HAZARD MITIGATION PLAN

FOR THE TOWN OF PETERBOROUGH

NEW HAMPSHIRE

ADOPTED BY THE PETERBOROUGH BOARD OF SELECTMEN ON

NOVEMBER 23, 2004

HAZARD MITIGATION PLAN

FOR THE TOWN OF PETERBOROUGH

NEW HAMPSHIRE

Prepared by the:

Town of Peterborough Hazard Mitigation Committee

&

The Peterborough Office of Community Development

1 Grove Street Peterborough, New Hampshire 03458

603-924-8000 X 104

ocd@townofpeterborough.us

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EXECUTIVE SUMMARY

The *Peterborough Hazard Mitigation Plan* serves as a means to reduce future losses from natural or man-made hazard events before they occur. The *Plan* was developed by the Peterborough Hazard Mitigation Committee and contains Hazard Mitigation Goals consistent with those of the State of New Hampshire.

Hazards addressed in this Plan are as follows:

- Flooding (Dam Failures, Riverine Flooding, Ice Jams)
- Wind (Hurricanes, Tornados)
- Severe Thunderstorms (Lightning, Hail, Downbursts)
- Extreme Winter Weather (Extreme Cold, Ice Storms, Heavy Snow Storms, Nor'easters)
- Earthquake
- Landslide and Subsidence
- Urban Fire
- Wildfire
- Drought
- Extreme Heat
- Radon
- Man-Made Hazard Events

The Peterborough Hazard Mitigation Committee, as detailed in Chapter III, identified "Critical Assets, and categorized them as follows:

Essential Facilities

- Fire Station
- Police Station
- Public Works Department
- Town House
- Communication Towers
- Water Supply System
- Wastewater Treatment Facility

Vulnerable Populations

- Monadnock Community Hospital
- Harborside Health Care
- Summerhill Assisted Living
- Scott Farrar Nursing Home
- RiverMead Retirement Community
- Peterborough Elementary School
- South Meadow Middle School
- ConVal Regional High School
- Monadnock Community Early Learning Center
- The Well School
- Trinity Christian Academy

Economic Assets

- Eastern Mountain Sports
- Millard Group
- NH Ball Bearing
- Staff Development for Educators
- ConVal School District
- Monadnock Community Hospital

Special Consideration

Historic Sites:

- G.A.R. Hall
- Peterborough Historical Society Building
- Town House
- Gurnsey Building

Recreational Sites:

- Adams Playground
- Cunningham Pond
- Edward MacDowell Lake

Churches:

- All Saints Parish
- Church of Jesus Christ of Latter-Day Saints
- First Church of Christ Scientist
- Good Shepherd Lutheran
- Grace Evangelical Methodist
- Monadnock Congregational
- Peterborough Unitarian
- St. Peter's Catholic
- Trinity Evangelical
- Union Congregational
- United Methodist

Hazardous Materials Facilities

- Rymes Oil
- Roland's Shell Service
- Mr. Mike's Convenience Store
- Monadnock Community Hospital
- NH Ball Bearing
- Waste Water Treatment Facility
- Peter's Oil
- Town Highway Garage

The Peterborough Hazard Mitigation Committee identified a number of existing hazard mitigation programs and strategies, described in detail in Chapter 6. The Peterborough Hazard Mitigation Committee prioritized newly identified hazard mitigation strategies as follows:

1. Establish a Hazardous Tree Removal Program
2. Install Catchment Systems at the Gasoline Stations
3. Improve Flood Warning Communications
4. Improve the Town Communication Systems
5. Repair the North Dam
6. Repair/Reconstruct the Granite Street Retaining Wall
7. Repair/Reconstruct the Transcript Dam
8. Repair the Downtown Canal and re-route the Drainage System
9. Set up an Emergency Operations Center
10. Update and Maintain the Town's Geographic Information System (GIS)
11. Update the Aquifer Protection Ordinance
12. Update the Town Emergency Management Plan

CERTIFICATE OF ADOPTION

TOWN OF PETERBOROUGH, NEW HAMPSHIRE

BOARD OF SELECTMEN

A RESOLUTION ADOPTING THE PETERBOROUGH HAZARD MITIGATION PLAN

WHEREAS, the Town of Peterborough established a Committee to prepare the Peterborough Hazard Mitigation Plan; and

WHEREAS, several public planning meetings were held between May and September of 2004 regarding the development and review of the Peterborough Hazard Mitigation Plan; and

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

WHEREAS, a duly-noticed public hearing was held by the Peterborough Board of Selectmen on November 23, 2004 to formally approve and adopt the Peterborough Hazard Mitigation Plan.

NOW, THEREFORE BE IT RESOLVED that the Peterborough Board of Selectmen adopts the Peterborough Hazard Mitigation Plan.

ADOPTED AND SIGNED this 23rd day of November, 2004.

Elizabeth Thomas, Chair
Peterborough Board of Selectmen

Eugene Kellogg

Joe Byk

ATTEST

Robert Lambert, Town Clerk

ACKNOWLEDGEMENTS

The Peterborough Hazard Mitigation Committee was comprised of the following individuals who met from May to September of 2004 to develop this Plan:

- Scott Guinard, Chief of Police
- Joe Lenox, Fire Chief and Emergency Management Director (EMD)
- George Sterling, Planning Board
- Tom Humphreys, Director of Engineering, Monadnock Community Hospital
- Mert Dyer, Former Fire Chief
- Ed Betz, Director Department of Public Works
- Tom Weeks, Health Officer

The following staff members of the Town of Peterborough contributed to the development of this Plan:

- Carol Ogilvie, Director Office of Community Development
- Fash Farashahi, Office of Community Development GIS Specialist
- Ben Danforth, Office of Community Development Intern

RESOURCES

The agencies and individuals mentioned below served as a resource for the Hazard Mitigation Committee by either attending work sessions, or providing valuable input and guidance through telephone conversation or printed data, or both. Training support has been offered by some of those on this resource list.

New Hampshire Office of Emergency Management:
State Office Park South
107 Pleasant Street
Concord, NH 03301

Field Representative:	Joann Beaudoin	1-800-852-3792
Mitigation Officer:	Mike Poirier	1-800-852-3792

U. S. Department of Homeland Security, Federal Emergency Management Agency:
99 High Street, 6th Floor
Boston, MA 02110-2320
Paul White, Team Leader 1-617-832-4712

CHAPTER 1
INTRODUCTION

BACKGROUND

The Federal Emergency Management Agency (FEMA) has mandated that all communities within the State of New Hampshire establish local hazard mitigation plans as a means to reduce future losses from natural or man-made hazard events before they occur. In response to this mandate, the NH Office of Emergency Management (NHOEM) contracted with the Southwest Region Planning Commission (SWRPC) in to develop a program that would achieve this goal. SWRPC prepared a Hazard Mitigation Planning Handbook (August 2000) to be used by local communities as a guide in the preparation of hazard mitigation plans. SWRPC then undertook a pilot project to develop Hazard Mitigation Plans for two towns in the Southwest Region using this handbook as a guide.

These Plans were accepted by NHOEM and by FEMA. The handbook was updated in October of 2002 to reflect rule changes for these Plans at the federal level. The handbook was updated in October of 2002 to reflect rule changes for these Plans at the federal level. All local Hazard Mitigation Plans are now developed in accordance with this guidance document; local plans that have been produced based on this handbook are now available to serve as models for a plan that complies with the federal rules.

AUTHORITY

This Hazard Mitigation Plan was prepared 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, hereinafter referred to as the "Stafford Act." Accordingly, this All-Hazard Mitigation Plan will be referred to as the "Plan."

PURPOSE

The Peterborough All-Hazard Mitigation Plan is a planning tool to be used by the Town of Peterborough, as well as other local, state and federal governments, in their efforts to reduce the effects from natural and man-made hazards. This plan does not constitute any section of Peterborough's Master Plan or Town Ordinances.

SCOPE OF THE PLAN

The scope of this Plan includes the identification of natural hazards affecting the Town of Peterborough, an assessment of vulnerability, as identified by the Hazard Mitigation Planning Committee, identification of existing mitigation strategies, and the development of recommended improvements and mitigation strategies.

METHODOLOGY

Using the *Guide to Hazard Mitigation Planning for New Hampshire Communities* handbook (SWRPC, October 2002), and *State and Local Hazard Mitigation How-to-Guides* (FEMA), the Peterborough Hazard Mitigation Committee developed the content of the *Peterborough Hazard Mitigation Plan* by following the recommended process set forth in the guidance documents.

An organizational meeting was held on May 19, 2004 to assess availability of potential Committee membership and meeting times. Subsequent to this, the Committee held meetings, all open to the public, beginning in May of 2004 through September of 2004, in order to develop the *Plan*.

In between meetings, Town staff researched historical files for information on hazards specific to Peterborough.

Public Committee Meetings (all held at the Peterborough Town House):

May 19, 2004 @ 7:30 A.M.	- Informational and Organizational Meeting
June 18, 2004 @ 7:30 A.M.	- Working Committee Meeting.
July 30, 2004 @ 7:30 A.M.	- Working Committee Meeting.
August 20, 2004 @ 7:30 A.M.	- Working Committee Meeting.
September 7, 2004 @ 12 Noon	- Working Committee Meeting.
September 14, 2004 @ 12 Noon	- Working Committee Meeting.

Public Meetings with the Board of Selectmen:

September 21, 2004: The Hazard Mitigation Committee presented the draft Plan to the Board of Selectmen at a duly-noticed public meeting of the Board. The Board approved the Committee's intent to submit the Plan to FEMA for review.

November 23, 2004: The Board of Selectmen adopted the Local Hazard Mitigation Plan at a duly-notice public hearing, held at the Peterborough Town House.

Hazard Mitigation Goals
Town of Peterborough, NH

The overall Goals of the Town of Peterborough with respect to Hazard Mitigation are stipulated here in the following order:

1. To improve upon the protection of the general population, the citizens of the Town of Peterborough and guests, from all natural and man-made hazards.

2. To reduce the potential impact of natural and man-made disasters on the Town of Peterborough's Emergency Response Services.

3. To reduce the potential impact of natural and man-made disasters on the Critical Facilities in the Town of Peterborough.

4. To reduce the potential impact of natural and man-made disasters on the Town of Peterborough's infrastructure.

5. To improve the Town of Peterborough's Emergency Preparedness and Disaster Response and Recovery Capability.

6. To reduce the potential impact of natural and man-made disasters on private property in the Town of Peterborough.

7. To reduce the potential impact of natural and man-made disasters on the Town of Peterborough's economy.

8. To reduce the potential impact of natural and man-made disasters on the Town of Peterborough's natural environment.

9. To reduce the Town of Peterborough's liability with respect to natural and man-made hazards through a community education program.

10. To reduce the potential impact of natural and man-made disasters on the Town of Peterborough's specific historic treasures.

11. To identify, introduce, and implement cost-effective Hazard Mitigation measures so as to accomplish the Town's Goals and Objectives and to raise the awareness and acceptance of Hazard Mitigation opportunities generally.

12. To work in conjunction and cooperation with the State of New Hampshire's Hazard Mitigation Goals.

CHAPTER 2

HAZARD IDENTIFICATION

The State of New Hampshire's Natural Hazard Mitigation Plan recommends that municipalities examine the following hazards; these include some consideration of man-made disasters as well as natural hazards. The Hazard Mitigation Plan incorporates the majority of the natural hazards listed within the State Plan; hazards such as tsunamis and phragmites australis were not deemed applicable to Peterborough. The following list represents hazards typical of those experienced in New Hampshire. Complete definitions from the State of New Hampshire Natural Hazard Mitigation Plan can be found in the Appendix.

NATURAL HAZARDS

- ❒ Flooding
  - *Hurricanes*
  - *100-year Floodplain Events*
  - *Erosion and Mudslides*
  - *Rapid Snow Pack Melt*
  - *River Ice Jams*
  - *Dam Breach and Failure*
  - *Severe Storms*
- ❒ Wind
  - *Hurricanes*
  - *Tornadoes*
  - *Nor'easters*
  - *Downbursts*
    - micro burst, which covers an area less than 2.5 miles in diameter
    - macro burst, which covers an area at least 2.5 miles in diameter
- ❒ Severe Thunderstorms
  - *Lightning*
  - *Hail*
- ❒ Extreme Winter Weather
  - *Extreme Cold*
  - *Ice Storm*
  - *Heavy Snow Storms*
- ❒ Earthquakes
- ❒ Fire
  - *Wildfires*
  - *Urban Fires*
- ❒ Landslides
- ❒ Drought
- ❒ Radon

MAN-MADE

- ❒ HazMat Release
  - *Transportation*
  - *Fixed Facility*
- ❒ Radiological Release
  - *Fixed Facility*
- ❒ Utility Disruption
  - *Communication*
  - *Electricity*
  - *Water Systems*
  - *Sewer Systems*

PAST HAZARD EVENTS THAT HAVE IMPACTED PETERBOROUGH

Over the years of Peterborough history a number of moderate and severe natural disasters have impacted the Town and the surrounding region. Like most New Hampshire towns, flooding represents the greatest risk, as it is the most common, and can create much damage. Major flood occur in the spring, fall and winter. Spring flooding is typically the result of snowmelt and heavy rains, in conjunction with ice jams.

Winter events have also caused much damage; this area of the state, for example, experienced a devastating ice storm in January of 1998 that had major impacts on utility provision, transportation networks, etc. In terms of overall devastation, however, the Hurricane of 1938 caused more damage than any other event before or since. Most of Main Street burned, there was severe flooding along the Contoocook, and forests were leveled from the high winds.

There have been two man-made events that have had serious impact on the town and the environment:

- In 1982 the South Well was contaminated by a manufacturing facility, and is only just now being brought back into service. This has significantly affected the available water supply to the Town.

- In January of 2003 a gasoline spill at a self-service gas station in the Downtown went into the storm drains and the underground canals; from there, directly into the Contoocook River. Fortunately, the spill was caught right away, and responders were on the scene quickly. Nevertheless, the entire Downtown was evacuated and it was months before some of the affected businesses were functioning at their normal levels.

Tables 1 and 2 following present data on flooding and federally-declared disasters; note that the data are not town-specific, but rather county-wide, or identified with the Contoocook and/or the Nubanusit.

Map 1 following shows the location of specific events that have occurred in Peterborough in recent history. Peterborough, as well as most of New Hampshire, is most at risk from flooding. Some of the flooding is the result of ice jams in the winter. In turn, flooding has caused roads to wash out. These hazards were identified in a brainstorming session with the Hazard Mitigation Committee meeting on May 19, 2004.

TABLE 1:
FLOODING HISTORY

Date	Area Effected (River Basins or Region)	Recurrence interval (in years)	Remarks
October 23, 1785	Cocheco, Baker, Pemigewasset, **Contoocook** and Merrimack	Unknown	Greatest discharge at Merrimack and at Lowell, Mass. Through 1902.
March 24-30, 1826	Pemigewasset, Merrimack, **Contoocook**, Blackwater and Ashuelot	Unknown	
April 21-24, 1852	Pemigewasset, Winnespaukee, **Contoocook**, Blackwater, and Ashuelot	Unknown	Merrimack River at Concord; highest stream stage for 70 years. Merrimack River at Nashua; 2 feet lower than 1785.
April 19-22, 1862	**Contoocook**, Merrimack, Piscataquog, and Connecticut	Unknown	Highest stream stages to date on the Connecticut River; due solely to snowmelt.
October 3-5, 1869	Androscoggin, Pemigewasset, Baker, **Contoocook**, Merrimack, Piscataquog, Soughegan, Ammonoosuc, Mascoma, and Connecticut	Unknown	Tropical storm lasting 36 hours. Rainfall, 6-12 inches.
March 11-21, 1936	Statewide	25 to > 50>	Double flood; first due to rains and snowmelt; second, due to large rainfall.
September 21, 1938	Statewide	Unknown	Hurricane. Stream stages similar to those of March 1936 and exceeded 1936 stages in the Upper Contoocook River.
November 1950	**Contoocook River and Nubanusit Brook**	Unknown	Localized storm resulted in flooding of this area.
July 1986 ? August 10, 1986	Statewide	Unknown	FEMA DR-771-NH: Severe summer storms with heavy rains, tornadoes; flash flood and severe winds.
March 31 to April 2, 1987	Androscoggin, Diamond, Saco, Ossipee, Piscataquog, Pemigewasset, Merrimack, and **Contoocook** Rivers.	25 to > 50	Caused by snowmelt and intense rain. Precursor to a significant, following event.
August 7-11, 1990	Statewide	Unknown	**FEMA DR-876-NH:** A series of storm events from August 7-11, 1990 with moderate to heavy rains produced widespread flooding in New Hampshire.
August 19, 1991	Statewide	Unknown	**FEMA DR-917-NH:** Hurricane Bob struck New Hampshire causing extensive damage in Rockingham and Stafford counties, but the effects were felt statewide.
October 1996	Northern and Western Regions	Unknown	**FEMA DR-1077-NH:** Heavy rains. Counties Declared: Grafton, **Hillsborough**, Merrimack, Rockingham, Strafford, and Sullivan.

