at Whispering Pines	Road flooding/Inadequate culvert	Minor	Upgraded in 2012 – no longer a problem
Intersection of Routes 28 and 128	Road flooding	Minor	Remains a problem
Parmenter Road at Route 102	Road flooding/Inadequate culvert	Minor	Remains a problem
Intersection of Route 102 and High Range Road	Road flooding/Inadequate culvert	Minor	Remains a problem
Gilcreast Road at Beaver Brook	Road flooding-during the fall of 1996 moderate flooding, bridge rebuilt in 1998 to mitigate future impacts	Minor	Remains a problem
Litchfield Road East of Misty Lane	Road flooding/Inadequate culvert	Minor	Replaced culvert in 2010- completed.

II. Complete Updates to Critical Facilities and Areas of Risk Section

The Committee reviewed the following as contained in the January 30th meeting minutes and made the following changes:

- The sewer and water service that is depicted on the plan's map should be updated according to the latest infrastructure mapping from each utility.
- There is a new wireless tower on Kelly Road.
- Emergency Shelters are at High School, Senior Center, South School, Police Station
- Public Water System includes wells and there is a list of them. Amy Kizak might have them.
- Media Communication Access Center; Technology Center, Comcast

- TSA Command Center in the Granite Room at the Manchester Airport --- could be a backup Town EOC.
- Bridges --- some were red listed but may have been rebuilt by NH DOT; check out
- There is an Orchard Community Christian Church
- Dams have to be updated
- Medical Facilities --- contact Amy and check Elliot facility
- New bus facility at Exit 5
- Child Care --- changes
- Adult Care --- identify their locations
- Community Facilities include Senior Center, Lions Hall and American Legion
- Age restricted Housing has changed
- Add wildfire areas as conservation land; S. Pillsbury Town Forest
- Steep slopes
- The 100 and 500 flood zones need to be determined.
- Past flooding has occurred at Whispering Pines, Brook view, Gilcreast, High Range at 102. Misty Lane and Whispering Pines have been fixed.
- The repetitive loss properties need to be located.
- Target areas include roads, airport and east of I – 93. Roadway bridges are included.
- No Railroad tracks are being used by trains anymore but there is a railway trail being created.
- Identification of Class 5 or Class 6 roads --- check with Pam
- Federal areas --- Army Reserve Center on Harvey Road, Military, FAA Beacon
- South Fire Station moved west

The Committee reviewed the following and made changes, which need to be updated on the GIS map:

Target Hazard Zones

- Page 45 of 2010 EMP --- now three fire stations

Areas at Risk

- Dialysis Area on Action Blvd and Commons Drive.
- There is now an Orchard Community Christian Church on Pillsbury Road
- The Pound, an historical site, is on NH Route 128.
- Need to determine the status of all bridges
- New Park and Ride off Exit 5 of I - 93
- The Adult Care Center no longer exits off I – 93
- Media Communications symbol on Hardy Road is the editor of paper.

Critical Facilities

- Difference with wastewater pumps and sewer pump status?
- Not sure of water pump/booster on Jewell Court
- New Tower off Mammoth Road/Route 28

Identified Hazard Zones

- Railroads not used anymore but for recreation
- Page Road --- Class V from Route 28 to Lucas
- Airport area extended
- Misty Lane – no longer flooding

J. Vogl reported that he scheduled a meeting with the SNHPC GIS staff (Amy Kizak) in early March to update the critical facilities information. He suggested the next step for this section of the plan is to review an in-process draft of the maps.

III. Review Repetitive Loss Properties

The Committee reviewed the GIS map and the flood prone areas and noted that the number of flood prone properties had declined.