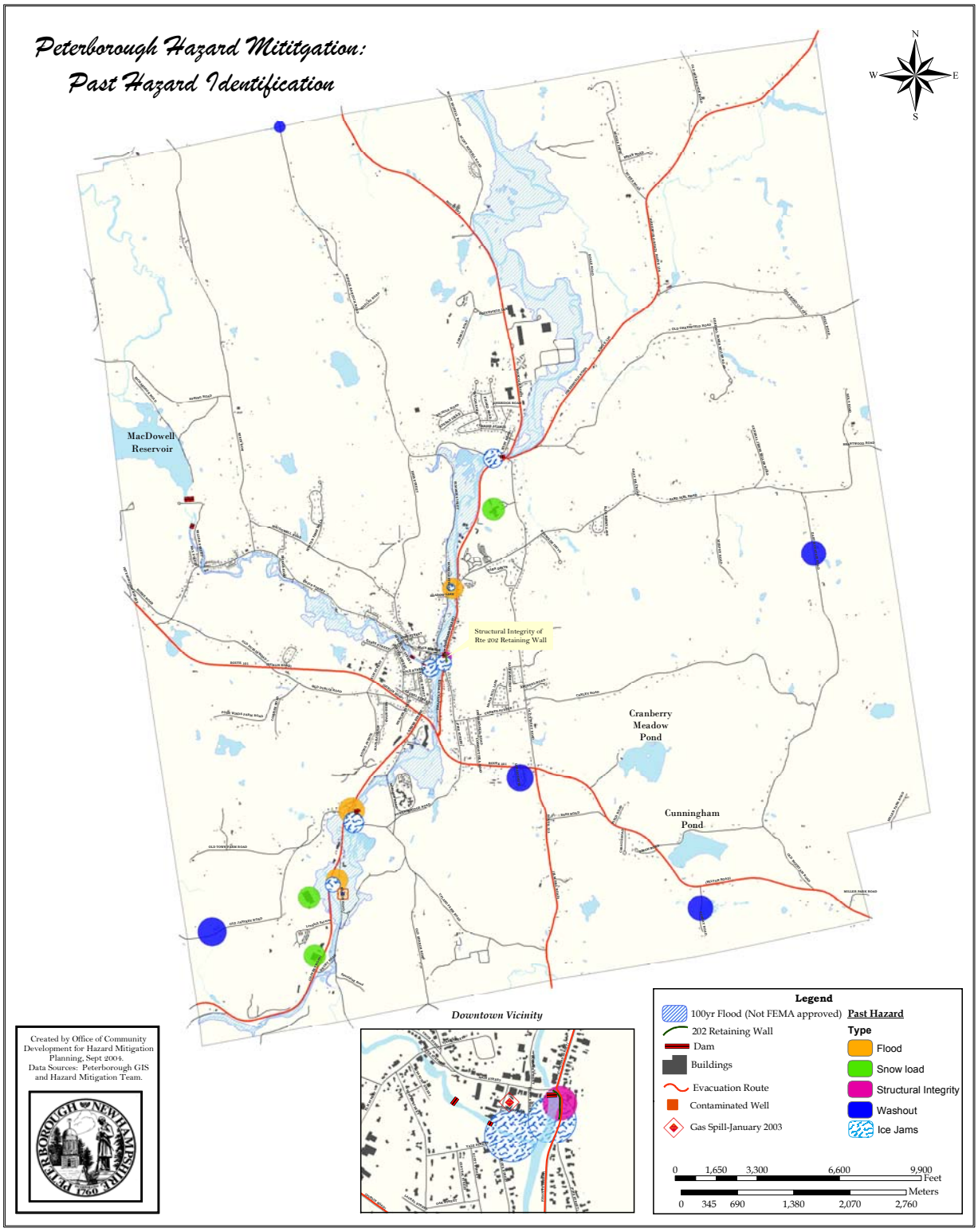
SOURCE: NH OFFICE OF EMERGENCY MANAGEMENT

TABLE 2:
MAJOR FEDERALLY-DECLARED DISASTERS, 1986 - 1998

Date Declared	Event Type	FEMA Disaster Declaration Number	Dollar Amount	Counties Designated
August 27, 1986	Severe Storms/Flooding	FEMA-771-DR	1,005,000	Cheshire & **Hillsborough**
April 16, 1987	Severe Storms/Flooding	FEMA-789-DR	4,888,889	Cheshire, Carroll, Grafton, **Hillsborough**, Merrimack, Rockingham & Sullivan
August 29, 1990	Severe Storms/Winds	FEMA-876-DR	2,297,777	Belknap, Carroll, Cheshire, Coos, Grafton, **Hillsborough**, Merrimack & Sullivan
March 16, 1993	Heavy Snow	FEMA-3101-EM	832,396	Statewide
October 29, 1996<	Severe Storms/Flooding	FEMA-1144-DR	2,341,273	Grafton, **Hillsborough**, Merrimack, Rockingham, Strafford & Sullivan
January 15, 1998	Ice Storm	FEMA-1199-DR	12,446,202	Belknap, Carroll, Cheshire, Coos, Grafton, **Hillsborough**, Merrimack, Strafford, Sullivan

SOURCE: NH OFFICE OF EMERGENCY MANAGEMENT

MAP 1: PAST HAZARDS



CHAPTER 3
ASSET IDENTIFICATION

A Critical Asset 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 community.
- Would create a secondary disaster if a hazard were to impact it.

The Critical Assets for the Town of Peterborough have been identified by the Hazard Mitigation Committee, and located on Map 2. For ease of understanding, these identified assets are broken out into five categories, described and listed below in the following tables. Note that there may be some overlap in the categorization of these assets; for example, many of the facilities listed under "Vulnerable Populations" or "Economic Assets" may also serve as temporary shelter in the event of a disaster.

1. Essential Facilities

Essential Facilities are typically government buildings or services that would be in the position of being first responders in the event of a disaster. Included in this category also are utilities, and the major roads that are essential for traffic movement.

TABLE 3:
ESSENTIAL FACILITIES

Facility Type	Location
▪ Fire Station	Summer Street
▪ Police Station	Grove Street
▪ Public Works Department	Elm Street
▪ Town House	Grove & Main Streets
▪ Utilities:	
▫ Communication Tower	Cheney Avenue
▫ Communication Tower	Cunningham Pond Road
▫ Water Supply System	
• Water Tanks:	• Sand Hill
	• Cheney Avenue
	• West Peterborough
	• Cunningham Pond
• Wells	
• North Well	Keenan Drive
• South Well	Sharon Road
• Summer Street	
• Tarbell Road	
• Hunt Road	
▫ Wastewater Treatment Plant	Pheasant Road
• Pump Station	
• Pump Station	
▪ Major Transportation Routes:	
• Route 202	
• Route 101	

2. Vulnerable Populations

Vulnerable populations, for the purposes of this document, are defined as follows:

- ❒ Areas or facilities that are densely populated.
- ❒ Buildings that house people who may not be self-sufficient.
- ❒ Areas with homes that are not very resistant to disasters.
- ❒ All elderly housing or day care facilities, nursing homes, and hospitals.

TABLE 4:
VULNERABLE POPULATIONS

Facility Type	Location
Medical/Health Care Facilities:	
▪ Monadnock Community Hospital	Old Street Road
▪ Harborside Health Care	Pheasant Road
▪ Summerhill Assisted Living	Old Dublin Road
▪ RiverMead Retirement Community	Old Sharon Road
Schools:	
▪ Peterborough Elementary School	High Street
▪ South Meadow Middle School	Concord Street
▪ ConVal Regional High School	Concord Street
▪ Monadnock Community Early Learning Center	Community Lane
▪ The Well School	Middle Hancock Road
▪ Trinity Christian Academy	Dublin Road (Route 101)

3. Economic Assets

The businesses listed below are those that are prominent for the number of people employed, since these are places where large numbers of people are located at one time, and may need to be evacuated in the event of a disaster. In other cases, these people may need to remain in place and, in addition, the facility may serve as a shelter to others from the outside.

TABLE 5:
ECONOMIC ASSETS

Facility Type	Location
▪ Eastern Mountain Sports	Vose Farm Road
▪ Millard Group	Vose Farm Road
▪ NH Ball Bearing	Jaffrey Road (Route 202)
▪ Staff Development for Educators	Sharon Road
▪ ConVal School District	Concord Street
▪ Monadnock Community Hospital	Old Street Road

4. Hazardous Material Facilities

There are only a few places in Peterborough that store or use hazardous materials. These are included in the critical asset listing due to the potential for leaking or combustion in the event of a disaster.

TABLE 6:
HAZARDOUS MATERIAL FACILITIES

Facility Type	Location
▪ Rhymes Oil	School Street, Depot Square
▪ Roland's Shell Service	Wilton Road (Route 101)
▪ Mr. Mike's Convenience Store	Jaffrey Road (Route 202)
▪ Monadnock Community Hospital	Old Street Road
▪ NH Ball Bearing	Jaffrey Road (Route 202)
▪ Waste Water Treatment Facility	Pheasant Road
▪ Peter's Oil	Summer Street

5. Special Consideration

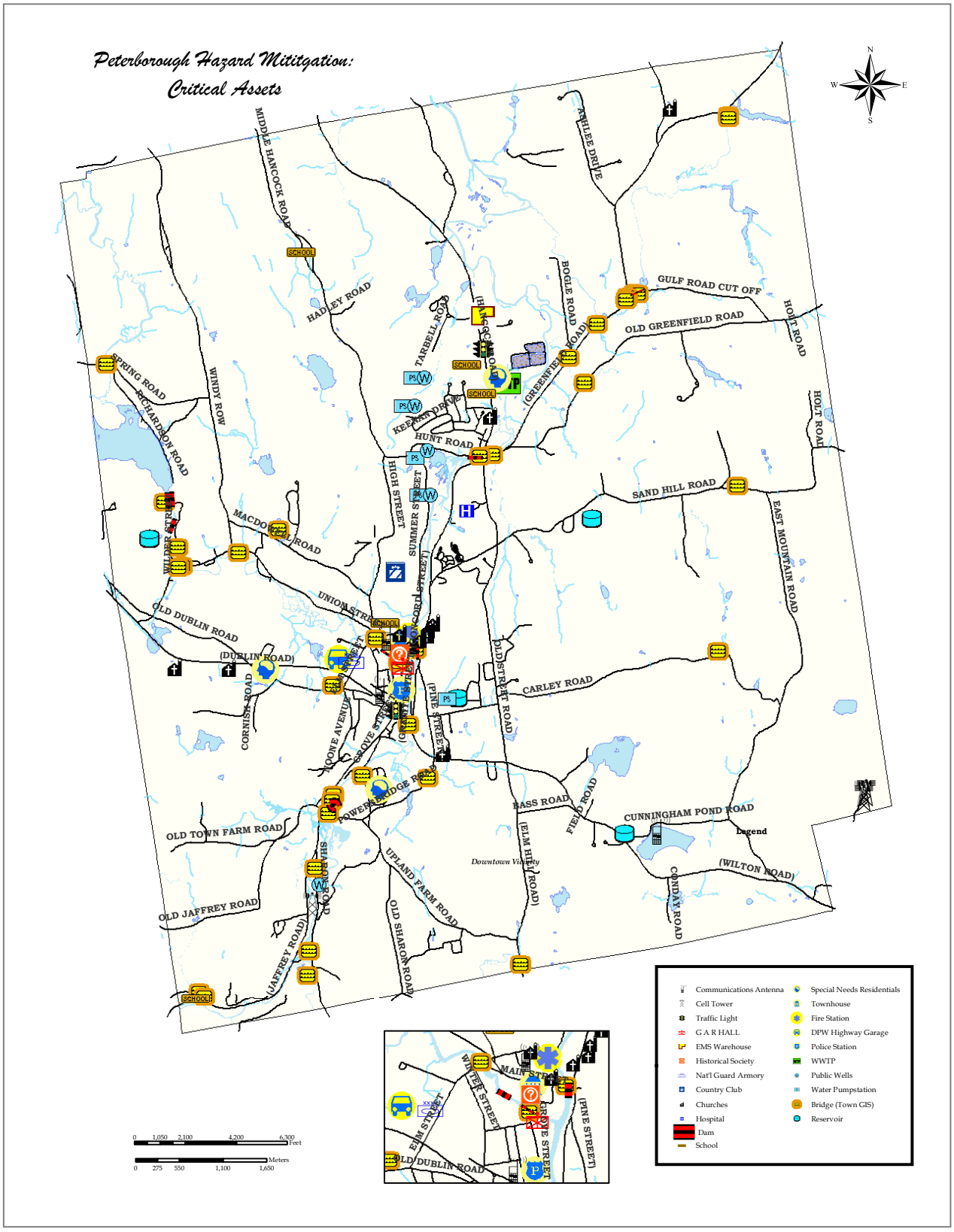
Combined into the category of Special Consideration are Historic Sites & Buildings, Churches, and Recreational Gathering Places. The preservation of historic sites and buildings in the event of a disaster are of utmost importance to the residents of Peterborough. Further, these may be more vulnerable to certain hazards since they may not have the most up-to-date safety features, and/or limited access. Churches serve as gathering places and can temporarily provide shelter. And, recreational sites are also places where large numbers of people are gathered in at one time.

A "special" category of Special Consideration is one that does not fit easily within these categories, and that is "Data." With today's reliance on computers and electronic data storage, any event that could damage or destroy files would be catastrophic – for Town Government, for the business community, and the healthcare providers, to name only a few.

TABLE 7:
SPECIAL CONSIDERATION

Facility Type	Location
Historic Sites:	
• G.A.R. Hall	Grove Street
• Peterborough Historical Society Building	Grove Street
• Town House	Corner of Main and Grove Streets
• Gurnsey Building	Main Street
• Union Mill	Union Street, West Peterborough
• Dams:	
• Transcript Dam	Downtown @Main & Granite Streets
• North Dam	Routes 202 & 136
• Noone Falls	South Peterborough @ Route 202 & Noone Falls
Churches:	
• All Saints Parish	Concord Street
• Church of Jesus Christ of Latter-Day Saints	Old Bennington Road
• First Church of Christ Scientist	Concord Street
• Good Shepherd Lutheran	Dublin Road (Route 101)
• Grace Evangelical Methodist	Hancock Road (Route 202)
• Monadnock Congregational	Wilton Road (Route 101)
• Peterborough Unitarian	Main Street
• St. Peter's Catholic	Vine Street
• Trinity Evangelical	Dublin Road (Route 101)
• Union Congregational	Concord Street
• United Methodist	Concord Street
Recreational Sites:	
Adams Playground	Union Street
Cunningham Pond	Cunningham Pond Road
Edward MacDowell Lake	Wilder Street

MAP 2: CRITICAL ASSETS



Chapter 4
Vulnerability Assessment

Peterborough is prone to a variety of man-made and natural hazards. These include dam failures, riverine and ice jam flooding, severe wind events, ice storms and severe winter storms. Of all potential hazards however, flooding, whether from heavy rains or ice jams, carries the greatest risk for Peterborough. The Contoocook experiences some level of flooding on a regular basis. The construction of MacDowell Dam on the Nubanusit Brook has certainly helped to regulate how much water gets into the Contoocook from that source; but the Contoocook has such a large catchment area that it continues to flood regardless of the regulation of the Nubanusit.

Geological events have not played much of a role in Peterborough's history; the topography does not lend itself to vulnerability from such occurrences. The same is true for hurricanes, with the exception of the 1938 hurricane, which was a devastating event for most of New England. Microbursts have posed more of a threat to the Town than the severe winds.

Winter weather is an intermittent hazard throughout the town of Peterborough. While Peterborough can experience heavy snowfalls and ice, in recent history damages have been minimal, with the exception of the ice storm in January of 1998.

Following is a compilation of hazards that have impacted Peterborough in the past, as well as those that are determined to pose a threat. Table 8 following presents these hazards in a ranking order based on methodology provided by FEMA; all hazards are categorized as being of High, Medium, or Low possibility for future occurrence. Included in this assessment is information provided by the NH Office of Emergency Management, in its State Hazard Mitigation Plan that assesses various risks by County. Note that for the purposes of this assessment "Man-Made Hazards" include intentional (such as terrorism) and accidental events. Map 3 presents some of this information, but not all, given that many of these potential hazards do not lend themselves to visual description in a specific place.

TABLE 8:
VULNERABILITY ASSESSMENT

Hazard	Probability (1 - 5)	Intensity (1 - 4)	Area affected (1 - 4)	Risk Coefficient	Rank	Category
Natural Hazards:						
Flood						
▫ Riverine	3	5	3	11	2	High
▫ Ice jam	4	3	2	9	4	High
▫ Dam failure	2	3	2	7	6	Medium
Wind						
▫ Hurricane	1	4	3	8	5	Medium
▫ Tornadoes	3	3	3	9	4	High
Severe Thunderstorms	5	2	4	11	2	High
▫ Lightning	5	2	1	8	5	Medium
▫ Hail	1	1	2	4	9	Low
▫ Downbursts	1	3	2	6	7	Medium
Extreme Winter Weather						
▫ Extreme Cold	2	3	4	9	4	Medium
▫ Ice Storm	3	3	4	10	3	High
▫ Heavy Snow Storms	5	3	4	12	1	High
▫ Nor'easters	4	3	4	11	2	High
Earthquake	1	1	2	4	9	Low
Landslide	1	2	1	4	9	Low
Subsidence	1	3	1	5	8	Medium
Fire						
Urban Fire	1	2	1	4	9	Low
Wildfire	1	3	2	6	5	Medium
Drought	2	2	3	7	6	Medium
Extreme Heat	1	1	2	4	9	Low
Radon	3	2	3	8	5	Medium

Man-Made Hazards:						
Hazmat Release						
▫ Transportation	2	4	3	9	4	High
▫ Fixed Facility	2	4	2	8	5	Medium
Radiological Release						
▫ Fixed Facility	1	2	4	7	6	Medium
Utility Disruption						
▫ Communication	2	3	4	9	4	High
▫ Electricity	3	3	4	10	3	High
▫ Water Systems	2	2	3	7	6	High
▫ Wastewater Treatment Plant	2	3	4	9	4	High
Probability = the likelihood that the hazard would occur						
Intensity = the magnitude if it occurs						
Area affected = geographic area of the town						
Risk Coefficient = Probability + Intensity + Area Affected: Low 1 - 4; Medium 5 - 8; High 9+						

Loss Estimates for Hazard Events

Part of the process of identifying potential hazards is to assess potential financial losses from those hazards. Following is a description of the potential risk to Peterborough of each of these identified hazards, and an assessment of the financial cost to the town in the event of any of these hazardous events. The method used for calculating the financial losses are those developed for FEMA and described in the FEMA manual, *Understanding Your Risks: Identifying Hazards and Estimating Losses* (August 2001); this manual provides the basic framework for the loss estimates below.