IV. Determination of Hazard Rankings

The Committee discussed risk ranking values for hazard events. In addition to the FEMA required hazard events, the Committee discussed locally important categories including radon, terrorism, Airport Related Hazards and Target Hazards (inclusive of pre planning for haz mat incidents, fires, airport, industrial areas, high fire areas, fire and haz mat areas and combustible areas). The latter was recodified as “Hazardous Materials”. The Committee opted to collapse “Downbursts” and Tornadoes” into a single category and to eliminate “Isolated Homes” as an event per direction from the NH DOS HS – EM. The Committee reviewed and ranked the following:

Londonderry 2015	Probability	Human Impact	Property Impact	Business Impact	Severity	Overall Risk
Natural Hazard Events	Likelihood the hazard will occur in 25 years 0=NA 1=Low 2=Moderate 3=High	Likelihood of injury or death in 25 years 0=NA 1=Low 2=Moderate 3=High	Likelihood of physical losses or damages in 25 years 0=NA 1=Low 2=Moderate 3=High	Likelihood of service interruption in 25 years 0=NA 1=Low 2=Moderate 3=High	Calculated Average of Human+Property+Business Impact <1.6=Low 1.6-2.5=Moderate >2.5=High	Calculated Probability X Severity
Flooding						
Riverine Flooding	3	1	1	0	0.7	2.0
Hurricanes	1	1	1	1	1.0	1.0
Debris-Impacted infrastructure	1	1	1	0	0.7	0.7

and Ice Jams						
Erosion and Mudslides	1	1	1	1	1.0	1.0
Rapid Snowpack Melt	2	2	1	1	1.3	2.7
Dam Breach or Failure	1	1	1	1	1.0	1.0
Other Water Retention Facility Failure	1	1	2	3	2.0	1.0
Wind						
Hurricanes	2	2	2	2	2.0	4.0
Nor'Easter	3	3	3	3	3.0	9.0
Tornadoes & Downbursts	1	2	2	2	2.0	2.0
Lightning	2	3	3	3	3.0	6.0
Fire						
Wildfire	3	1	3	1	1.7	4.0
Target Fire & Haz materials	3	3	3	3	3.0	9.0
Ice and Snow Events						
Heavy Snow Storms	3	3	3	3	3.0	9.0
Ice Storms	3	3	3	3	3.0	9.0
Hailstorms	1	1	1	1	1.0	1.0
Seismic						
Earthquake	2	3	3	3	3.0	6.0
Landslides	0	0	0	0	0.0	0.0
Other Hazards						
Utility Pipe Failure	2	3	3	3	3.0	6.0
Airport-related Hazards	3	3	3	3	3.0	9.0
Drought	1	1	1	1	1.0	1.0
Extreme Heat	1	1	1	1	1.0	1.0

Extreme Cold	1	1	1	1	1.0	1.0
Radon	1	1	1	1	1.0	1.0

The Committee discussed water retention / water basin in the northern part of Town related to Manchester Water Works, history of “Red Alerts” and the five FEMA claims related to federal emergency declarations.

V. Review Goals and Objectives

The Committee agreed to retain 2010 Hazard Mitigation goals for the 2015 update and to add the following goal from the State Plan, 2013:

- Provide information and resources to residents of Londonderry so that they can become more resilient to hazards that impact the Town’s critical support services, critical facilities, infrastructure, economy, environment, historical and cultural assets and private property.

VI. Next Meeting

The next meeting will be Thursday March 26, 2015 at 9:30 AM at the Elwood Conference Room, Londonderry Town Office.

**DRAFT Londonderry Hazard Mitigation Committee (HMC) Meeting
March 26, 2015
MINUTES Meeting # 3**

Attendees: Gerald Coogan, Consultant, SNHPC
John Balfe, Intern, SNHPC
Al Sypek, Planning Board
John Vogl, GIS Manager/Comprehensive Planner, Town of Londonderry
Richard Canuel, Senior Building Inspector
John Trottier, Assistant Director of Public Works and Engineering, Town of Londonderry
Tim Jones, Lieutenant, Police Department, Town of Londonderry

The meeting was called to order at 9:30 am by Gerald Coogan. The first point of business was to elect the Chair of the Committee. John Trottier made a motion to elect Al Sypek as the Chair which was seconded and approved by the HMC.

The next order of business was the approval of minutes from the January 30 and February 26 Committee meetings. John Trottier gave Gerald Coogan his edits of the January 30 meeting and approval of the minutes was postponed until the next meeting. The Committee made changes to the February 26 minutes and decided to approve the minutes as amended. The following changes were made:

- Page 2 – Spell out SFHA (Special Flood Hazard Area).
- Page 3 – Correct spelling error “Gilcreast”
- Page 3 – Changed “Army Beacon” to “FAA Beacon”

I. Review Past Work

The Committee reviewed the updated “Identified Hazard Zone Map”. John Vogl summarized the changes made to the map since the last meeting. The following points below were noted about the map. John Vogl suggested that the Steep Slopes classification be removed from the map because it is a non-issue in Londonderry. The committee agreed that the steep slopes are extremely isolated in Londonderry and do not need to be on the map. The highest elevation in Town is 400 feet.

- Some hazard areas were reduced or eliminated by upgrades made by the Department of Public Works.
- Expanded wildfire area.
- The airport area was reclassified.

The Committee also reviewed the Critical Facilities Map. The following points below were noted about the map.

- Federal facilities were labeled as Aviation Support Centers.

- Two Emergency Operations Centers (EOC) are identified on the map – the EOC at the Londonderry Police Department and EOC at the TSA center at the airport.
- The EOC located on the map near the airport needs to be relocated to match its actual location at 4 Technology Drive.
- The state public works garage on Mammoth Road was incorrectly omitted.
- The Londonderry High School is a regional shelter.
- All schools in Londonderry are possible shelters for the Seabrook Nuclear Power Plant.
- One decommissioned wireless tower to be removed from the map.
- Fire and communication repeaters should be added to map inventory.
- Obtain list of community wells from the NH Department of Environmental Services. Some include Oakridge, Kendall Woods, Charlestown Ave., Century Village, Longview, Bayberry and others.
- Possible booster water station on Gilcreast Road not listed on map.
- Update legend to read “Electric Power Substations”
- Discussion of the TN pump station and gas pump line

The Essential Facilities Map, which displays dams, medical facilities, daycares and other similar facilities, will be reviewed at the next meeting.

The Committee reviewed and approved the goals/objectives from the 2010 HMP and added one goal from the State HMP.

II. Identify Areas of High Vulnerability and Future Mitigation Efforts

The Manchester Regional Airport was identified as the Town’s most vulnerable facility. Lt. Tim Jones provided Gerald Coogan with incident data from the past five years at the airport. The Londonderry Police Department is the primary response agency for airport emergency instances.

Al Sypek noted that wildfire prone conservation lands need fire lanes to adequately fight forest fires. Specifically, the Musquash Conservation area is of particular concern for wildfires.

Regarding future mitigation strategies, J. Vogl questioned whether the town’s telecommunications are completely adequate; are there communication “dead zones” in town? T. Jones noted that repeaters have increased connectivity but some areas, such as the north side of town, still have issues communication issues. The town has applied for grant monies to expand coverage throughout the town.

III. Public Outreach Effort

The Committee brainstormed ideas to reach out to the residents of Londonderry and abutting towns. A letter notifying neighboring towns that Londonderry is in the process of updating the HMP will be sent out by J. Vogl. Gerald Coogan and Al Sypek will

discuss local access television advertisements to notify the public of the HMP process and adoption of the final plan.

IV. Other Items

Discussion of the topics such as “red alert” (computerized dispatching system), Nixle 360 (notification website), I 93 Haz Mat team, fire lanes in conservation areas, Whispering Pines (difficulty w/ communications), inclusion of the Town’s EOP as an appendix to the Hazard Mitigation Plan, Update 2015, letter to the abutting municipalities informing them of the HMP 2015 and requesting comments et cetera.

V. Next Meeting

The next meeting will be Thursday April 30, 2015 at 9:30 AM at the Elwood Conference Room, Londonderry Town Office.

Londonderry Hazmit
April 30, 2015
MINUTES Meeting # 4

Attendees: Gerald Coogan, Consultant, SNHPC
John Balfe, Intern, SNHPC
Al Sypek, Planning Board
John Vogl, GIS Manager/Comprehensive Planner, Town of Londonderry
Darren O'Brien, Londonderry Fire Chief
Kaitlyn G. Woods, Londonderry Times
John Trotter, Assistant Director of Public Works

The meeting was called to order at 9:30 am by Chairman Al Sypek.