Note that human losses are not calculated for this exercise, but could be expected to occur depending on the nature and severity of each hazard. Instead, the focus of the analyses is on the potential losses of economic assets, excluding changes in land values. When numerical estimates are given for potential losses, the figures include losses to structures, contents, and functional downtime (for commercial properties) unless noted otherwise. Based on the most recent available property valuation data, the value of all structures in Peterborough, including exempt structures such as schools and churches, is $278,994,570.

NATURAL HAZARDS

Flooding - High Risk

Flooding occurs frequently in Peterborough, particularly on the two main rivers in town: the Contoocook River and Nubanusit Brook. Running from south to north, the Contoocook River passes through the center of town and several important residential and commercial areas. Nubanusit Brook, which feeds into the Contoocook River, also passes through several residential districts in the northwestern part of town. Both rivers are prone to flooding caused by heavy rains and rapid snowmelt.

Riverine Flooding - High Risk

Contoocook River - High Risk:

Approximately 61 residential and commercial structures are situated in the floodplain along the Contoocook River with an estimated combined replacement value of $11,793,250, excluding their contents. The town's waste water treatment facility is also located along the Contoocook River. A significant flood would probably not undermine the structural integrity of the facility's earthen levies, but it could facilitate the release of untreated waste water into the river. In addition, six bridges span the river, connecting the western and eastern sections of town. Several sections of Route 202 and several important town roads also border the Contoocook River. Significant damage to these structures and roads could significantly hinder emergency response efforts in the wake of a disaster.

The table below summarizes the assets located in the Contoocook River floodplain and the potential losses that could be expected during a flood. This analysis provides a basic estimate of the number of people that typically occupy this area, but it does not confer actual fatalities. Moreover, the analysis presents dollar amounts for total economic losses, which are dependent on the level of flood waters. This relationship is incorporated into the analysis by calculating potential losses for three different flood levels: 2, 4, and 8 feet.

Estimated Loss – Flood on Contoocook River					
Assets in Hazard Area			Total Estimated Loss		
Type	# Buildings	# People	2' Flood	4' Flood	8' Flood
Residential	32	100	$1,007,545	$1,410,563	$2,468,485
Commercial	28	550	$5,487,250	$7,682,150	$12,465,286
Total	61	650	$6,494,795	$9,092,713	$14,933,771

Nubanusit Brook - Medium Risk:

Following the completion of the Edward MacDowell Dam in 1950, flooding on Nubanusit Brook has diminished markedly. Approximately four structures are located in the river's floodplain with an estimated combined replacement value of $425,500, excluding their contents. Although few buildings lie in the floodplain along Nubanusit Brook, the river converges with the Contoocook River in the center of town. Consequently, any flooding on Nubanusit Brook is likely to compound flood conditions on the Contoocook River, particularly in the downtown area. Five bridges also span the river, all of which would be at risk during a severe flood.

The loss estimate figures outlined in the table below were computed in the same manner as those for the Contoocook River. Since there are no commercial assets located in Nubanusit Brook's floodplain, functional downtime was omitted from the calculations.

Flood on Nubanusit Brook					
Assets in Hazard Area			Total Estimated Loss		
Type	# Buildings	# People	2' Flood	4' Flood	8' Flood
Residential	4	10	$148,925	$208,495	$361,675
Total	4	10	$148,925	$208,495	$361,675

Ice Jams - High Risk

The areas most prone to ice jams are the several dams along the Contoocook River and the confluence of the Contoocook River and Nubanusit Brook in the downtown area. In the past, ice jams have often resulted in localized flooding. Occasionally, severe ice jams have caused substantial flooding upstream of the jam site. Consequently, the risk of property damage and loss is similar to that described above in riverine flooding section but to a lesser extent. Based on historical evidence, the downtown area is most prone to ice jams and consequent flooding. Ice jams may also elevate the risk of a dam breach because several of the dams along the Contoocook River and Nubanusit Brook are old and in disrepair. The consequences of such a dam breach, however, would be modest because the dams are classified as minimal risk dams.

Dam Failure - Medium Risk

Peterborough has more than forty dams, two of which have been classified as high hazard by the NH Department of Environmental Services. Most of dams are owned and maintained by private individuals. The two high-hazard dams, however, are owned and maintained by government agencies. Although it is highly unlikely that either of these two dams will breach, the potential consequences of such a failure should be recognized.

One of the high-hazard dams is the Wastewater Treatment Facility, a Class B dam owned and maintained by the town. The treatment facility, which consists of three lagoons, has an approximate area of 17 acres and depth of 9 feet (approximately 45,900,000 gallons). If this dam were to breach, a large amount of water would be released into the Contoocook River, causing some flooding downstream. More importantly, waste materials would also be released into the river, likely leading to environmental damage and endangering public health. The actual risk to Peterborough's residents and their property would probably be minimal since little of the downstream shoreland is developed and occupied. On the other hand, other communities further downstream could be adversely affected by a significant waste water release.

Dams in Peterborough		
Dam Class	**#**	**# Public Owned**
Unclassified	11	0 Town Owned
AA	24	2 Town Owned
A	14	2 Town Owned
B	1	1 Town Owned
C	1	AMCE Edward MacDowell Reservoir

Source: NH Department of Environmental Services

The second high-hazard dam, the Edward MacDowell Dam, is located on Nubanusit Brook. This class C dam is maintained and operated by the US Army Corps of Engineers. Depending on the water level of Edward MacDowell Reservoir, the failure of this dam could cause serious damage to property along Nubanusit Brook and the Contoocook River. A significant surge of water could also cause minor dams located downstream to fail, further elevating the level of danger.

Two other dams also warrant serious attention, although they have not been classified by the NH Department of Environmental Services; they are the Transcript Dam in the downtown, and the North Dam at Route 202 and Route 136. The Transcript Dam has structural problems that are, in part, related to issues with the retaining wall (discussed later). And the North Dam has structural problems as well that require on-going attention.

Hurricane - Medium Risk

Although hurricanes occur infrequently in Peterborough, the severity associated with such storms makes them an important hazard for the town. The most destructive event in the town's history was the hurricane of 1938. The downtown area was flooded after days of rain and high winds ripped trees from the saturated ground. Secondary fires also burned down half the town's commercial district in the wake of the storm. Although no deaths occurred, the total damages amount to over $500,000 (roughly $6,000,000 today). After this catastrophe, however, a number of improvements were made in order to prevent such an event from

occurring again. Most notably, the federal government constructed Edward MacDowell Dam on Nubanusit Brook. More recent hurricanes have been weaker, producing only nominal damage to property in Peterborough.

The potential loss estimate for a hurricane is dependent on two main factors: rain totals and wind strength. Based on historical data, Peterborough is typically prone to a category 3 hurricane or lower on the Saffir-Simpson scale. The tables below provide the potential losses for hurricanes that fall within this range (category 1 - 3). It should be noted that the category systems does not provide a direct indication of potential rainfall. Consequently, the flood levels used below are estimated. The total estimated loss is the sum of the water and wind damage. Given this, the estimated losses for a hurricane range from $7,346,950 to $23,734,233.

Estimated Loss – Hurricane: Flooding					
Assets in Hazard Area			Total Estimated Loss		
Type	# Buildings	# People	2' Flood	4' Flood	8' Flood
Residential	36	110	$1,156,469	$1,619,058	$2,830,160
Commercial	28	550	$5,487,250	$7,682,150	$12,465,286
Total	65	660	$6,643,719	$9,301,208	$15,295,446

Estimated Loss – Hurricane: High Winds				
Type	Total Value (Buildings)	74 – 95 MPH (0.25% damage)	96 – 110 MPH (1% damage)	111 – 130 MPH (3% damage)
Residential	$203,911,710	$ 509,779	$ 2,039,117	$ 6,117,351
Commercial	$72,776,850	$ 181,942	$ 727,768	$ 2,183,305
Government	$4,604,389	$11,510	$46,044	$138,131
Total	$281,292,949	$703,231	$2,812,929	$8,438,787

Tornado - High Risk

Tornadoes are relatively uncommon natural hazards in New Hampshire. On average about six touch down each year. However, damage largely depends on where a tornado strikes. If it strikes an inhabited area, the impacts could be severe. In the state of New Hampshire, the total cost of tornadoes between 1950 and 1995 was $9,071,389 (The Disaster Center). The effect of a tornado in Peterborough would probably not be town-wide because, due to the topography

here, it would be likely to strike in localized, smaller areas. Dollar amounts would depend on if the tornado hit an area with a high density of buildings.

According to the NH State Hazard Mitigation Plan, risk from tornadoes is considered to be high in this County. The county has experienced 7 known F2 events and one F3 event. The compilation of data from www.tornadoproject.com lists a total of 18 tornadic events (all additional are F 1or less events) from 7/27/1956 to 6/16/1986.

Thunderstorm - High Risk

Thunderstorms are fairly common in Peterborough, especially during the summer months. These storms often generate heavy rainfall and high winds in conjunction with severe thunder and lightning. Occasionally, thunderstorms produce other weather hazards including downbursts and hailstorms.

Lightning Strikes - Medium Risk

While there have been no deaths in recent history due to lightning in Peterborough and the surrounding towns, national statistics indicate that it remains an important environmental danger. Occasionally, lightning strikes cause property damage in Peterborough, but the scope of the damage is generally quite minimal. Several of the town's communication antennas, however, are quite vulnerable to lightning strikes due to their location on exposed mountain ridges. In the past, lightning strikes have disabled these antennas, causing disruptions in the town's emergency and non-emergency radio communications.

Hailstorm - Low Risk

Despite the frequent occurrence of thunderstorms in Peterborough, major hailstorms are rare. When hail does occur, it is typically small and non-destructive. The absence of major agriculture production in Peterborough further diminishes the potential economic loss generally associated with hailstorms. There is also no record of property damage that is attributed to hailstorms. For these reasons, hailstorms are considered a low-risk hazard for Peterborough.

Downburst - Medium Risk

Peterborough has experienced downbursts in the last few years. Trees were uprooted, shingles blown off structures, and chimneys lost bricks. There have been some fatalities due to downbursts in the surrounding region, but none have yet occurred in Peterborough. All areas of the town are vulnerable to this weather phenomenon.

No potential loss estimate is available because there is no definitive information to use in modeling this hazard. As mentioned earlier, downbursts have the potential to cause deaths and destroy property, but the actual effects depend upon the location and severity of such an event.

Winter Weather - High Risk

The entire area of Peterborough is susceptible to extreme winter weather including heavy snow storms, ice storms, and extreme cold. In the past, extreme winter weather has caused structural damage to a number of buildings, ranging from minor water damage to total structural failure. These weather phenomena have also resulted in a number of deaths in Peterborough and the surrounding region. Winter storms also frequently damage above-ground utility systems, particularly electrical and telephone lines. Roadways also become hazardous for vehicle traffic, especially on steeper sections. These widespread effects can sometimes place an immense strain on the town's emergency response personnel and resources.

Heavy Snow Storm/Nor'easters - High Risk

Heavy snow storms, which are defined as snow storms that deposit 4 or more inches of snow in a 12-hour period, are the most common winter weather hazard in Peterborough. Occasionally, these heavy snowstorms are accompanied by high winds and low temperatures, and thus may be classified as Nor'easters or blizzards. A well-known problem caused by heavy snowstorms is the deterioration of road conditions. Despite having a well-equipped snow removal crew, roads often become dangerous during such storms. Occasionally, a section of Route 101 that passes over Temple Mountain in the southeast corner of town must be closed due to high snow accumulations.

These storms can also damage aboveground utility system such as power and telephone lines. Poor road conditions combined with utility disruptions can severely limit emergency and medical services throughout Peterborough. Large deposits of heavy snow can also lead to a variety of structural problems, particularly roof and structural collapse. Recent examples of structural damage caused by heavy snow loads include the collapse of a large barn on a local farm and the cracking of support beams in the town library in February 2003. Overall, the expense of snow removal, cost of repairs, and loss of business associated with heavy snow storms can have a large economic impact on the entire town.

Although heavy snowstorms are a frequent phenomenon in Peterborough, it is difficult to predict their future impact. There are innumerable variables that ultimately determine the severity of these storms and the ultimate damage they cause. Consequently, a quantitative analysis is impractical.

Ice Storm - High Risk

Ice is a common feature of the winter months ranging from light freezing rain and sleet to heavy ice storms. The most devastating ice storm to date occurred in January 1998.

Extreme Cold - Medium Risk

During the winter months, temperatures in Peterborough are quite variable. The average for the season is 19° F, but it is not uncommon for temperatures to exceed 40° F and drop below 0° F. When temperatures remain low, however, there is an increased risk to life and property. Moreover, extreme cold can adversely affect utilities in town, especially the town's water system. Extreme cold can also increase the chances of the ice jams developing on the major rivers in town.

Earthquake - Low Risk

Seismic activity in Peterborough and the surrounding region is limited. Small tremors occur frequently in the area, but they are generally unnoticeable. Major earthquakes are a rare phenomenon because there are no major fault lines in vicinity of Peterborough. There is no historical record of major damage due to seismic activity in the region. According to the United States Geological Service, the town is likely to experience a magnitude 4.6 quake every 10 years and a magnitude 7 quake every 1,000 years (on the Richter scale).

Structural Characteristics			
Type	**Wood Frame**	**Masonry**	**Pre-Code**
Residential	95%	5%	76%
Commercial	40%	60%	50%
Government	50%	50%	50%

Although seismic activity in Peterborough is considered minimal, a minor earthquake could cause extensive damage to the town and possible loss of life. Many buildings throughout town are quite old, lacking the necessary design features to withstand significant seismic activity. Smaller structures, including most residential buildings, consist primarily of wood-frame construction. Larger buildings in town are typically made of brick and stone with varying degrees of reinforcement. About 76% of residential structures and 50% of commercial structures in Peterborough were constructed before the formal adoption of building codes in 1977. Based on these widespread structural characteristics, it is apparent that most buildings in Peterborough are vulnerable to seismic damage. A sizeable earthquake would also damage roads and town utilities, particularly the water system. Extensive damage to roads and utilities would considerably hinder emergency response efforts after such a disaster.

Estimated Loss – Earthquake				
Type	**Total Value (Buildings)**	**10% PE in 50 yr PGA 5.17%**	**5% PE in 50 yr PGA 8.93%**	**2% PE in 50 yr PGA 17.00%**
Residential	$203,911,710	$167,615	$1,328,689	$6,566,365
Commercial	$72,776,850	$101,888	$640,436	$4,657,718
Government	$4,604,389	$5,755	$37,986	$264,752
Total	$281,292,949	$275,264	$2,007,120	$11,488,836

Landslide - Low Risk

From a geological prospective, Peterborough's terrain is quite stable. Although the terrain is hilly in many areas of town, the presence of matured soil compositions and vegetation cover have reduced the effects of erosion. Consequently, the risk for landslides is generally limited to steep slopes with minimal vegetation cover, especially along rivers. One potential problem that has been identified, however, is the presence of old retaining walls throughout town. If one of these walls were to fail, they could damage structures in the immediate vicinity. An area of particular concern is the steep slope along the Contoocook River adjacent to Route 202 / Pine Street. An old stone retaining wall, dating back to the 1890s, supports the base of the slope along the river. Recent evidence suggests that the retaining wall is becoming increasingly unstable, endangering a major roadway (Rt. 202) and several structures located above it. The town is currently evaluating possible solutions to resolve the problem.

While there is a potential risk for the failure of old retaining walls, the extent of this hazard is unknown. A number of factors influence the severity of landslides such as the slope gradient, soil composition, and water content of the ground. To provide a basic estimate of potential losses, the retaining wall adjacent to Route 202 / Pine Street can be used as a model. There are six residential structures within 150 feet of the retaining wall, three of which are small apartment buildings. The estimates below are based on the assumption that the structures would be completely destroyed (worse-case scenario). This assumption is made because of limited data and modeling techniques for this hazard. In actuality, structural damage is likely to be less if such a hazard did occur.

Estimated Loss – Landslide Rt. 202 / Pine St.			
Assets in Hazard Area			**Total Estimated Loss**
Type	**# Buildings**	**# People**	**100% Damage**
Residential	6	55	$2,724,400
Total	6	55	$2,724,400

Subsidence - Medium Risk

The risk for natural subsidence is considered low in Peterborough based on soil composition and water features. There is a small potential risk for subsidence, however, over the two aquifers that have supplied the town with water since 1953: the North and South Aquifers. At present, a number of residential buildings are located over the aquifers, but there have been no documented cases of structural damage due to subsidence. A more pertinent danger in Peterborough is the presence of old, man-made subterranean structures beneath populated areas of the town, particularly the downtown area. An old canal system running below the center of town has been a primary concern due to its critical location and considerable deterioration. The town conducted an investigation of the canal system in 2002 and made several key improvements to reinforce the canal. The condition of the underground structure continues to be monitored.

A potential loss estimate for natural subsidence is not practical because there is no record of cost for this hazard. A basic analysis, however, is possible for the underground canal in the center of town because its general location and condition is known. Although it is highly unlikely the entire canal would collapse, the assessment below makes this assumption. Overall, there is approximately $2,724,400 of buildings and contents located over the underground canal. This represents the maximum potential damage caused by a future collapse.

Estimated Loss – Collapse of Downtown Canal			
Assets in Hazard Area			Total Estimated Loss
Type	# Buildings	# People	100% Damage
Residential	6	55	$2,724,400
Total	6	55	$2,724,400

Fire - Medium Risk

Fire risk in Peterborough is of two types - wildfire and urban fire, described below:

Wildfire - Medium Risk

While massive wildfires have historically been a Western phenomenon, each year hundreds of acres forests are consumed by fires in New Hampshire. The greatest risk exists in the spring and late summer/early fall. In Peterborough, the reduction of timber harvesting and several destructive storms (e.g. ice storm 1998) have increased the risk for forest fires across the town. This growing risk is further compounded by limited road access to remote forested areas, particularly in the northwest and southeast quadrants of the town. Although the Peterborough Fire Department regulates outdoor fires through permitting, lightening strikes and human activity remain potential causes of wildfires.