The first order of business was the approval of meeting minutes from two past Hazard Committee Meetings. The minutes from the January 30th meeting had been amended at two previous meetings and were finally approved by The Committee at the April 30th meeting. The March 26th meeting minutes were amended and approved as well.

I. Review Past Work

The Committee reviewed the updated "Critical Facilities Map". John Vogl summarized the changes made to the map since the last meeting. The bullets below note the changes:

- The Committee decided to add the list of repeater stations to the map.
- Committee members noted that most homes that are in the FEMA designated flood prone areas have been lifted off the ground. The only homes that have not been built have refused to do so for unknown reasons.

Briefly, The Committee reviewed the public outreach efforts. The items below were noted at the meeting:

- Letters to abutting towns alerting them of Londonderry's development of a new Hazard Mitigation Plan
- Al Sypek and Jerry Coogan to do an interview on Public Access Television in Londonderry

The Essential Facilities map was reviewed and the following discussion points were noted:

- Most facilities/infrastructure on the map is Town owned/managed.
- Social facilities – daycares, recreational facilities – remain on map even though not owned or operated by the Town.
- All childcare facilities are inspected by the FD annually.
- Interstate 93 bridges were removed from the map.

- John Vogl suggests removal of relic sites from the map.
- Possible addition to historic site list: fire smoke tower near Hall road and Mammoth Road.
- West Road outdoor recreation facility to be added.
- Slavic Baptist Church changed to correct location.
- Need to find out name of the church on Hall Road.

Review Past Projects from 2009 Hazard Mitigation Plan:

- **Update Schools' Emergency Plan:** contact schools for status update.
- **Multiple Educational Outreach Campaign Projects:** remains relevant for 2015 plan.
- **Develop Local Sheltering Plan:** Emergency shelter got new generator. Old generator installed at Senior Center. Shelter for pets made available at High School. Reevaluate cost range.
- **Water Resource and Management Protection Plan:** No further action taken. – Delete from list?
- **Upgrade Inadequate Culverts:** Many culverts have been upgraded since last HMP. Two sites have been removed from the list. No new sites added.
- **Brookview Drive Mitigation and Education:** Houses in low-lying areas have been lifted, therefore eliminating danger. One household is unwilling to be lifted. – Delete from list?
- **Warning Signs at Kendall Pond:** Review this project at next meeting.
- **Educational Materials for Residents of Isolated Areas:** No longer a major issue in town due to lack of isolated areas. Remove from list.
- **Prioritize and upgrade Class VI Roads:** No activity. Delete from list.
- **Educational Materials for Residents of Flood Prone Areas:** New flood maps have been created and made public since old plan. Add new maps to Londonderry Town Website for easier public access.
- **Adopt New FAA/Airport Authority Noise overlay Zoning Codes:** Project has been accomplished – Londonderry has implemented contour noise zones to mitigate issues near the airport.
- **Extend Public Water System:** Ongoing extension by three companies in town.
- **Mobile Truck Safety Inspection Issues:** Review project at next meeting. Need PD representative for this information.

II. Discussion of New Mitigation Strategies and Project

- Install fire lanes into the conservation areas of Londonderry.
 - Firefighters have no way to access conservation areas in case of emergencies involving hikers, walkers or wildfires.
 - Al Sypek expressed interest in applying for wildfire grants from FEMA.
 - There was a 110 acre wildfire in 1982 at the Musquash Conservation area.

- Fire Chief Darren O'Brien expressed interest in applying for grants to improve the radio strength capabilities throughout the town.
 - Current equipment is outdated and parts are becoming harder to find.
 - Grants for radio propagation analysis.

III. Next Meeting

The next meeting will be Thursday May 28, 2015 at 9:30 AM at the Elwood Conference Room, Londonderry Town Office.