Estimating the potential losses that can be attributed to wildfire is difficult because there are a myriad of variables that determine the location and severity of such a hazard. Based on historical information and basic intuition, however, it is estimated that 10 square miles of the town are prone to large wildfires. This represents 26% of the town's total land area of 38 square miles. Population densities in these high-risk areas tend to be low, which implies that the potential for loss of life, structures, and possessions is minimal. If wildfires were to expand outside these areas, however, potential losses would increase significantly.

As mentioned above, a specific area of concern is the immediate area surrounding North Pack Monadnock and Pack Monadnock Mountains along the town's southeastern border. 11 homes are located in this area, which adjoins a state park and a network of conservation land. This region is considered a high-risk area for wildfires because it is a large tract of forested hills and mountains with limited road access. The chart below provides some basic estimates of potential losses resulting from wildfires.

Estimated Loss – Wildfire in North Pack Monadnock / Pack Monadnock Area				
Assets in Hazard Area			Total Estimated Loss	
Type	# Buildings	# People	10% Damage[1]	100% Damage
Residential	11	30	$224,345	$3,365,175
Total	11	30	$224,345	$3,365,175

The first column under "Total Estimated Loss" denotes the potential losses from a large wildfire that is efficiently and effectively contained. More specifically, a significant amount of forested land would be consumed, but fire response teams would be able to protect structures in the area and prevent the fire from spreading into adjacent areas. The second column indicates the potential damage in a worse-case scenario. According to this scenario, all buildings and their contents in the area would be consumed by fire.

Urban Fire - Low Risk

The Greater Downtown area contains a number of wood-construction buildings that could create a risk from spreading fires in a densely-developed area. During the 1938 hurricane most of the downtown did, in fact, burn. Since then, however, much of the reconstruction and new construction of the downtown was brick and mortar. In addition, building codes are in place that addresses fire issues; and the Town has adopted an ordinance that requires all new and substantially-improved construction to install fire sprinklers in the buildings. For these reasons, the threat of urban fire is considered to be small.

[1] Excludes contents because they would likely be unaffected unless the structures were seriously compromised.

Drought - Medium Risk

There have been several documented cases of drought in Peterborough in the past, but the general abundance of water in the town has diminished their effects. During the past century, there have been several documented droughts in New Hampshire, occurring in four different periods: 1929-36, 1939-44, 1947-50, and 1960-69. The typical effects of these dry spells included higher wildfire risk, decreased water supplies, and diminished hydroelectric output. These problems are likely to become more pronounced as population growth continues in Peterborough, further increasing demand for limited water resources. For this reason, the risk of drought is likely to grow in the future.

According to the NH State Hazard Mitigation Plan, Hillsborough County was impacted by the drought event of the 1960s as was the rest of the State. The county hosts significant forestry, agricultural and livestock assets which are negatively impacted by such events.

Since drought poses no direct threat to structures, contents, or human life, a quantitative analysis of the hazard is impractical. It is sufficient to say that a prolonged drought would strain the town's water supplies, which could impact human life.

Extreme Heat - Low Risk

Extreme heat occurs rather infrequently in Peterborough. When extreme heat conditions do exist, however, the potential for loss of life is quite real. The town and its residents are less prepared to deal with extreme heat than their Western and Southern counterparts because it is an infrequent phenomenon. The most vulnerable segments of the population include the young and the elderly. According to recent demographic data, 55% of the town's residents fall into either of these two categories. Prolonged extreme heat can damage roads and bridges Furthermore, extreme heat increases the risk of other hazards occurring, especially drought and wildfire. Better resources and improved awareness in Peterborough have diminished some of the risk associated with extreme heat, but it remains a hazard nonetheless.

There is no potential loss estimate for extreme heat because there is no realistic way to model this hazard in Peterborough. This is due to the lack of historical evidence and the variable nature of this hazard. As noted above, the main threat extreme heat poses to Peterborough is the loss of human life.

Radon Air/Water - Medium Risk

According to the EPA, Peterborough is located in a region that has moderate potential for radon gas. This rating implies that 1.2 to 2.3% of the general population is likely to develop lung cancer due to radon exposure. Although there have been no recorded deaths directly attributed to radon exposure in

Peterborough, it is still an important long-term health risk for the town's population. No quantitative analysis is given for radon because it is a hazard to human health, not physical property. The long-term, invisible nature of this hazard also makes it difficult to predict its effects on human life in Peterborough. It can be surmised that a small percentage of Peterborough's residents will be affected by this contaminate during their lifetimes.

❒ MAN-MADE HAZARDS

HAZMAT Release - High Risk

Peterborough's geographic location and it's economy makes it increasingly vulnerable to HAZMAT release. Many commercial and industrial businesses in town store and use dangerous materials on their premises. Accidental releases of these materials could harm property and life both the immediate site and the neighboring areas. Peterborough is also located at the intersection of two major highways, Route 101 and 202, both of which are used to transport hazardous materials. With the constant threat of vehicle accidents, there is a real potential for the release of hazardous materials along these two roadways.

Fixed Facility - Medium Risk

There are many facilities in town that store hazardous materials, but some pose higher risk to the community than others. The facilities that pose the highest risk include three gas stations and a fuel storage site located in the central area of town. Large quantities of refined petroleum are stored on these locations, all of which are situated on or near the Contoocook River. The release of these hazardous liquids poses two major problems: explosion and contamination. The discharge of gasoline into the river is a critical concern because it feeds the North Aquifer. This aquifer supplies the town with most of its drinking water.

In January 2003, such a hazardous release did occur at one of the gas stations when over 200 gallons of gasoline were accidentally released from a fuel truck. The gasoline leaked onto a nearby roadway, into the municipal drainage system, and down into an old underground canal. A small amount of gasoline eventually reached the Contoocook River, but a quick response prevented any major contamination. As a precaution, several of the town's wells located on the North Aquifer were temporarily shut down. The spill caused no known long-term effects, but it highlights the risk of a fixed facility release in the downtown area.

Determining the potential loss associated with fixed facility releases of hazardous material is difficult because there is no well-developed model for this hazard. If such a spill were to contaminate a major ground water source like the North Aquifer, however, it would have a major impact on the town. For example, the South Aquifer was discovered to be contaminated in 1982 with volatile organic

compounds (VOCs) leaked from a nearby factory. A town well was immediately shut down and a groundwater treatment facility had to be constructed on the site. For the next twenty years, a multi-million dollar clean-up process was implemented to restore the groundwater.

Transportation - Medium Risk

As noted above, two major highways, Route 101 and 202, intersect in the center of Peterborough. On average, daily traffic on Route 101 is 6,683 vehicles and on Route 202 it is 14,053 vehicles. While these statistics do not reveal the exact numbers of hazardous material transports traveling through Peterborough, it can be surmised that a small percentage of daily traffic falls into this category. This hazard is further compounded by the prevalence of water bodies along these two major highways. Consequently, the release of hazardous materials on these roads could potentially affect a much larger through surface and underground waterways.

No numerical analysis is available because there are no known figures available on the type and frequency of hazardous transports passing through Peterborough. As emphasized above, however, cleaning hazardous waste is expensive. According to the Federal Motor Carrier Safety Administration, the average cost for a HAZMAT release accident is about $536,000[2]. The costs are more than doubled if the accident generates a fire. These statistics provide a basic sense of the potential costs associated with a HAZMAT release on a transportation route in Peterborough.

Radiological Release - Medium Risk

Peterborough is vulnerable to both low-scale and large-scale radiological release. Locally, small quantities of radiological material are stored and used in Monadnock Community Hospital for medical purposes. Potentially, these hazardous materials could be released in the vicinity of the hospital or other areas of town, jeopardizing the health of town residents. The town is within fifty miles of the Vermont Yankee Nuclear Power Plant located in southeastern Vermont. According to federal emergency planning, a major radiological release from a nuclear power plant could contaminate water, crops, and livestock within a fifty-mile radius of the plant. A major radiological release would produce many adverse health, environmental, and economic effects and jeopardize the town's future vitality.

No potential loss estimate is provided due to the lack of data for this hazard. Based on past episodes in the United States and other countries, however, it can be assumed that the cost of recovery after a radiological release would be very high.

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[2] *Comparative Risks of Hazardous Materials and Non-Hazardous Materials Truck Shipment Accidents/Incidents*; March 2001

Utility Disruption – High Risk

- **Water and Sewer Systems**

Approximately 60% of all structures in Town are served by the municipal water and sewer system (see Map 3 for a depiction of the area). The sewer system is at risk from disruption of the system or the treatment, which could be caused by loss of electricity, earthquake, or fire. The water system, on the other hand, is made up of three components, each with its own set of hazard risks.

Supply	Storage	Distribution
Contamination of the Aquifer	Earthquake	Accidental Rupture
Drought	Structural Failure	Earthquake
Earthquake	Lightning	Flooding
Loss of Electricity	Vandalism	Age/Corrosion
Disruption of Treatment	Wildfire	
Vandalism	Extreme Heat or Cold	

The two systems combined are valued at nearly $10 million. It is highly unlikely that all components of either system would be destroyed. Losses would primarily be incurred from functional downtime for any businesses that were affected; and the actual cost to the town to repair and/or replace the damaged components. Assuming a 1-5% range of damage, the costs to repair these systems would be approximately $100 – 500,000.

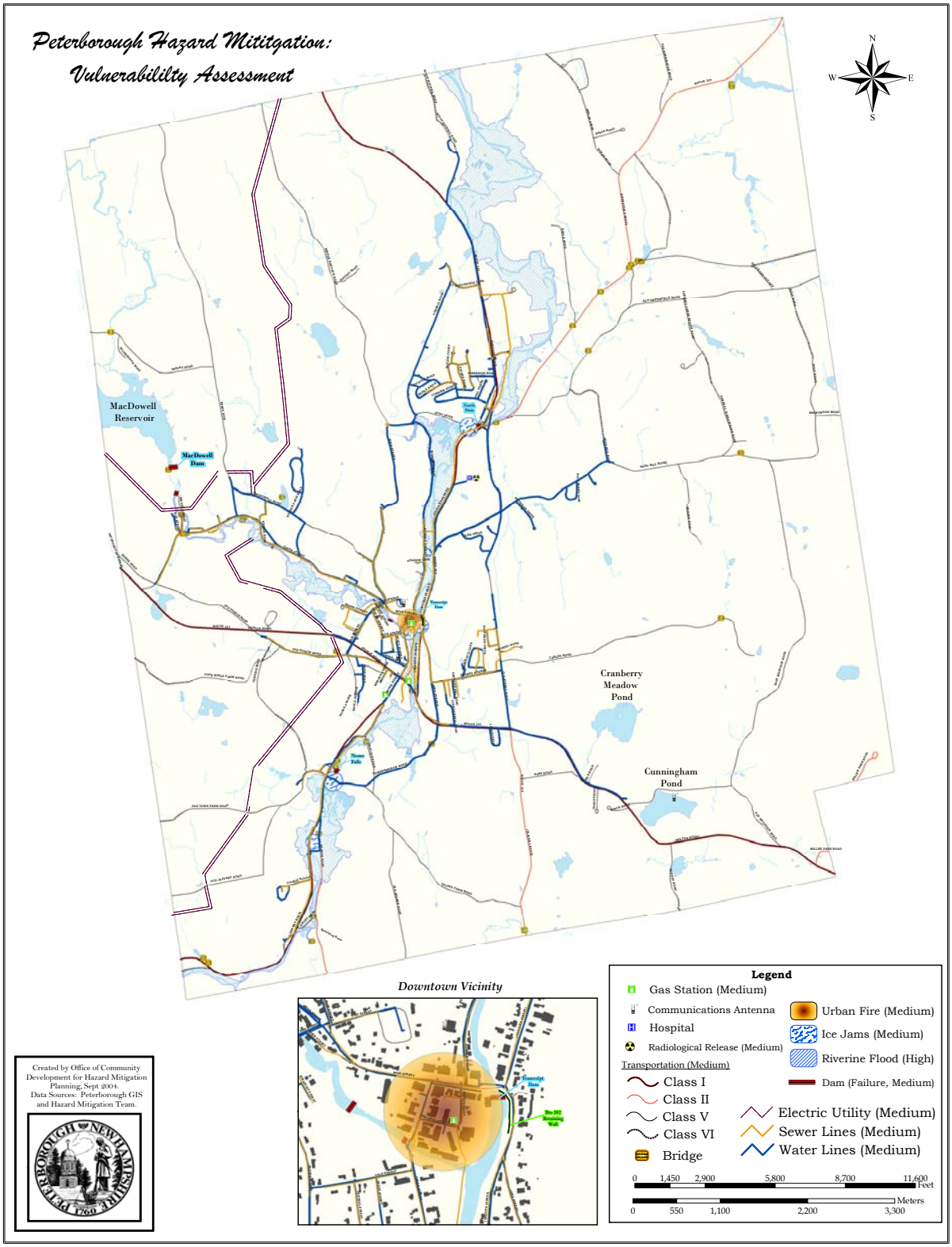
- **Electricity**

It is common in this part of the country to lose electricity during severe weather events – both high winds and rains in the spring and fall, or ice and wind in the winter. The Town has three portable generators; the hospital, nursing homes the schools, and some of the larger business have emergency back-up generators. There would, however, be a loss of function for the smaller businesses in the event of widespread power failure. Most of these businesses are located in the downtown and along Route 202. The functional downtime for these businesses is estimated at $50,000 for each day of downtime.

- **Communications**

The importance of the fire, police and public works personnel being able to communicate during a disaster cannot be underestimated. At this time, however, the communication system in Peterborough is not adequate to allow this. There are large gaps in the network; and not only can the departments not communicate with their own colleagues in certain parts of Town, but they cannot communicate with other departments. It is difficult to place a dollar amount on the damage that might be caused by this failure to communicate.

MAP 3: AREAS OF VULNERABILITY

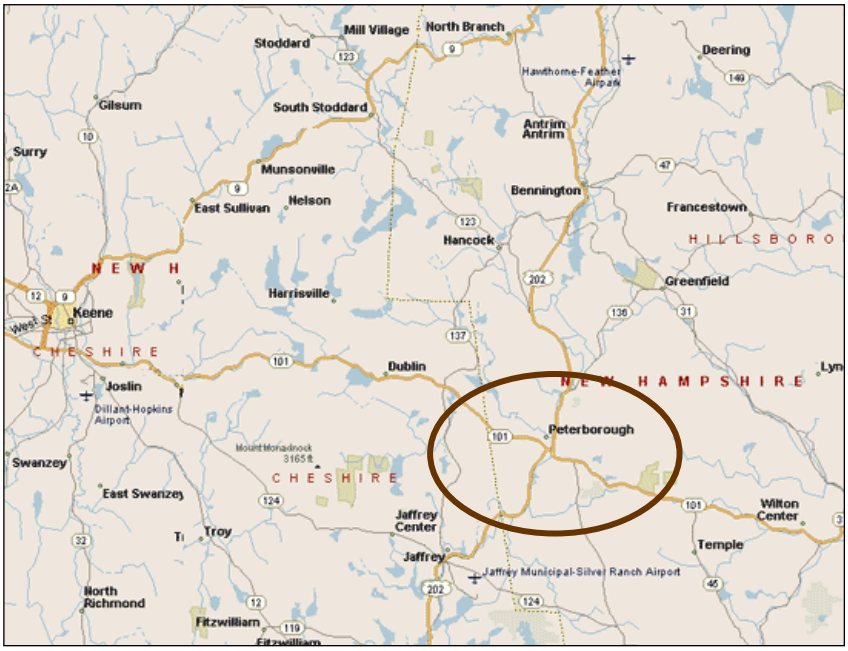


Chapter 5
Development Trends

Community Profile

The Town of Peterborough is located in southwest New Hampshire in what is known as the Monadnock Region. The Town lies on Hillsborough County's western border with Cheshire County. Peterborough is bounded on the north side by Hancock, on the east by Greenfield and Temple, on the south by Sharon (all in Hillsborough County), and on the west by Jaffrey, Dublin and Harrisville (in Cheshire County). As of 2003, the Town was estimated to have a population of 6,086 (according to the NH Office of Energy and Planning), much larger than all its immediate neighbors with the exception of Jaffrey.

The Town of Peterborough comprises 38 square miles of land area and 0.4 square miles of inland water area. The natural form of the town of Peterborough consists of a triangular shaped valley, running and widening in a south to north direction and contained to the west and east by rising topography.



Location Map of Peterborough, NH

Towards Dublin and Jaffrey, elevations rise to approximately 1,000 feet above sea level. Towards Sharon, Temple, and Greenfield, elevations rise to the summit of Pack Monadnock Mountain which is at 2,280 feet above sea level. The dominating topography is, therefore, to the southeast.

The Contoocook River, rising some miles to the south of Peterborough, flows in a northerly direction to Concord and a confluence of the Merrimack River system. The Contoocook approximately bisects the valley base which makes up the entire central portion of the town's geography. Nubanusit Brook, with its sources to the northwest of Peterborough, flows southeasterly to join the

Contoocook River at the narrow southern end of the valley. The confluence of these two systems is the location of Downtown Peterborough in the main village area, the availability and amenity of a major water source obviously being of significance in the original selection and development of the site.

A three-member Board of Selectmen governs the Town of Peterborough. The Town supports a full-time Town Administrator, as well as a full-time Director of Public Works, Police and Fire. Peterborough is fortunate to have a hospital in town – the Monadnock Community Hospital has been in service since 1923.

DEVELOPMENT TRENDS[3]

Historic Development Patterns

Peterborough's development pattern can be described as having four components: (1) highway development along Routes 101 and 202; (2) village nodes; (3) neighborhoods; and (4) frontage development along the town roads. An examination of old town maps indicates that Peterborough always had a dispersed development pattern; this is likely because the Town was divided into lots as soon as the land grant was sold. A 1954 map does not look appreciably different in terms of dispersal than today's land use map.

The first Master Plan, written in 1974, identified five distinct villages or neighborhood areas; by 1992, those had increased to eight. The observation was also made in the 1992 Plan that the distinction between town and country had become blurred, with some areas connected by highway strip development, a type of development not typical of an old-fashioned New England Village.

General Land Use Pattern

Today, the general land use pattern is not appreciably different from that described in 1992. As noted above, some of the village areas are connected by strip development and are not typical of an old fashioned New England village. The remainder of the Town is still predominantly rural, although there are pockets of residential development throughout. The 1992 Master Plan provides a detailed description of these individual areas.

Present Development Pattern

Describes below are the various land uses that exist in Peterborough today. The identification of these uses was based on tax assessing information, aerial photographs, and visual surveys.

[3] The following discussion on land uses in Peterborough is taken from the 1986 and the 2003 Master Plans.

- **RESIDENTIAL**

Residential development in Peterborough is comprised primarily of single-family homes. As the map illustrates, this development is dispersed throughout the entire Town, much of it as frontage development along town roads. In addition, there are clusters of village or neighborhood development. There are several apartment/condominium developments as well.

- **COMMERCIAL**

Commercial activity in Peterborough is, for the most part, located along Route 202 and in the Downtown/Village areas. There are several areas where commercial activity is clustered (outside of the Downtown). One of these is at the intersection of Routes 101 and 202 South to the Monadnock Plaza; another is at Noone Falls; and 202 North has a small cluster of commercial uses in the area north and south of the Contoocook Valley Regional High School.

Professional services comprise the largest percentage of commercial uses in Peterborough, at 20%, followed by retail sales at 15%, and healthcare at 14%. Overall, 473 business establishments have been identified by the Economic Vitality Subcommittee.

- **INDUSTRIAL**

Industrial activity does not comprise a significant portion of developed land uses in Peterborough. There are only six businesses that have been identified as such through the assessing data. They are:

  - Sims Press
  - The Harris Construction Company
  - Carroll Concrete Company
  - The Peterborough Basket Company
  - New Hampshire Ball Bearing

- **PUBLIC/SEMI-PUBLIC/INSTITUTIONAL**

These uses are principally municipal government functions, such as town government offices and facilities; the category also includes churches, cemeteries, post offices, schools, and the library. This does not include town-owned recreational facilities, which are identified separately.

- **RECREATIONAL**

The Town of Peterborough owns three public parks: Putnam Park in the downtown, Teixeria Park in West Peterborough, and Adams Playground on Union Street. Adams Playground is a 50-acre park that provides tennis courts, a swimming pool, basketball courts, baseball and softball fields, a volleyball court, an outdoor ice skating rink, a skateboarding park, a children's playground center, and office space for the Recreation Department. In addition, there is a town beach at Cunningham Pond. And, although outdoor recreation takes place on many other lands all around Town, they are not specifically identified as "recreational," since they fall under the protected lands category or the public lands category.

TABLE 9:
EXISTING LAND USE, 2003
BY ACRE AND PERCENT OF LAND AREA

Land Use	Acres	% of Developed Land Area	% of Total Land Area
Residential	1,681	33%	7%
Commercial	660	13%	3%
Industrial	200	4%	1%
Public/Semi-Public	620	12%	3%
Recreation	1,203	24%	5%
Roads	702	14%	3%
Total Developed	**5,066**		**21%**
Total Land Area	**23,732**		
Vacant	**18,666**		**79%**

SOURCE: TOWN OF PETERBOROUGH MASTER PLAN, 2003

POTENTIAL FOR DEVELOPMENT

Based on the calculations of land area that is committed to a given use, approximately 79%, or more than 18,000 acres of land are available for development in Peterborough. However, in actual practice, this might not be feasible due to zoning restrictions and environmental concerns. In addition to land that has natural or regulatory constraints, there is also land that cannot be developed due to conservation easements or some other form of protection. There are currently over 4,000 acres in Peterborough that fall into this category.

Table 10 illustrates the wetlands and conservation shore lands that are regulated by the zoning ordinance. These sensitive areas cannot be used for development. Steep slopes and floodplains, which are not prohibited from development by town regulations, constitute lands that are generally considered to be sensitive and problematic for development.

Table 10: Constraints to Development

Constraints:	Acres
Wetlands	3,560
Conservation Shoreland	2,561
Total Zoning Constraints	**6,121**
Slopes >25%	91
Floodplain	963
Total Natural Constraints	**1,054**
Total Constraints	**7,175**

In this analysis of development potential, there is one further consideration, and that is land that is already developed and land that is protected from development. When these two variables are added, there remain about 8,400 acres in Town that have no development on them, or are not constrained by zoning or protective easements. Thus, while it appears that 36% of the town still has potential to be developed, it is important to note that nearly half of the land (43%) in Peterborough is either constrained from development through zoning or is permanently protected from development.

One technique used to estimate what level of growth could occur in the future is known as a Build-out Analysis. "Build-out" is a theoretical condition, and it exists when all available land has been developed. The analysis estimates the maximum number of housing units that would exist with full build-out, the population of the Town at that time, and the year when build-out would be complete. There are a number of variables that make up a thorough analysis, most of which are beyond the scope of this document.

However, a simple calculation can be done for illustrative purposes **ONLY**: In the Rural District a lot must have at least 200 feet of frontage and three acres. If we consider only those lots in the Rural District that have twice the required frontage and lot size (and are not protected by conservation easements) we find:

- There are 247 lots in the Rural District that meet the frontage and lot size criteria.
- Of the 247 lots, 174 already have a house on them, leaving 73 lots that are vacant.
- The 247 lots comprise 9,362 acres; the 73 lots comprise 2,600 acres.

Thus, at this time, there are about 70 lots in the Rural District that could be subdivided under the current zoning rules into at least two lots, without factoring in the possibilities of constructing roads or which housing types might be

developed. There are a number of constraints to fulfilling such a hypothetical condition, including employment opportunities, willingness to subdivide and develop, market influences, services available, and other factors relating to regional demographics. It is important to bear in mind that any analysis of this type is highly speculative, and external factors primarily related to the national and regional economies and populations will have a significant influence on development.

In terms of future population, the Office of Energy and Planning estimates that Peterborough will have a population of about 8,000 by the year 2020. This represents a 33% increase in the population over the next 15 years, or about 2% annually. This rate is fairly consistent with the rates of growth experienced by the town over the last 20 years.

Development in Hazard Areas

Many of the hazards identified in this Plan are regional risks and as such, much of any new development would fall into the hazard area. Many of the hazards identified in this plan are regional risks and, as such, much of any new development would fall into the hazard area. The exception to this is flooding, which, as has been noted, is a statewide issue; nonetheless, Peterborough has a history of flooding and it is expected that flooding will continue to pose a threat to the town. However, all new development since 1980 has been reviewed based on its location relative to flood hazard areas. Most of the development in the floodplain is residential, although there is a portion of the downtown commercial district that lies within the flood hazard area. All new and substantial improvements must be constructed in accordance with FEMA regulations. Within the special flood hazard areas there is only moderate potential for new development; most of the land has already been built upon; in addition, there are over 200 acres within the flood hazard areas that are under permanent easement.

National Flood Insurance Program

Peterborough is a participating member of the National Flood Insurance Program. Flood Insurance Rate Maps and the Flood Boundary and Floodway Map, all bearing the effective date of May 1, 1980 are used for flood insurance purposes and are on file at the Office of Community Development. As of November of 2003, the Town had records of 64 residential structures and 96 other structures located within FEMA-designated Special Flood Hazard Areas (SFHA's).

As of this writing, there are 62 NFIP policies. To date there have been two claims for "Repetitive Loss Properties" insured under the NFIP within the Town of Peterborough; one property has claimed three losses, the other two, but none since 1987. Peterborough participates in the Community Rating System, and came into the program at a Class 8, which affords a 10% reduction in flood insurance policies.

CHAPTER 6
EXISTING MITIGATION STRATEGIES

The Hazard Mitigation Committee identified mitigation Strategies that are already in place. These are presented in the following matrix (Table #11), and include activities at the federal, state, and local levels. The identified activities/programs are those that were determined by the Committee to play a role in the reduction of damages and losses in the event of a natural hazard or secondary disaster.

In addition to identifying these strategies, the Committee made determinations as to the effectiveness of each one, and recommended changes or improvements where necessary to improve the effectiveness. The matrix also provides information on the area of town affected by the particular strategy, and the agent(s) responsible for the implementation.

TABLE 11:
EXISTING MITIGATION STRATEGIES

Existing Program or Activity	Description	Area of Town Covered	Responsible Agent(s)	Effectiveness	Improvements or Changes Needed
EMERGENCY OPERATIONS:					
1. Communication between Town Departments	Fire, Police and Public Works cooperate to ensure effective response in emergencies.	Town-wide	Fire Chief/Police Chief/Public Works Director	Medium	Communication towers and radios and cellular telephones are needed.
2. Emergency Back-up Power	The Town has three emergency generators	As Needed	Fire Chief/Police Chief/Public Works Director	Medium	Need for mobile units in a trailer that could be moved to affected sites.
3. Fire Department Training	There is monthly training for all members.	Town-wide	Fire Chief	High	
4. Flood Warning System	Gauges in the Contoocook River @ Noone Falls	Contoocook River Corridor	Police Chief	Medium	Communications between Town and USGS need to be improved
5. NH Public Works Mutual Aid Program	Facilitates cooperation between towns to be able to respond most effectively in the event of an emergency.	Town-wide	Public Works Director	High	
6. Police Department Training	• Police Academy training for non-certified officers • On-going training in various areas	Town-wide	Police Chief	High	

Existing Program or Activity	Description	Area of Town Covered	Responsible Agent(s)	Effectiveness	Improvements or Changes Needed
7. Police Mutual Aid Agreements	Peterborough Police Department has mutual aid agreements with neighboring towns for coverage	Town-wide	Police Chief	Medium	
8. Southwestern NH Fire Mutual Aid	Dispatch center in Keene for fire, rescue & police. Covers southwestern NH and southeastern VT.	Town-wide	Fire Chief	Medium	System at times is overloaded; alarm to Peterborough can be delayed
9. State Police On-line Telecommunication System	Police Department has computer access to the state police database for various issues and events.	Town-wide	Police Chief	Medium	
10. Warning System	Fire Horn @ the Fire Station/Radio & TV Stations/Websites	Town-wide	Emergency Management Director	Medium	Town could improve its internal communication procedures
11. Wastewater Treatment Facility Emergency Response Guide	Describes a set of procedures that defines staff responsibilities and SOP's to be followed in response to emergency situations.	Wastewater Treatment Facility and remote pump stations	Director of Public Works/Utilities Superintendent	Medium	
INFRASTRUCTURE:					
12. Culvert and Storm Drain Maintenance	Maintains systems and identifies areas that need improvement.	Town-wide	Public Works Director	Medium	
13. Dam Maintenance Program	State of NH dam inspection program.	The four town-owned dams	Public Works Director	Medium	Town could improve its own inspection procedures
14. Leak Detection System for Water System	Water audits are taken to monitor water usage	Areas served by Town Water System	Public Works Director	Medium	The Town needs to improve its system of implementation.
15. NH DOT Bridge Inspection Program	The DOT inspects all bridges on a regular basis and issues a report identifying problems	Town-wide	Public Works Director	High	
16. Road and Sidewalk Reconstruction	The Public Works Director maintains a plan for the continued repair and reconstruction of town roads and sidewalks.	Town-wide	Public Works Director/Highway Superintendent	Medium	Continued funding of the plan is necessary to maintain an adequate level of service.

Existing Program or Activity	Description	Area of Town Covered	Responsible Agent(s)	Effectiveness	Improvements or Changes Needed
17. Road and Bridge Construction Standards	Specifies construction standards and materials for all Town roads and bridges; includes storm water management standards.	Town-wide	Public Works Director/Highway Superintendent/Planning Board	High	None at this time. Planning Board has just adopted new standards, based on research and development of model standard by UNH Technology Transfer Center.
18. Snow Removal Policy	Sets forth the order in which town roads will be cleared of snow.	Town-wide	Public Works Director/Highway Superintendent/Selectmen	Medium	
19. Water Supply Vulnerability Assessment	Identifies which components of the water supply system could be vulnerable to vandalism and/or terrorism	Areas served by the Town water system	Public Works Director	Medium	
PLANNING:					
20. Capital Reserve Funds for Large Equipment	Plans for future large expenditures by setting aside money each year. Ensures that necessary equipment will be functional.	Town-wide	Public Works Director	Medium	Needs continual funding to be effective
21. Community Rating System	FEMA/NFIP program that offers reductions is flood insurance rates for town participation in flood mitigation activities	Town-wide	OCD/DPW/Planning Board	Medium	The Town has just come into the Program at a Class 8 level, but should continually strive to maintain and improve the rating.
22. Contingency Emergency Plan for DPW Elm Street Fuel Tanks	Describes the basic procedure to be followed in the event of fuel spills at the DPW Highway Garage	DPW Highway Garage on Elm Street	Director of Public Works/Emergency Management Director/Selectmen/ Town Administrator	High	
23. Emergency Management Plan	Describes the preparation and emergency response required by the Town to react to any type of an emergency situation.	Town-wide	Fire, Police and Public Works Departments /Selectmen/ Town Administrator	High	Needs to be updated.

Existing Program or Activity	Description	Area of Town Covered	Responsible Agent(s)	Effectiveness	Improvements or Changes Needed
24. Emergency Water Management Plan	Describes the procedure to be followed in the event of an emergency situation that would affect the public water supply system.	Water system supply, storage and distribution systems	Public Works Director/Utilities Superintendent/ Selectmen/Town Administrator	High	Needs to be updated
25. Fleet Maintenance	The Town supports full-time mechanics to maintain all Town vehicles, although some major repairs may go to authorized repair facilities.	Town-wide	Public Works Director/High-way Department Supervisor	High	Needs continual funding to be effective
26. Fleet Replacement Program	Town-owned vehicles are replaced on a regular schedule to ensure that they are all in good working order.	Town-wide	Public Works Director/Fire Chief/Police Chief	High	Needs continual funding to be effective
27. Geographic Information System (GIS)	The Town is developing a computerized database that maps all critical facilities, flood plains, municipal water and sewer systems, etc.	Town-wide	Office of Community Development	Medium	Needs funding to be completed, and to be maintained.
28. Master Plan	Contains an inventory of Town-owned lands and buildings, describes existing land use development, and projects future development.	Town-wide	Planning Board/Master Plan Steering Committee	Limited	None at this time. The Planning Board adopted a newly-updated Master Plan in November of 2003. The Selectmen have appointed a permanent Master Plan Steering Committee to oversee the maintenance and continual updating of the Master Plan.
29. Monadnock Community Hospital Evacuation Plan	In the event of an emergency, the hospital patients would be evacuated to South Meadow Middle School	Hospital	Monadnock Community Hospital/ Emergency Management Director	High	
30. School Incident Plan	Sets forth procedures to be followed in the event of an incident; includes procedures for lock-downs as well as evacuations.	Middle School/Elementary School	Superintendent of Schools/ Police Chief/Fire Chief	High	

Existing Program or Activity	Description	Area of Town Covered	Responsible Agent(s)	Effectiveness	Improvements or Changes Needed
31. School Incident Plans	The Police Department has plans for all three schools in Town that set forth police procedures to be followed in the event of an incident.	ConVal/ South Meadow/ Elementary School	Police Chief/ Superintendent of Schools	High	
32. Smallpox Vaccination Plan	Sets forth the procedures to be followed in the event of a smallpox threat	Region-wide	Police Chief/NH Office of Emergency Management/ Health Officer	High	In process. Soon to be completed
33. US COE Flood Emergency Plan					
REGULATORY:					
34. Aquifer Protection District	Protects identified aquifers and drinking water sources.	Aquifer Protection District	Planning Board/Water Resources Committee/Code Enforcement Officer	Medium	Needs updating to reflect new mapping, and to incorporate improved performance standards.
35. Best Management Practices	Various state agencies recommend practices for a variety of land use activities, aimed primarily at mitigating erosion and sedimentation.	Town-wide	Planning Board/Public Works Director/Code Enforcement Officer	Medium	Important to stay aware of the BMP's as they are updated, or new ones put forward.
36. Drinking Water Standards	In accordance with NH DES standards, all new wells must be tested for potable water	Town-wide	Code Enforcement Officer	Medium	
37. Floodplain Protection Ordinance	Manages and regulates development in the floodplain in accordance with NFIP standards and FEMA requirements.	FEMA-designated floodplain areas	Planning Board/Code Enforcement Officer	High	Better mapping would result in more accurate definitions of the special flood hazard areas.
38. Height Restrictions	Zoning Ordinance limits the height of structures based on Fire Department's capacity to fight fires.	Town-wide	Planning Board/Code Enforcement Officer/Fire Chief	Medium	
39. International Building Codes	Sets construction standards for residential and non-residential buildings.	Town-wide	Code Enforcement Officer	High	

Existing Program or Activity	Description	Area of Town Covered	Responsible Agent(s)	Effectiveness	Improvements or Changes Needed
40. Septic System Standards	Requires the location and construction of on-site septic systems to comply with state and local standards to minimize potential damage from flooding or other hazardous events.	Town-wide	Planning Board/Public Works Director/Code Enforcement Officer	Medium	
41. Shoreland Conservation Zone	Restricts development within 100 feet of the shoreland.	Corridors for the Contoocook River, Nubanusit Brook, and all water bodies shown on USGS maps	Planning Board/Conservation Commission/ Water Resources Committee/Code Enforcement Officer	Low	
42. State Fire Code	Sets construction standards related to life safety, fire prevention, fuel and gas.	Town-wide	Fire Chief/Code Enforcement Officer	High	
43. Stormwater Management Regulations	Sets standards for the mitigation of stormwater runoff.	Town-wide	Planning Board/Public Works Director/Code Enforcement Officer	Low	None at this time. The Planning Board has just adopted new standards, based on a report submitted to the Town by an environmental consultant.
44. Wetland Protection District	Designates a buffer area around wetland, within which no development can occur.	Town-wide	Planning Board/Code Enforcement Officer	Low	

CHAPTER 7
RECOMMENDED MITIGATION STRATEGIES

DEVELOPING NEWLY-IDENTIFIED MITIGATION STRATEGIES

In this step of the process, the Committee has identified new mitigation strategies that would complement the existing strategies described in the previous section, and further the goals of this Plan, as spelled out in Chapter 1. In order to identify needed mitigation strategies, the Committee first looked back at the Vulnerability Assessment presented in Table 8, Chapter 4; this exercise identified four primary hazards to which the Town appears to be most vulnerable; they are:

1. Flooding
2. Storms – Winter storms as well as thunderstorms
3. Hazardous Materials Release
4. Utility Disruptions

Next, the Committee reviewed the list of Existing Mitigation Strategies presented in Table 11, Chapter 6. This review indicated that there are 10 of the 44 strategies that needed improvement, seven of which are addressed in this Plan; they are:

1. Communications
2. Emergency Backup Power
3. Flood Warning
4. Dam Integrity
5. Emergency Management Plan
6. Geographic Information System
7. Aquifer Protection

- **Prevention:** Administrative or regulatory actions and processes that influence the way land and buildings are developed and built. These actions also include public activities to reduce hazard losses. Examples include planning and zoning, building codes, capital improvement programs, open space preservation, and storm water management regulations.
- **Property Protection:** Actions that involve the modification of existing buildings or structures to protect them from a hazard, or removal of the structures from the hazard area. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass.
- **Emergency Services:** Actions that protect people and property during and immediately after a disaster or hazard event. Services include warning systems, emergency response services, and protection of critical facilities.
- **Structural Projects:** Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, levees, floodwalls, drainage, seawalls, retaining walls, and safe rooms.
- **Equipment:** Purchase of equipment that aids in the reduction of damages from natural and man-made hazards.