DRAFT Londonderry Hazard Mitigation Committee Meeting
May 28, 2015
MINUTES Meeting # 5

Attendees: Gerald Coogan, Consultant, SNHPC
John Balfe, Intern, SNHPC
Al Sypek, Planning Board
John Vogl, GIS Manager/Comprehensive Planner, Town of Londonderry
Darren O'Brien, Londonderry Fire Chief
Richard Canuel, Senior Building Inspector, Health Officer, Zoning Administrator & Code Enforcement Officer.
John Trottier, Assistant Director of Public Works

The meeting was called to order at 9:30 am by Chairman Al Sypek.

The first order of business was the approval of meeting minutes from the previous Hazard Committee Meeting. The minutes from the April 30th meeting were amended with one change; child care facilities are inspected every **third** year by the Fire Department and the Health Officer, not every year as previously stated.

I. Review Past Work

The Committee reviewed their past work and the following notes were made:

- The Town's Emergency Management Plan (EMP) will be updated in the next year.
 - Gerald Coogan to contact superintendent for update on the School's EMP.
- The High School received a new emergency backup generator and the old generator was given to the senior center.
- Delete the items below from the list of projects to be included in the 2015 plan;
 - Water Resource and Management Protection Plan
 - Upgrade Inadequate Culverts Delete
 - Brookview Drive Mitigation and Education
 - Warning Signs at Kendall Pond Road
 - Educational Materials for Residents of Flood Prone Areas
 - Mobile Truck Safety Inspection Issues
- The project to Extend the Public Water System in Londonderry would not be completed by the Town because the Town neither owns nor operates the water supply system. However, the Town would encourage an extension if it satisfied a need.
- The following items were noted in regard to the new projects included in the 2015 plan;
 - The construction of fire lanes is specifically targeted for the Musquash Conservation Area.

- The radio propagation analysis and upgrades would upgrade capabilities to repeater or microwave links. The cell tower on Kelly Street was noted as a problem area for the Fire Department.

II. Rank Projects Using STAPLEE Process

- The following table shows the results of the STAPLEE ranking process:

	S		T		A		P		L		E		E		TOTAL
	Social		Technical		Administrative		Political		Legal		Economic		Environmental		
Project	Socially Acceptable (by community)	Effect on segment of population	Technically Feasible/ Potentially Successful	Is it a long-term solution?	Administratively Feasible- Staffing and Maintenance	Is there funding allocated for this project?	Politically Acceptable- has support	Does it help achieve other community objectives	Conforms to State & local law	Low Potential to be legally challenged	Economically Beneficial- Benefits outweigh Costs	Does the project reduce future disaster damages?	Environmental impacts on land, water, animal, plants is slight or none	Conforms to State, Local, & Federal Regs	
Update School's Emergency Plan	3	3	3	3	3	3	3	3	3	3	3	3	3	3	42
Multiple Educational Outreach Campaign Projects	3	3	3	3	3	2	3	3	3	3	3	3	3	3	41
Develop Local Sheltering Plan	3	3	3	3	3	3	3	3	3	3	3	3	3	3	42
Extend Public Water System	3	3	2	3	2	1	3	3	3	3	2	3	3	3	37
Construct Fire Lanes	2	3	2	3	1	1	2	2	2	3	1	3	2	3	30
Increase / improve Radio Communications	3	3	3	3	3	3	3	3	3	3	3	3	3	3	42

- The HMPC noted that the most important projects are (1) increase radio communication, (2) update school EMP and (3) develop local shelter plan.

III. Next Meeting

The HMPC will likely meet one time to review the *Draft Londonderry HMP Update 2015*. The date is TBD.

APPENDIX G

PUBLIC AND OTHER AGENCY PARTICIPATION

Coordination with Other Agencies and Individuals

The HMPUC members and their respective Town Departments contributed to the HMP Update 2015 by including updated information and by reviewing the *Plan* drafts. Departments represented were:

- Building Department
- Fire Department / Emergency Management
- Planning and Economic Development Department
- Police Department
- Public Works and Engineering

Comprehensive Planner and HMPUC member John Vogl invited the following individuals and agencies to review and comment on the *Plan*.

- American Red Cross
- Conservation Commission
- Londonderry Elder Affairs
- Londonderry Town Council
- Manchester Airport
- Londonderry School Department
- SE HazMat Mutual Aid District
- Manchester Water Works
- Pennichuck Water Works
- Londonderry Planning Board

Notice of the draft Plan was distributed to all abutting communities, including the City of Manchester and Towns of Auburn, Derry, Windham, Hudson, and Litchfield for their review and comments. In addition a copy of the Plan was available at the Town Clerk's Office, Town Planning Department, and SNHPC office, for public review and comment from dates July 1, 2015 to November 1, 2015. Availability of the Plans and their locations were publicized during the same period by public notice on the Londonderry Town website and postings at the Town Hall and SNHPC office.

Receipt of public comment.

Public comment period was opened through the entire update process. No comments were received outside of the posted meetings.

Press Release:

For Immediate Release

Town of Londonderry Hazard Mitigation Plan Update

The Town of Londonderry is working with the Southern NH Regional Planning Commission (SNHPC) to update the local Hazard Mitigation Plan. Such plans form the foundation for a community's long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction and repeated damage. Local governments are required to develop Plans as a condition for receiving certain types of non-emergency disaster assistance. Adopted plans must be must reviewed and revised to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval at least every five (5) years to continue to be eligible for mitigation project grant funding.

A Committee of Town Employees is meeting monthly on Thursdays at 9:30 am in the Elwood Conference Room (next meeting scheduled for March 26th) to review and update to the 2010 plan. Public comment is always welcome. It is expected that the update will be completed in 6 months, between December 2014 and May, 2015. Interested parties are asked to contact Gerald Coogan at the Southern New Hampshire Planning Commission at gcoogan@snhpc.org or (603) 669-4664 or 748-5580 with any questions.

Hazard Mitigation Fact Sheet

What Is Hazard Mitigation?

Hazard mitigation is any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards (44 CFR 201.2). Hazard mitigation activities may be implemented prior to, during, or after an event. However, it has been demonstrated that hazard mitigation is most effective when based on an inclusive, comprehensive, long-term plan that is developed before a disaster occurs.”¹ It includes both structural interventions, such as flood control devices, and nonstructural measures, such as avoiding construction in the most flood-prone areas. Mitigation includes not only avoiding the development of vulnerable sections of the community, but also making existing development in hazard-prone areas safer. For example, a community could identify areas that are susceptible to damage from natural disasters and take steps to make these areas less vulnerable. It could also steer growth to less risky areas. Keeping buildings and people out of harm’s way is the essence of mitigation.

Mitigation is not an impediment to growth and development. On the contrary, incorporating mitigation into development decisions will result in a safer, more resilient community, one that is more attractive to new families and businesses.

Why Develop a Hazard Mitigation Plan?

The full cost of the damage resulting from natural hazards—personal suffering, loss of lives, disruption of the economy, and loss of tax base—is difficult to measure. New Hampshire is subject to many types of natural disasters: floods, hurricanes, nor’easters, winter storms, earthquakes, tornadoes, and wildfires, all of which can have significant economic and social impacts. Some, such as hurricanes, are seasonal and often strike in predictable locations. Others, such as floods, can occur any time of the year and almost anywhere in the state.

Benefits of Hazard Mitigation

Hazard mitigation offers many benefits for a community. It can:

- **Save lives and property.** A community can save lives and reduce property damage from natural hazards through identifying risks and taking action, such as elevating structures in the floodplain.

¹ FEMA *Local Mitigation Plan Review Guide*. October 1, 2011.

- **Reduce vulnerability to future hazards.** By having a mitigation plan in place, a community is prepared to take steps that will permanently reduce the risk of future losses. This opportunity is often lost when we build our communities without regard to natural hazards, or when we rebuild them after a disaster “just like they were before.” While it is natural to want to return things to the way they were, it is important to remember that, in many cases, the disaster would not have been as severe if a mitigation plan had been implemented.
- **Facilitate post-disaster funding.** By identifying and ranking recovery projects before the next disaster, a community will be in a better position to obtain post-disaster funding because much of the background work necessary for applying for federal funding will already be completed.
- **Speed recovery.** By developing a mitigation strategy, a community can identify post-disaster mitigation opportunities in advance of a disaster and be ready to respond quickly after a disaster.