Using this information as guidance, the Committee then began to develop a list of possible strategies; these are presented in Table 12. The types of activities proposed by the Committee are also organized into five categories described in the sidebar.

The non-prioritized items also identify which type of activity the proposed strategy would fall under, what part of town would be affected, and which hazard would be mitigated.

Table 12:
Recommended Mitigation Strategies

Hazard Type	Recommended Mitigation Strategy	Affected Location	Type of Activity
Extreme Weather	1. Establish a Hazardous Tree Removal Program	Town-wide	• Prevention • Property Protection
HazMat Release	2. Install catchment systems at the gasoline stations	Immediate area and the Contoocook River	Prevention
Flooding	3. Improve Flood Warning Communications	Nubanusit Brook and Contoocook River Corridors	Prevention
All	4. Improve Town Communication Systems	Town-wide	Emergency Services
Flooding	5. Repair the North Dam	Contoocook River Corridor	• Prevention • Structural Project
▫ Landslide ▫ Flooding	6. Repair/Reconstruct the Granite Street Retaining Wall	Downtown & Contoocook River downstream	Structural Project
▫ Landslide ▫ Flooding	7. Repair/Reconstruct the Transcript Dam	Downtown & Contoocook River downstream	Structural Project
▫ Subsidence ▫ Hazardous Materials	8. Repair Downtown Canal and re-route the Drainage System	Downtown & Contoocook River downstream	• Structural Project • Prevention
All	9. Set up an Emergency Operations Center	Town-wide	Emergency Services
All	10. Update and maintain the Town's Geographic Information System (GIS)	Town-wide	Prevention
HazMat Release	11. Update the Aquifer Protection Ordinance	Primarily the area along Route 202/Contoocook River Corridor	Prevention
All	12. Update the Town Emergency Management Plan	Town-wide	Prevention

DESCRIPTION OF THE MITIGATION STRATEGIES

During the development of the list above, the Committee recognized that emphasis should be placed on mitigation. It is, however, understood that there is some potential for hazards the town simply cannot plan away – for example, accidents on either of the major highways that might involve the transportation of hazardous materials. For that reason, several of the newly-identified strategies are of an "emergency response" type, rather than of a purely preventative nature.

1. **Hazardous Tree Program:** Every year during spring and winter storms dead and damaged trees pose a risk from breaking and falling. Damage can occur to property and persons, in addition power lines are often affected, which disrupts utilities and communications.

2. **Install Catchment Systems at the Gasoline Stations**: Of the three gasoline stations in town, one is directly adjacent to the Contoocook River, one is over the old canal system in the downtown near the Contoocook River, and the third is located within one thousand feet of the Contoocook River. There is some risk of a gasoline spill from the fueling process, which did happen at the downtown location in January of 2003. Catchment systems on site to capture the materials before they reached the stormwater drainage systems and the River would be an effective mitigation approach.

3. **Telecommunications in Town**: Due to Peterborough's geography, maintaining a seamless communication network for emergency services is very difficult. The Town needs to locate at least one telecommunication tower from which service providers can operate, and all emergency responders need radios and cellular telephones that are connected to this system. This could be accomplished through a public/private partnership, with a private company actually installing the tower.

4. **Flood Warning Communication**: The United States Geological Survey has river gauges on the Contoocook River at Noone Falls. In the event of unusually high water, an alarm is triggered at a facility in Massachusetts. The Town should work with USGS to establish a procedure whereby there is a faster notification to the town, giving more warning of an impending flood. The same applies to flood warnings from the MacDowell Dam, which is managed by the US Army Corps of Engineers.

5. **North Dam:** The North Dam has been inspected by the NH Department of Environmental Services, and has been found to be much deteriorated. In fact, the report notes that more water flows under and through the dam than over it. Should this dam fail, the repercussions would be especially serious for the important wetland behind the dam. Furthermore, two of the Town's wells rely on the reservoir behind the dam for some portion of their capacity. A more detailed structural analysis is needed in order to determine exactly what the nature and extent of the repairs would be.

6. **Granite Street Retaining Wall:** This wall has been the subject of much study and analysis over the past several years. An engineering study prepared for the Town in 2001[4] concluded that the wall was in danger of collapse and that a majority, if not all of the wall should be replaced or reconstructed.

7. **Transcript Dam**: The engineering study of the retaining wall indicated that this dam would be impacted by the failure of the wall. In addition, a detailed study of this dam[5] found that lowering this dam by one to two feet would provide additional flood protection to the downtown and would compensate for the continued urbanization of the Contoocook River watershed.

8. **Downtown Drainage System:** Underneath the downtown still exists part of a canal system that was built in the 1700s to provide water power to a large mill. Over time, this canal has been partly filled and partly covered with reinforced concrete. The most serious risks associated with this canal are that (1) the danger that it will collapse; and (2) that water and other materials that get into the storm drains dump into the canal, and from there straight to the Contoocook River. (The gasoline spill in January of 1998 is an example.) Work needs to be completed on shoring up the weakened portions of the canal. And, the drainage system under the downtown needs to be re-routed away from the canal so that pollutants do not find their way into the River by this route. The Public Works Director proposes funding some of the drainage work at the 2005 Town Meeting; the costs for repairing the canal are not included in this request.

9. **Emergency Operations Center:** Peterborough currently does not have a site that is adequate to serve as an emergency operations center in the event of an incident. Even though the Fire Chief is the Emergency Management Director, the Fire Station does not have the capacity to serve this function. The Police Station, however, does have a room that could serve this purpose. In addition, the Police Station has the SPOTS terminal, a base radio, other computer equipment, and shower facilities. All that is needed to make the room fully functional are approximately six designated telephone lines to provide the necessary communications.

10. **Update GIS:** The Town already supports a basic Geographic Information System, the establishment of which was partly funded through Project Impact. Some detailed flood mapping has been developed, but more data needs to be put into the system in order for it to play a stronger role in hazard mitigation planning. The Department of Public Works relies on the GIS as well, in the mapping of all catchment basins, water and sewer lines, and other components of the public utilities systems. This is labor-intensive work, and some of it must be provided by consultants (for example the

[4] Granite Street Retaining Wall, Existing Conditions Report, SEA, March 200.
[5] Delta Environmental, 2000.

orthophotography). A fully-functioning local database can then be made available to the NH Office of Emergency Management, which can incorporate the Town data into the state database.

11. **Update the Aquifer Protection Ordinance:** The existing ordinance is based on old information – the aquifers have been mapped more accurately since this ordinance was adopted. The local Water Resources Committee has been working on an update to the ordinance, which expands it scope to include protection of all groundwater, and wellhead areas. The Planning Board should put this amendment on the ballot for the March 2005 Town Meeting.

12. **Update Emergency Management Plan:** The Plan was last updated in September of 2000. Much has changed in Town since then, including available resources. This Plan is a critical component in the Town's ability to respond to emergencies.

CHAPTER 8
EVALUATION AND IMPLEMENTATION

After the Committee developed the list of possible mitigation strategies, they then followed a two-step approach to set priorities for the implementation of these strategies:

First, these strategies were ranked using the STAPLEE scoring methodology recommended by FEMA. The evaluation form and the scoring results are presented in Table 13. Questions are asked of each potential mitigation strategy (see the sidebar), and a score is applied, based on how well the strategy answers the questions. A score of "1" for Poor, "2" for Average and "3" for Good is applied to each strategy.

After going through the scoring process for each mitigation strategy, the totals were compared, and ranked from highest to lowest. A score of 36 would be the highest. The 12 mitigation strategies proposed by the Committee ranged from 35 to 27; these are illustrated in Table 13 on the following page.

Does the Action:

- Reduce damage?
- Contribute to community objectives?
- Meet existing regulations?
- Protect historic structures/properties?

Is the Action:

- Socially acceptable?
- Technically feasible?
- Administratively possible?
- Politically acceptable?
- Legally authorized?
- Economically beneficial?
- Environmentally sound?

Table 13:
STAPLEE Evaluation Form

PROPOSED MITIGATION ACTION	Does it reduce disaster damage?	Does it contribute to community objectives?	Does it meet existing regulations?	Will historic structures be saved or protected?	Could it be quickly implemented?	Is it Socially acceptable?	Is it Technically feasible and potentially successful?	Is it Administratively workable?	Is it Politically acceptable?	Is there Legal authority to implement?	Is it Economically beneficial?	Are other Environmental aprovals required?	TOTAL
1. Establish a Hazardous Tree Removal Program	3	3	3	2	3	3	3	3	3	3	3	3	35
2. Install Catchment Systems at the Gasoline Stations	3	3	3	1	2	3	2	2	2	2	3	2	28
3. Improve the Town Communication Systems	3	3	2	1	1	2	3	2	2	3	2	3	27
4. Improve Flood Warning Communications	3	3	3	1	3	3	3	3	3	3	3	3	34
5. Repair the North Dam	3	3	3	1	1	3	3	2	3	3	3	1	29
6. Repair/Reconstruct the Granite Street Retaining Wall	3	3	3	2	1	3	3	2	3	3	3	1	30
7. Repair/Reconstruct the Transcript Dam	3	3	3	1	1	3	3	2	3	3	3	1	29
8. Repair the Downtown Canal and re-route the Drainage System	3	3	3	1	1	3	3	3	3	3	3	3	32
9. Set up an Emergency Operations Center	3	3	3	1	3	3	3	3	3	3	3	3	34
10. Update and Maintain the Town's Geographic Information System	3	3	3	1	2	3	3	3	2	3	3	3	32
11. Update the Aquifer Protection Ordinance	3	3	3	1	3	3	3	3	2	3	3	3	33
12. Update the Emergency Management Plan	3	3	3	1	2	3	3	3	3	3	3	3	33

The rankings shown in Table 14 – Prioritized Implementation Schedule, are intended as guidance for the Town. As explained above, the Hazard Mitigation Committee followed a procedure for scoring and thereby ranking these various activities but, as is well known, circumstances can change that might affect decisions about timing for any of these items. The Committee has made every attempt to develop a Plan that is comprehensive, by considering not just the mitigation strategy, but also who would be responsible for its implementation and how much it would cost. This Plan, combined with the additional information included in the Appendix, should provide guidance for Peterborough's future hazard mitigation efforts.

Table 14:

PRIORITIZED IMPLEMENTATION SCHEDULE

Rank	Mitigation Action	Responsibility/ Oversight	Estimated Cost	Funding/ Support	Timeframe
35	Establish a Hazardous Tree Removal Program	Public Works Director	$10,000 annually	Town Budget/Town Staff	2 years
34	Improve Flood Warning Communication	Police Chief	None	Town	1 year
34	Set Up Emergency Operations Center	▫ Police Department ▫ Emergency Management Director	$5,000	DHS[6] & Town Budget	1 year
33	Update the Aquifer Protection Ordinance	▫ Planning Board ▫ Office of Community Development	None	Office of Community Development	1 year
33	Update the Emergency Management Plan	▫ Emergency Management	Minimal	Fire, Police and Public Works Staff	2 years
32	Repair Downtown Canal Re-route Drainage System	Public Works Director	$150,000	DHS & Town Budget	2-3 years
32	Update GIS	Office of Community Development	$75,000	DHS & Town Budget	2 years
30	Repair/Reconstruct the Granite Street Retaining Wall	Public Works Director	Under Study	DHS & Town Budget	5 years
29	Repair/Reconstruct the North Dam	Public Works Director	$350,000	DHS & Town Budget	4 years
29	Repair/Reconstruct the Transcript Dam	Emergency Management	$750,000	DHS & Town Budget	5-6 years
28	Install Catchment Systems at the Gasoline Stations	Public Works	$75,000	Town Budget	3 years
27	Improve Town Communications System	Public Works	$5,000	Town Budget	2 years

[6] Department of Homeland Security

CHAPTER 9
IMPLEMENTATION, MONITORING & UPDATE

IMPLEMENTATION OF THE PLAN THROUGH EXISTING PROGRAMS

In addition to work by the Hazard Mitigation Committee and town departments, several other mechanisms exist that will ensure the Peterborough Hazard Mitigation Plan receives the attention it requires for satisfactory use. These are described below.

The Town of Peterborough will continually explore funding opportunities to help offset the high costs of several of the identified projects, such as repair/reconstruction of dams and retaining walls. (Appendix C contains a list of all federal grant opportunities related to hazard mitigation.) Several of the projects identified require no funding – rather an effort by the Town to complete the project, which is a cost in terms of staff time, but no actual purchase would be required – for example, the updating of the Emergency Management Plan.

Master Plan

Implementation of the Master Plan has been ongoing since its most recent update and adoption in 2003. Recommendations from the Peterborough Hazard Mitigation Plan will be considered for insertion into future updates of the Master Plan. The Planning Board will consider the Plan as an amendment to its Master Plan. The Peterborough Hazard Mitigation Committee will oversee the process to begin working with the Planning Board to ensure that the Peterborough Hazard Mitigation Plan is adopted as a Chapter of the Master Plan.

Zoning Ordinance and Regulations

Some of the implementation strategies proposed involve revisions to the Subdivision Regulations and/or the Site Plan Review Regulations, for example, updating the Aquifer Protection Ordinance). The Water Resources Committee has already begun the process of updating the Aquifer Protection Ordinance and, in conjunction with the Office of Community Development, has submitted a draft to the Planning Board for consideration on the March 2005 zoning ballot.

Capital Improvements Program

The Town of Peterborough adopts and maintains a Capital Improvements Program (CIP) on an annual basis. This process is overseen by a CIP Committee that meets weekly from early September to early October, after which it presents its budget to the Planning Board and the Budget Committee. Any hazard mitigation strategies identified in this Plan that fall within the scope of the CIP will be included in the Program; several, in fact, already are (e.g. Engineering study for the retaining wall, Culvert and Drainage Maintenance).

Continued Public Involvement

On behalf of the Hazard Mitigation Committee, the Emergency Management Director (EMD), under direction of the Board of Selectmen, will be responsible for ensuring that town departments and the public have adequate opportunity to participate in the planning process. Administrative staff may be utilized to assist with the public involvement process. For the yearly update process, techniques that will be utilized for public involvement include:

- Provide copies of the Hazard Mitigation Plan to Budget Committee members and to all Department Heads.
- Post notices of any meetings of the Hazard Mitigation Committee at the Town House, Library, and local businesses.
- Post flyers of the project at the Town House, Library, and local businesses. And
- Submit newspaper articles for publication to the Peterborough Transcript and the Monadnock Ledger.

Additionally, the public will be invited to participate in the yearly process of updating the Peterborough Hazard Mitigation Plan using pamphlets and other available media outlets. These outreach activities will be undertaken during the Plan's annual review and during any Hazard Mitigation Committee meetings the Board of Selectmen calls to order.

MONITORING & UPDATES

Recognizing that many mitigation projects are ongoing, and that while in the implementation stage communities my suffer budget cuts, experience staff turnover, or projects my fail altogether, a good plan needs to provide for periodic monitoring and evaluation of its successes and failures and allow for updates of the Plan where necessary.

In order to track progress and update the Mitigation Strategies identified in the Action Plan (Chapter 8), it is recommended that the Town revisit the Peterborough *Hazard Mitigation Plan* annually, or after a hazard event. The Emergency Management Director is responsible for initiating this review and needs to consult with members of the Emergency Management Committee identified in the Peterborough Emergency Management Plan completed in 2000. Changes should be made to the Plan to accommodate for projects 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 did not make the implementation list, 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. In keeping with the process of adopting the 2004 Peterborough Hazard Mitigation Plan, a public hearing to receive public comment on Plan maintenance and updating should be held during the annual review period and the final product adopted by the board of Selectmen appropriately.