Town of Londonderry Hazard Mitigation Plan Update 2015

Committee Meeting, Thursday, May 28, 2015

Town of Londonderry Elwood Conference Room

Town residents welcome to be part of the process!

If you want to be part of the process to update the Town of Londonderry Hazard Mitigation Plan please attend the next meeting of the Hazard Mitigation Committee on Thursday, May 28, at 9:30 AM at the Elwood Conference Room, Londonderry Town Office. This may be the last of the monthly meetings in this planning cycle.

Local Hazard Mitigation Plans must be updated every five years in order to continue to be eligible for FEMA hazard mitigation project grant funding. A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five (5) years to continue to be eligible for mitigation project grant funding. At the May 28th meeting, the Hazard Mitigation Committee will review and rank mitigation projects.

The purpose of hazard mitigation is to reduce potential losses from future disasters. Hazard Mitigation is any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards.

Please contact Gerald Coogan, AICP at the Southern New Hampshire Planning Commission (SNHPC) at gcoogan@snhpc.com or (603) 669-4664 if you have any questions.



Hazard Mitigation Plan Update Committee

Information Courtesy of GIS Manager John Vogl

The Town of Londonderry is working with the Southern NH Planning Commission (SNHPC) to update the local Hazard Mitigation Plan, last adopted in 2010. Such plans form the foundation for a community's long-term strategy to reduce disaster losses and break the cycle of repeated losses and reconstruction. Local governments are required to develop Plans as a condition for receiving certain types of non-emergency disaster assistance. Adopted plans must be reviewed and revised on a regular basis to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmitted for approval at least every five years to continue to be eligible for mitigation project grant funding.

A Committee of Town Employees and the public is meeting monthly on Thursdays at 9:30 am in the Elwood Conference Room (next meeting scheduled for March 26th) to review and update to the 2010 plan. Public comment is always welcome. It is expected that the update will be completed this summer.

To date, the Committee has reviewed past incidents, reviewed critical facilities and target hazards mapping and has examined the potential severity and likelihood of different types of hazards. Future meetings will focus on mitigation goals and strategies. Meeting minutes and agendas are posted in the Hazard Mitigation Plan section of londonderynh.org.

Interested parties are asked to contact Gerald Coogan at the Southern New Hampshire Planning Commission at gcoogan@snhpc.org or (603) 748-5580 with any questions.



Repairs to Auburn Road, completed in 2013, served to mitigate repeated flooding and storm damage in that part of Town.

APPENDIX H

DOCUMENTATION OF PLAN ADOPTION

Town of Londonderry, New Hampshire
Londonderry Town Council

A Resolution Approving the Londonderry Hazard Mitigation Plan Update 2015

WHEREAS, the Southern New Hampshire Planning Commission received funding from the New Hampshire Department of Safety – Homeland Security and Emergency Management under a Pre-Disaster Mitigation Grant to assist the Town of Londonderry in the preparation of the Londonderry Hazard Mitigation Plan Update 2015; and

WHEREAS, several public planning meetings were held between January 2015 and July 2015 regarding the development and review of the Londonderry Hazard Mitigation Plan Update 2015; and

WHEREAS, the Town of Londonderry authorizes responsible departments and/or agencies to execute their responsibilities demonstrated in the Londonderry Hazard Mitigation Plan Update 2015; and

WHEREAS, the Londonderry Hazard Mitigation Plan Update 2015 contains several potential future projects to mitigate hazard damage in the Town of Londonderry; and

WHEREAS, a public hearing was held by the Londonderry Town Council on (Date) to formally approve and adopt the Londonderry Hazard Mitigation Plan Update 2015.

NOW, THEREFORE BE IT RESOLVED that the Londonderry Town Council adopts the Londonderry Hazard Mitigation Plan Update 2015.

1. The Plan is hereby adopted as an official plan of the Town of Londonderry;
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 Town Council by the Emergency Management Director

ADOPTED this day, the _____ of _____ 2015.
Londonderry Town Council

John Farrell, Chairman

Jim Butler, Vice Chairman

Joe Green

Tom Dolan

Tom Freda

ATTEST _____