APPENDICES

APPENDIX A:
TECHNICAL RESOURCES

1) Agencies

New Hampshire Office of Emergency Management (OEM) 271-2231
Hazard Mitigation Section 271-2231

Federal Emergency Management Agency (FEMA) ..... (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 Energy and Community Services 271-2611
New Hampshire Office of State Planning 271-2155

NH Department of Cultural Affairs: 271-2540
Division of Historical Resources 271-3483

NH Department of Environmental Services: 271-3503
Air Resources 271-1370
Waste Management 271-2900
Water Resources 271-3406
Water Supply and Pollution Control 271-3504
Rivers Management and Protection Program 271-1152

NH Office of Energy & Planning (OEP) 271-2155

NH Municipal Association 224-7447

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

Northeast States Emergency Consortium, Inc. (NESEC).....(781) 224-9876

US Department of Commerce:
National Oceanic and Atmospheric Administration:
National Weather Service; Tauton, Massachusetts .....(508) 824-5116

US Department of the Interior:
US Fish and Wildlife Service 225-1411
US Geological Survey 225-4681
US Army Corps of Engineers .....(978) 318-8087

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

2) Mitigation Funding Resources

404 Hazard Mitigation Grant Program (HMGP) .....NH Office of Emergency Management
406 Public Assistance and Hazard Mitigation .....NH Office of Emergency Management
Community Development Block Grant (CDBG).....NH OEM, NH OEP, also refer to RPC
Dam Safety Program..... NH Department of Environmental Services
Disaster Preparedness Improvement Grant (DPIG) .....NH Bureau of Emergency Management
Emergency Generators Program by NESEC‡ .....NH Bureau of Emergency Management
Emergency Watershed Protection (EWP) Program.....USDA, Natural Resources Conservation Service
Flood Mitigation Assistance Program (FMAP).....NH Bureau of Emergency Management
Flood Plain Management Services (FPMS).....US Army Corps of Engineers
Mitigation Assistance Planning (MAP) .....NH Bureau of Emergency Management
Mutual Aid for Public Works ..... NH Municipal Association
National Flood Insurance Program (NFIP) †.....NH Bureau of Emergency Management
Power of Prevention Grant by NESEC‡ .....NH Bureau of Emergency Management
Project Impact.....NH Bureau of Emergency Management
Roadway Repair & Maintenance Program(s) ..... NH Department of Transportation
Section 14 Emergency Stream Bank Erosion & Shoreline Protection …….US Army Corps of Engineers
Section 103 Beach Erosion……...……US Army Corps of Engineers

Section 205 Flood Damage Reduction……..US Army Corps of Engineers
Section 208 Snagging and Clearing.....US Army Corps of Engineers
Shoreline Protection Program…….NH Department of Environmental Services
Various Forest and Lands Program(s)..... NH Department of Resources and Economic Development
Wetlands Programs ..... NH Department of Environmental Services

‡NESEC – Northeast States Emergency Consortium, Inc. is a 501(c)(3), not-for-profit natural disaster, multi-hazard mitigation and emergency management organization located in Wakefield, Massachusetts. Please, contact NH BEM for more information.

† Note regarding **National Flood Insurance Program** (NFIP) and **Community Rating System** (CRS):

The National Flood Insurance Program has developed suggested floodplain management activities for those communities who wish to more thoroughly manage or reduce the impact of flooding in their jurisdiction. Through use of a rating system (CRS rating), a community's floodplain management efforts can be evaluated for effectiveness. The rating, which indicates an above average floodplain management effort, is then factored into the premium cost for flood insurance policies sold in the community. The higher the rating achieved in that community, the greater the reduction in flood insurance premium costs for local property owners. The NH Office of Energy & Planning can provide additional information regarding participation in the NFIP-CRS Program.

3) Websites

Sponsor	Internet Address	Summary of Contents
Natural Hazards Research Center, U. of Colorado	http://www.colorado.edu/litbase/hazards/	Searchable database of references and links to many disaster-related websites.
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.html	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://wwwep.es.llnl.gov/wwwep/ghp.html	General hazard information developed for the Dept. of Energy.
The Tornado Project Online	http://www.tornadoroject.com/	Information on tornadoes, including details of recent impacts.
National Severe Storms Laboratory	http://www.nssl.uoknor.edu/	Information about and tracking of severe storms.
Independent Insurance Agents of America IIAA Natural Disaster Risk Map	http://www.iiaa.iix.com/ndcmap.htm	A multi-disaster risk map.
Earth Satellite Corporation	http://www.earthsat.com/	Flood risk maps searchable by state.
USDA Forest Service Web	http://www.fs.fed.us/land	Information on forest fires and land management.

APPENDIX B:

TECHNICAL AND FINANCIAL ASSISTANCE FOR HAZARD MITIGATION

The Appendix contains supplemental information to this Hazard Mitigation Plan. The intent of this Plan is to provide information about potential disasters, assets at risk, and a means of implementing the actions to help minimize loss to life and property. In addition, the process by which grant and relief money can be obtained and what programs are available to assist the Town and its residents are equally important. When the Hazard Mitigation Plan process is repeated in 2004 and subsequent years, materials used for publicity and meetings are exhibited to lay out the process for future Hazard Mitigation Committees.

Process for Disaster Declaration in Peterborough

There are two phases to a disaster – first response and recovery. The recovery phase, or clean-up efforts, is where the majority of grant funds could be applied for. Having a Hazard Mitigation Plan in place before a disaster occurs, according to the US Disaster Mitigation Act of 2000 and its amendments, is required after November 2004 in order to be eligible to apply for these recovery funds. These grant programs are briefly explained later in this chapter under the **Grant Programs for Disaster Relief** section.

FEMA Information

The Federal Emergency Management Agency (FEMA) has extensive resources related to disaster prevention and disaster recovery on its website at www.fema.gov. The following is an excerpt from their on-line library:

The first response to a disaster is the job of local government's emergency services with help from nearby municipalities, the state and volunteer agencies. In a catastrophic disaster, and if the governor requests, federal resources can be mobilized through the Federal Emergency Management Agency (FEMA) for search and rescue, electrical power, food, water, shelter and other basic human needs.

It is the long-term recovery phase of disaster which places the most severe financial strain on a local or state government. Damage to public facilities and infrastructure, often not insured, can overwhelm even a large city.

A governor's request for a major disaster declaration could mean an infusion of federal funds, but the governor must also commit significant state funds and resources for recovery efforts.

A Major Disaster could result from a hurricane, earthquake, flood, tornado or major fire which the President determines warrants supplemental federal aid. The event must be clearly more than state or local governments can handle alone. If declared, funding comes from the President's Disaster Relief Fund, which is managed by FEMA, and disaster aid programs of other participating federal agencies.

A Presidential Major Disaster Declaration puts into motion long-term federal recovery programs, some of which are matched by state programs, and designed to help disaster victims, businesses and public entities.

An Emergency Declaration is more limited in scope and without the long-term federal recovery programs of a Major Disaster Declaration. Generally, federal assistance and funding are provided to meet a specific emergency need or to help prevent a major disaster from occurring.

The Major Disaster Process

A Major Disaster Declaration usually follows these steps:

- The Local government responds, supplemented by neighboring communities and volunteer agencies. If overwhelmed, turn to the state for assistance;
- The State responds with state resources, such as the National Guard and state agencies;
- Damage assessment by local, state, federal, and volunteer organizations determines losses and recovery needs;
- A Major Disaster Declaration is requested by the governor, based on the damage assessment, and an agreement to commit state funds and resources to the long-term recovery;
- FEMA evaluates the request and recommends action to the White House based on the disaster, the local community and the state's ability to recover;
- The President approves the request or FEMA informs the governor it has been denied. This decision process could take a few hours or several weeks depending on the nature of the disaster.

Disaster Aid Programs

There are two major categories of disaster aid: Individual Assistance is for damage to residences and businesses or personal property losses, and Public Assistance is for repair of infrastructure, public facilities and debris removal.

- ***Individual Assistance***

Immediately after the declaration, disaster workers arrive and set up a central field office to coordinate the recovery effort. A toll-free telephone number is published for use by affected residents and business owners in registering for assistance. Disaster Recovery Centers also are opened where disaster victims can meet with program representatives and obtain information about available aid and the recovery process.

Disaster aid to individuals generally falls into the following categories:

Disaster Housing may be available for up to 18 months, using local resources, for displaced persons whose residences were heavily damaged or destroyed. Funding also can be provided for housing repairs and replacement of damaged items to make homes habitable.

Disaster Grants are available to help meet other serious disaster related needs and necessary expenses not covered by insurance and other aid programs. These may include replacement of personal property, and transportation, medical, dental and funeral expenses.

Low-Interest Disaster Loans are available after a disaster for homeowners and renters from the U.S. Small Business Administration (SBA) to cover uninsured property losses. Loans may be for repair or replacement of homes, automobiles, clothing or other damaged personal property. Loans are also available to businesses for property loss and economic injury.

Other Disaster Aid Programs include crisis counseling, disaster-related unemployment assistance, legal aid and assistance with income tax, Social Security and Veteran's benefits. Other state or local help may also be available.

Assistance Process -- After the application is taken, the damaged property is inspected to verify the loss. If approved, an applicant will soon receive a check for rental assistance or a grant. Loan applications require more information and approval may take several weeks after application. The deadline for most individual assistance programs is 60 days following the President's major disaster declaration.

Audits are done later to ensure that aid went to only those who were eligible and that disaster aid funds were used only for their intended purposes. These federal program funds cannot duplicate assistance provided by other sources such as insurance.

After a major disaster, FEMA tries to notify all disaster victims about the available aid programs and urge them to apply. The news media are encouraged to visit a Disaster Recovery Center, meet with disaster officials, and help publicize the disaster aid programs and the toll-free teleregistration number.

- ***Public Assistance***

Public Assistance is aid to state or local governments to pay part of the costs of rebuilding a community's damaged infrastructure. Generally, public assistance programs pay for 75 per cent of the approved project costs. Public Assistance may include debris removal, emergency protective measures and public services, repair of damaged public property, loans needed by communities for essential government functions and grants for public schools.

- ***Hazard Mitigation***

Disaster victims and public entities are encouraged to avoid the life and property risks of future disasters. Examples include the elevation or relocation of chronically flood damaged homes away from flood hazard areas, retrofitting buildings to make them resistant to earthquakes or strong winds, and adoption and enforcement of adequate codes and standards by local, state and federal government. FEMA encourages and helps fund damage mitigation measures when repairing disaster damaged structures.

For more information, FEMA should be contacted at (617) 223-9540 or at www.fema.gov, or contact the NH Office of Emergency Management at (800) 852-3792 or at www.nhoem.state.nh.us.

Grant Programs for Disaster Relief

Through the NH Office of Emergency Management (NH OEM), the Federal Emergency Management Agency provides funds for assistance to municipalities in the event of a disaster. The programs are described briefly here; some of them may not be currently active. For more details about these funding sources, contact the NH OEM.

- Emergency Management Assistance (EMA)

This proactive funding program requires a 50% match from communities. It supports projects that will improve local emergency management preparedness and response in the following areas: planning, training, drills and exercise, and administration. It is designed to fund projects such as Hazard Mitigation Plans, Emergency Management/Action Plans, and other administrative projects.

- Mitigation Assistance Program (MAP)

This program requires a 25% match (in-kind or cash) and supports planning and implementation activities that reduce long-term hazard vulnerability and risk under the following categories: public awareness and education; mitigation planning and implementation; and preparedness and response planning.

Pre-Disaster Mitigation Program (PDM)

The Pre-Disaster Mitigation (PDM) program provides technical and financial assistance to States and local governments for cost-effective pre-disaster hazard mitigation activities that complement a comprehensive mitigation program, and reduce injuries, loss of life, and damage and destruction of property. FEMA provides grants to States and Federally recognized Indian tribal governments that, in turn, provide sub-grants to local governments (to include Indian Tribal governments) for mitigation activities such as planning and the implementation of projects identified through the evaluation of natural hazards.

Flood Mitigation Assistance Program (FMA)

This program requires a 25% match (half in-kind and half local cash) and awards funds for Planning Grants, Technical Assistance Grants, and Project Grants. A Flood Mitigation Plan must be in place before funds can be sought for Technical Assistance or Projects. This program awards funding for Flood Mitigation Plans, structural enhancements, acquisition of buildings or land, and relocation projects.

Community Development Block Grant (CDBG)

A disaster must be declared to take advantage of this program, which awards emergency funds to cover unmet needs in a community. At least one of three national objectives must be met: the funds must have a direct benefit to low and moderate income persons; or must prevent or eliminate slums and blight in neighborhoods; or must eliminate conditions which threaten the public health and welfare. The NH Office of State Planning administers this program.

Hazard Mitigation Grant Program (HMGP)

A disaster must be declared to take advantage of this program, which is designed to protect public and private property from future disasters. This program typically awards funding for projects that are structural in nature or for the acquisition of buildings or land.

For more information, for a listing of criteria, or to request an application to these or any other grant programs, please contact the NH Office of Emergency Management at (800) 852-3792 or at www.nhoem.state.nh.us.

APPENDIX C: MATRIX OF FEDERAL ALL-HAZARD GRANTS

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. It lists the purpose of the program, amount appropriated for this program in FY 2002 and 2003, and the website where additional information can be found.[1]

Agency	Office/ Directorate	Program	Amount (FY 02)	Amount (FY 03)	Purpose	Funding Beneficiaries
Preparedness					**Programs to prepare the Nation to address the consequences of natural and man-made disasters and emergencies.**	
Department of Homeland Security	*Border and Transportation Security Directorate*	State Homeland Security Grant Program www.ojp.usdoj.gov	*See DOJ State Domestic Preparedness Grant Program*	$566.3 million *$39.7 M Planning* *$29.8 M Training* *$99.3 M Exercises* *$397.4 M Equipment*	To provide for the purchase of specialized equipment to enhance the capability of state and local agencies to prevent and respond to incidents of terrorism involving the use of chemical, biological, radiological, nuclear or explosive (CBRNE) weapons; for the protection of critical infrastructure and prevention of terrorist incidents; for costs related to the design, development, conduct and evaluation of CBRNE exercises; for costs related to the design, development and conduct of a state CBRNE Training Program; and for costs associated with updating and implementing each state's Homeland Security Strategy.	State and local governments; first responders
	Emergency Preparedness and Response Directorate	Emergency Management Performance Grants www.fema.gov	$134 million	$165 million	To provide basic assistance to sustain the nation's emergency management system, build state and local emergency management capability, and serve as the foundation for first responder activities.	States with pass through to local emergency management organizations
	Emergency Preparedness and Response Directorate	Assistance to Firefighters Grant Program www.usfa.fema.gov/grants	$360 million	$750 million	To provide direct assistance to local fire departments in order to support basic levels of capability to protect the health and safety of the public and firefighting personnel against fire and fire-related hazards, and to provide assistance for fire prevention programs	Local Fire Departments

[1] FY03 funding information for some grant programs and cooperative agreements are not yet available.

MATRIX OF FEDERAL ALL-HAZARDS GRANTS

Agency	Office/ Directorate	Program	Amount (FY 02)	Amount (FY 03)	Purpose	Funding Beneficiaries
	Emergency Preparedness and Response Directorate	State and Local Emergency Operations Planning Grants www.fema.gov	$100 million	$0	To provide funding assistance to States and local governments to update their all-hazards Emergency Operations Plans, with an emphasis making sure WMD hazards are covered in the plans.	States with a pass through to local governments
	Emergency Preparedness and Response Directorate	State and Local Emergency Operation Centers (EOCs) www.fema.gov	$56 million	$25 million	To address the most immediate EOC needs nationwide to build state and local capabilities to respond to all-hazards, including acts of terrorism.	States; local governments may be sub-grantees of the State
	Emergency Preparedness and Response Directorate	Citizen Corps www.citizencorps.gov	$4 million	$0	To support the formation of state and local Citizen Corps Councils to help drive local citizen participation by coordinating Citizen Corps programs, developing community action plans, assessing possible threats and identifying local resources to make communities safer, stronger, and better prepared to respond to the threats of terrorism, crime, public health issues, and disasters of all kinds.	States with a pass through to local governments
	Emergency Preparedness and Response Directorate	Community Emergency Response Teams www.fema.gov	$17 million	$18.8 million	To train people in neighborhoods, the workplace, and schools in basic disaster response skills, such as fire suppression, urban search and rescue, and medical operations, and helps them take a more active role in emergency preparedness.	States with pass through to local jurisdictions
	Emergency Preparedness and Response Directorate	National Fire Academy Training Grants www.fema.gov	$1.2 million	$1.2 million	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
	Emergency Preparedness and Response Directorate	Emergency Management Institute Training Assistance www.fema.gov	$1.4 million	$1.4	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

MATRIX OF FEDERAL ALL-HAZARDS GRANTS

Agency	Office/ Directorate	Program	Amount (FY 02)	Amount (FY 03)	Purpose	Funding Beneficiaries
	Emergency Preparedness and Response Directorate	Hazardous Materials Assistance Program (CERCLA Implementation)	$330,000	200,000	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
	Emergency Preparedness and Response Directorate	Interoperable Communications Equipment Grant	$0	$25 million	To facilitate communications interoperability among public safety emergency responders at the state and local level. (This funding is being coordinated with funding provides through COPS.)	N/A
	Emergency Preparedness and Response Directorate	SARA Title III Training Program www.fema.gov	$193,000	$187,000	To make funding available to provide training in support of Tribal governments emergency planning, preparedness, mitigation, response, and recovery capabilities. These programs must provide special emphasis on emergencies associated with hazardous chemicals.	Indian tribal governments
	Emergency Preparedness and Response Directorate	Chemical Stockpile Emergency Preparedness Program www.fema.gov	$64.8 million	$72.1 million	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.
	Emergency Preparedness and Response Directorate	Metropolitan Medical Response System www.mmrs.hhs.gov	*See HHS MMRS Grant*	$50 million	To provide contractual funding to the 122 largest metropolitan jurisdictions to sustain and enhance the integrated medical response plans to a WMD terrorist attack.	Local governments
Department of Justice	*Office of Domestic Preparedness*	State Domestic Preparedness Equipment Support Program www.usdoj.gov	$315.7 million *$301.7 M Equipment* *$14 M Exercises*	*See State Homeland Security Grant Program*	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

MATRIX OF FEDERAL ALL-HAZARDS GRANTS

Agency	Office/ Directorate	Program	Amount (FY 02)	Amount (FY 03)	Purpose	Funding Beneficiaries
	National Institutes of Justice	Domestic Anti-Terrorism Technology Development Program www.usdoj.gov/nij	$47 million	N/A	To support the development of counter terrorism technologies, assist in the development of standards for those technologies, and work with state and local jurisdictions to identify particular areas of vulnerability to terrorist acts and be better prepared to respond if such acts occur.	States and local governments, nonprofit and for profit organizations, universities
	Office of Community Oriented Police Services (COPS)	COPS Interoperable Communications Technology Program www.cops.usdoj.gov	N/A	$19.9 million	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	$242.9 million	$2.3 billion *$514 M Hospital Preparedness* *$940 M Public Health Preparedness*	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
	Health Resources and Services Administration	State Rural Hospital Flexibility Program www.ruralhealth.hrsa.gov	$25 million	$25 million	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
	Health Resources and Services Administration	EMS for Children www.hrsa.gov	$18.9 million	$19.5 million	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

MATRIX OF FEDERAL ALL-HAZARDS GRANTS

Agency	Office/ Directorate	Program	Amount (FY 02)	Amount (FY 03)	Purpose	Funding Beneficiaries
	National Institute of Health	Superfund Hazardous Substances Basic Research and Education www.nih.gov	$25 million	$48.9 million	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
		Metropolitan Medical Response System www.mmrs.hhs.gov	$25 million	*See EP&R MMRS Grant*	To provide contractual funding to the 122 largest metropolitan jurisdictions to sustain and enhance the integrated medical response plans to a WMD terrorist attack.	Local governments
	Centers for Disease Control	Immunization Research, Demonstration, Public Information and Education www.cdc.gov	$9 million	$9 million	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
	Centers for Disease Control	Surveillance of Hazardous Substance Emergency Events www.atsdr.cdc.gov	$1.32 million	$1.84 million	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
	Centers for Disease Control	Human Health Studies, Applied Research and Development www.atsdr.cdc.gov	$1.5 million	$1.8 million	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

MATRIX OF FEDERAL ALL-HAZARDS GRANTS

Agency	Office/ Directorate	Program	Amount (FY 02)	Amount (FY 03)	Purpose	Funding Beneficiaries
Department of Education		School Emergency Response and Crisis Management Plan Discretionary Grant Program www.ed.gov/emergencyplan/	N/A	$30 million	To provide school districts with funds to strengthen and improve current school crisis plans in preparation for emergencies including potential terrorist attacks.	School Districts
Department of Transportation	*Research and Special Programs Administration*	Hazardous Materials Emergency Preparedness Training and Planning Grants www.rspa.dot.gov	$12.8 million	$12.8 million	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.
Response					**Programs to coordinate Federal response efforts and to assists states, localities, and tribes in responding to disasters and emergencies.**	
Department of Homeland Security	*Emergency Preparedness and Response Directorate*	Urban Search and Rescue www.fema.gov	$32.4 million	$60 million	To expand the capabilities of existing Urban Search and Rescue Task Forces.	28 existing US&R Task Forces

MATRIX OF FEDERAL ALL-HAZARDS GRANTS

Agency	Office/ Directorate	Program	Amount (FY 02)	Amount (FY 03)	Purpose	Funding Beneficiaries
		Recovery			**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.**	
Department of Homeland Security	*Emergency Preparedness and Response Directorate*	Individual Assistance	$256 million (as of 4/03 for disasters and emergencies declared in FY02; additional funding expected as assistance is provided; FY01=$1.39 billion as of 4/03)	N/A	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
	Emergency Preparedness and Response Directorate	Public Assistance	$519 million (as of 4/03 for disasters and emergencies declared in FY02; additional funding expected as assistance is provides; FY01=$3.6 billion as of 4/03)	N/A	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

MATRIX OF FEDERAL ALL-HAZARDS GRANTS

Agency	Office/ Directorate	Program	Amount (FY 02)	Amount (FY 03)	Purpose	Funding Beneficiaries
	Emergency Preparedness and Response Directorate	Fire Management Assistance Grant Program	$56 million (as of 4/03; for fires declared in FY02; additional funding is expected as assistance is provided)	N/A	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	*Office of Disaster Assistance*	Disaster Loan Program www.sba.gov/disaster/			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	*Office for Victims of Crime*	Antiterrorism and Emergency Assistance Program www.usdoj.gov	Based on Need of Applicant Community	Based on Need of Applicant Community	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
		Mitigation			**Programs to reduce or eliminate future risk to lives and property from disasters.**	
Department of Homeland Security	*Emergency Preparedness and Response Directorate*	Hazard Mitigation Grant Program	$16.5 million (as of 4/03 for disasters declared in FY02; additional funding expected as assistance is provided; FY01=$319 million as of 4/03)	N/A	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
	Emergency Preparedness and Response Directorate	Pre-Disaster Mitigation Program	$25 million	$150 million	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

MATRIX OF FEDERAL ALL-HAZARDS GRANTS

Agency	Office/ Directorate	Program	Amount (FY 02)	Amount (FY 03)	Purpose	Funding Beneficiaries
	Emergency Preparedness and Response Directorate	Map Modernization	$11 million	$33 million	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
Prevention					**Programs to interdict potentially hazardous events from occurring**	
Department of Health and Human Services	*Centers for Disease Control*	Immunization Grants www.cdc.gov	$350 million (317 Grants) $745 million (VFC Grants)	$403 million (317 Grants) $772.3 million (VFC Grants)	To assist States and communities in establishing and maintaining preventive health service programs to immunize individuals against vaccine-preventable diseases.	States

Appendix D
Documentation of the Planning Process

PETERBOROUGH HAZARD MITIGATION COMMITTEE

MEETING #1

MAY 19, 2004
8:00 A. M.
SELECTMEN'S ROOM OF THE TOWN HOUSE

AGENDA

1. **Introductions and Overview of the Project**

2. **Identification of Past Hazards**

   a. Place the locations of past hazard events on a map

3. **Identification of Critical Facilities**

   a. Place the locations of critical facilities on a map

4. **Set goals for next meeting**

PETERBOROUGH HAZARD MITIGATION COMMITTEE

MEETING #2

JUNE 18, 2004
7:30 A. M
SELECTMEN'S ROOM OF THE TOWN HOUSE

AGENDA

1. **Review work from last meeting – Identification of Past Hazards and Critical Facilities**

2. **Vulnerability Assessment – Use worksheet to:**

    a. Determine what critical facilities are at risk/vulnerable from the hazards identified in the first meeting

    b. Estimate potential losses from hazard events

3. **Set goals for next meeting**

PETERBOROUGH HAZARD MITIGATION COMMITTEE

MEETING #3

JULY 30, 2004
7:30 A.M.

AGENDA

1. **Review Maps**

   - Past Hazards
   - Critical Assets
   - Hazard Vulnerabilities

2. **Discuss Vulnerability Rankings**

3. **Review/Develop Existing Mitigation Strategies**

   a. What are we already doing?

   b. What are the gaps?

4. **Set goals for next meeting**

PETERBOROUGH HAZARD MITIGATION COMMITTEE

MEETING #4

AUGUST 20, 2004
7:30 A.M.
SELECTMEN'S ROOM OF THE TOWN HOUSE

AGENDA

1. **Review work from last meeting**
   a. Vulnerability Assessment

   b. Existing Mitigation Strategies – including gaps in existing programs

2. **Review and Discuss Peterborough Development Patterns**

   a. Review Existing Land Use Map of Peterborough

   b. Review Future Land Use Map of Peterborough and Recommendations from the Master Plan

3. **Set goals for next meeting**

PETERBOROUGH HAZARD MITIGATION COMMITTEE

MEETING #5

SEPTEMBER 7, 2004
12 NOON
OFFICE OF COMMUNITY DEVELOPMENT

AGENDA

1. **Review list of existing mitigation measures / projects**

2. **Begin to develop list of proposed new strategies**

3. **Set goals for next meeting**

PETERBOROUGH HAZARD MITIGATION COMMITTEE

MEETING #6

SEPTEMBER 14, 2004
12 NOON
OFFICE OF COMMUNITY DEVELOPMENT

AGENDA

1. **Finalize list of new mitigation strategies**

2. **Establish an implementation strategy for each new mitigation action defining the following three questions.**

    a. Who will lead the effort?
    b. How will it be implemented? (Technical and financial resources)
    c. When will it take place?

3. **Prepare to present the Plan to the Selectmen**

APPENDIX E
DEFINITIONS OF HAZARD TYPES

Flooding

Floods are defined as a temporary overflow of water onto lands that are not normally covered by water. Flooding results from the overflow of major rivers and tributaries, storm surges, and/or inadequate local drainage. Floods can cause loss of life, property damage, crop/livestock damage, and water supply contamination. Floods can also disrupt travel routes on roads and bridges.

Inland floods are most likely to occur in the spring due to the increase in rainfall and melting of snow; however, floods can occur at any time of year. A sudden thaw in the winter or a major downpour in the summer can cause flooding because there is suddenly a lot of water in one place with nowhere to go.

Hurricanes

A hurricane is a tropical cyclone in which winds reach speeds of 74 miles per hour or more and blow in a large spiral around a relatively calm center. Flooding is often caused from the coastal storm surge of the ocean and torrential rains, both of which accompany the storm. These floods can result in loss of lives and property.

100-year Floodplain Events

Floodplains are usually located in lowlands near rivers, and flood on a regular basis. The term 100-year flood does not mean that a flood will occur once every 100 years. It is a statement of probability that scientists and engineers use to describe how one flood compares to others that are likely to occur. It is more accurate to use the phrase "1% annual chance flood". What it means is that there is a 1% chance of a flood of that size happening in any year.

Erosion and Mudslides

Erosion is the process of wind and water wearing away soil. Typically in New Hampshire, the land along rivers is relatively heavily developed. Mudslides may be formed when a layer of soil atop a slope becomes saturated by significant precipitation and slides along a more cohesive layer of soil or rock.

Erosion and mudslides become significant threats to development during floods. Floods speed up the process of erosion and increase the risk of mudslides.

Rapid Snow Pack Melt

Warm temperatures and heavy rains cause rapid snowmelt. Quickly melting snow coupled with moderate to heavy rains are prime conditions for flooding.

River Ice Jams

Rising waters in early spring often break ice into chunks, which float downstream and often pile up, causing flooding. Small rivers and streams pose special flooding risks because they are easily blocked by jams. Ice in riverbeds and against structures presents significant flooding threats to bridges, roads, and the surrounding lands.

Dam Breach and 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.

Severe Storms

Flooding associated with severe storms can inflict heavy damage to property. Heavy rains during severe storms are a common cause of inland flooding.

Wind

Significantly high winds occur especially during hurricanes, tornadoes, winter storms, and thunderstorms. Falling objects and downed power lines are dangerous risks associated with high winds. In addition, property damage and downed trees are common during high wind occurrences.

Hurricanes

A hurricane is a tropical cyclone in which winds reach speeds of 74 miles per hour or more and blow in a large spiral around a relatively calm center. The eye of the storm is usually 20-30 miles wide and may extend over 400 miles. High winds are a primary cause of hurricane-inflicted loss of life and property damage.

Tornadoes

A tornado is a violent windstorm characterized by a twisting, funnel shaped cloud. They develop when cool air overrides a layer of warm air, causing the warm air to rise rapidly. The atmospheric conditions required for the formation of a tornado include great thermal instability, high humidity, and the convergence of warm, moist air at low levels with cooler, drier air aloft. Most tornadoes remain suspended in the atmosphere, but if they touch down they become a force of destruction. Tornadoes produce the most violent winds on earth, at speeds of 280 mph or more. In addition, tornadoes can travel at a forward speed of up to 70 mph. Damage paths can be in excess of one mile wide and 50 miles long. Violent winds and debris slamming into buildings cause the most structural damage. The Fujita Scale is the standard scale for rating the severity of a tornado as measured by the damage it causes. A tornado is usually accompanied by thunder, lightning, heavy rain, and a loud "freight train" noise. In comparison to a hurricane, a tornado covers a much smaller area but can be more violent and destructive.

Nor'easters

A Nor'easter is defined as 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 impact the coast and inland areas from a northeasterly direction. The sustained winds may meet or exceed hurricane force, with larger bursts, and may exceed hurricane events by many hours (even days) in terms of duration.

Downbursts

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. Downbursts fall into two categories:

• microburst, which covers an area less than 2.5 miles in diameter and

• macroburst, which covers an area at least 2.5 miles in diameter.

Severe Thunderstorms

All thunderstorms contain lightning. During a lightning discharge, the sudden heating of the air causes it to expand rapidly. After the discharge, the air contracts quickly as it cools back to ambient temperatures. This rapid expansion and contraction of the air causes a shock wave that we hear as thunder, a shock wave that can damage building walls and break glass.

Lightning

Lightning is a giant spark of electricity that occurs within the atmosphere or between the atmosphere and the ground. As lightning passes through the air, it heats the air to a temperature of about 50,000 degrees Fahrenheit, considerably hotter than the surface of the sun. Lightning strikes can cause death, injury, and property damage.

Hail

Hailstones are balls of ice that grow as they are held up by winds, known as updrafts that blow upwards in thunderstorms. The updrafts carry droplets of supercooled water - water at a below freezing temperature - but not yet ice. The supercooled water droplets hit the balls of ice and freeze instantly, making the hailstones grow. The faster the updraft, the bigger the stones can grow. 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.

Wildfire

Wildfire is defined as an uncontrolled and rapidly spreading fire.

Forest Fires and Grass Fires

A forest fire is an uncontrolled fire in a woody area. They often occur during drought and when woody debris on the forest floor is readily available to fuel the fire. Grass fires are uncontrolled fires in grassy areas.

Ice & Snow Events

Ice and snow events typically occur during the winter months and can cause loss of life, property damage, and tree damage.

Heavy Snow Storms

A winter storm can range from moderate snow to blizzard conditions. Blizzard conditions are considered blinding, wind-driven snow over 35 mph that lasts several days. A severe winter storm deposits four or more inches of snow during a 12-hour period or six inches of snow during a 24-hour period.

Ice Storms

An ice storm involves rain, which freezes upon impact. Ice coating at least one-fourth inch in thickness is heavy enough to damage trees, overhead wires, and similar objects. Ice storms also often produce widespread power outages.

Nor'easters

A Nor'easter is defined as 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 impact the coast and inland areas from a Northeasterly direction. In the winter months, oftentimes blizzard conditions accompany these events. The added impact of the masses of snow and/or ice upon infrastructure often affects transportation and the delivery of goods and services for extended periods.

Earthquakes/Landslides

Geologic events are often associated with California, but New England is considered a moderate risk earthquake zone.

Earthquake

An earthquake is a rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric and phone lines, and often cause landslides, flash floods, fires, and avalanches. Larger earthquakes usually begin with slight tremors but rapidly take the form of one or

more violent shocks, and end in vibrations of gradually diminishing force called aftershocks. The underground point of origin of an earthquake is called its focus; the point on the surface directly above the focus is the epicenter. The magnitude and intensity of an earthquake is determined by the use of scales such as the Richter scale and Mercalli scale.

Landslide

A landslide is the downward or outward movement of slope-forming materials reacting under the force of gravity including: mudflows, mudslides, debris flows, rockslides, debris avalanches, debris slides, and earth flows. Landslides have damaged or destroyed roads, railroads, pipelines, electrical and telephone lines, mines, oil wells buildings, canals, sewers, bridges, dams, seaports, airports, forests, parks, and farms.

Drought

A drought is defined as a long period of abnormally low precipitation, especially one that adversely affects growing or living conditions. Droughts are rare in New Hampshire. They generally are not as damaging and disruptive as floods and are more difficult to define. The effect of droughts is indicated through measurements of soil moisture, groundwater levels, and streamflow. However, not all of these indicators will be minimal during a drought. For example, frequent minor rainstorms can replenish the soil moisture without raising groundwater levels or increasing streamflow. Low streamflow also correlates with low ground-water levels because ground water discharge to streams and rivers maintains streamflow during extended dry periods. Low streamflow and low ground-water levels commonly cause diminished water supply.

Radon

Radon is a naturally occurring radioactive gas with carcinogenic properties. The gas is a common problem in many states, including New Hampshire. Data collected by the NH Office of Community and Public Health's Bureau of Radiological Health indicates that one third of the houses in New Hampshire have indoor radon levels that exceed the US Environmental Protection Agency's "action level" of four picocuries per liter for at least some portion of the year. Radon may also enter homes dissolved in drinking water from drilled wells. High levels of radon in water from individual drilled wells are a common occurrence in New Hampshire.

APPENDIX F
RESOURCES USED IN THE PREPARATION OF THIS PLAN

- NH OEM's *State of New Hampshire Natural Hazards Mitigation Plan* (9/99)
- SWRPC's *Hazard Mitigation Planning for New Hampshire Communities* (10/02)
- FEMA's *Community Based Hazard Mitigation Planning: Lowering the Risks and Costs of Disasters* (8/98)
- FEMA's *Understanding Your Risks: Identifying Hazards and Estimating Losses,* August 2001
- Town of Peterborough, NH's *Master Plan* (2003 update)
- Town of Peterborough Emergency Management Plan (September 2000)